SUPPLIER CATALOGUES

POSITIVE DISPLACEMENT BLOWER MAIN COMPONENTS

GQB22.23XZ

4000369 - Part II

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S3-PM

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A Technical documentation

A.1 Lists

A.2 Quality and inspection plan

A.3 Drawings/Plans

A.4 Design and Utility Data

B Blower stage / Blower unit

Name	Data
Designation	POSITIVE DISPLACEMENT BLOWER
Type	GQb 22.23 XZ
Number	
Type of manual	*Product documentation*
Manufacturer	Aerzener Maschinenfabrik GmbH

Serial no.

Blower stage	Blower unit	Place of installation
4112784	4114849	Stage 1
4113138	4114541	Stage 1
4113561	4115208	Stage 1
4115273	4115273	Stage 2
4115420	4117027	Stage 2
4115956	4117690	Cooling gas stage

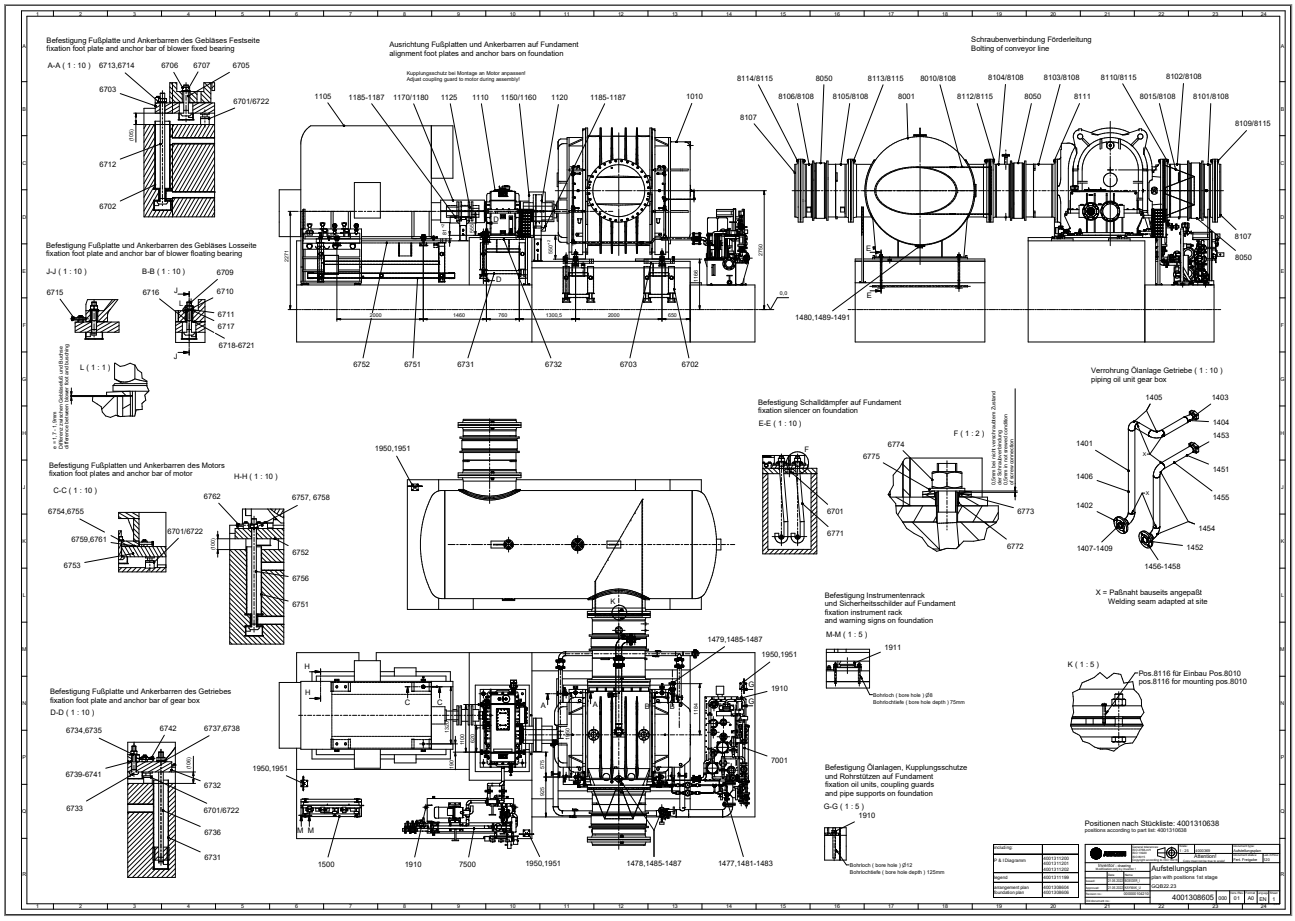
B.1 Technical documentation

B.1.1 Operating manual All stages

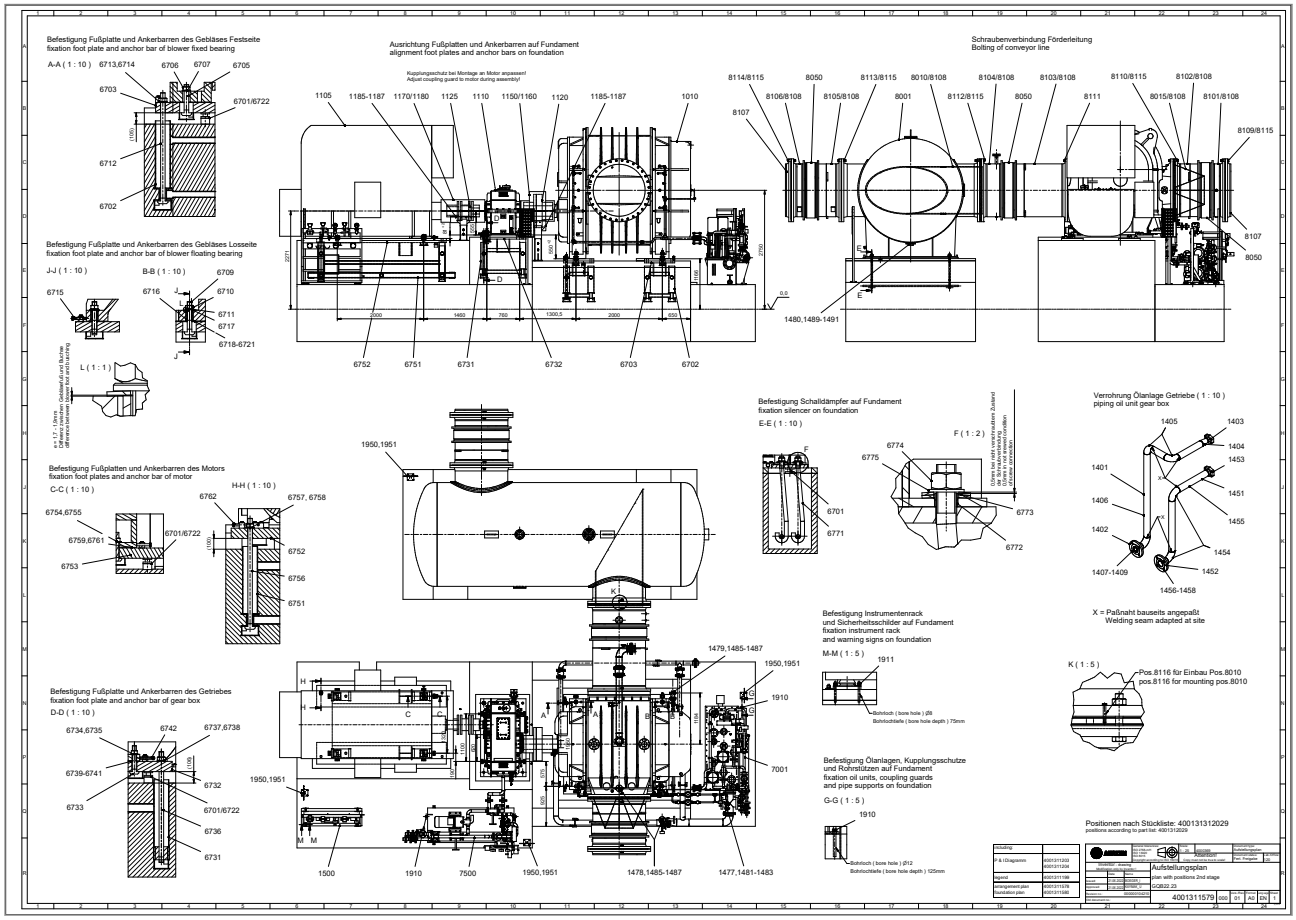
For operating instruction see "Part 1"

B.1.2 Drawings/Plans

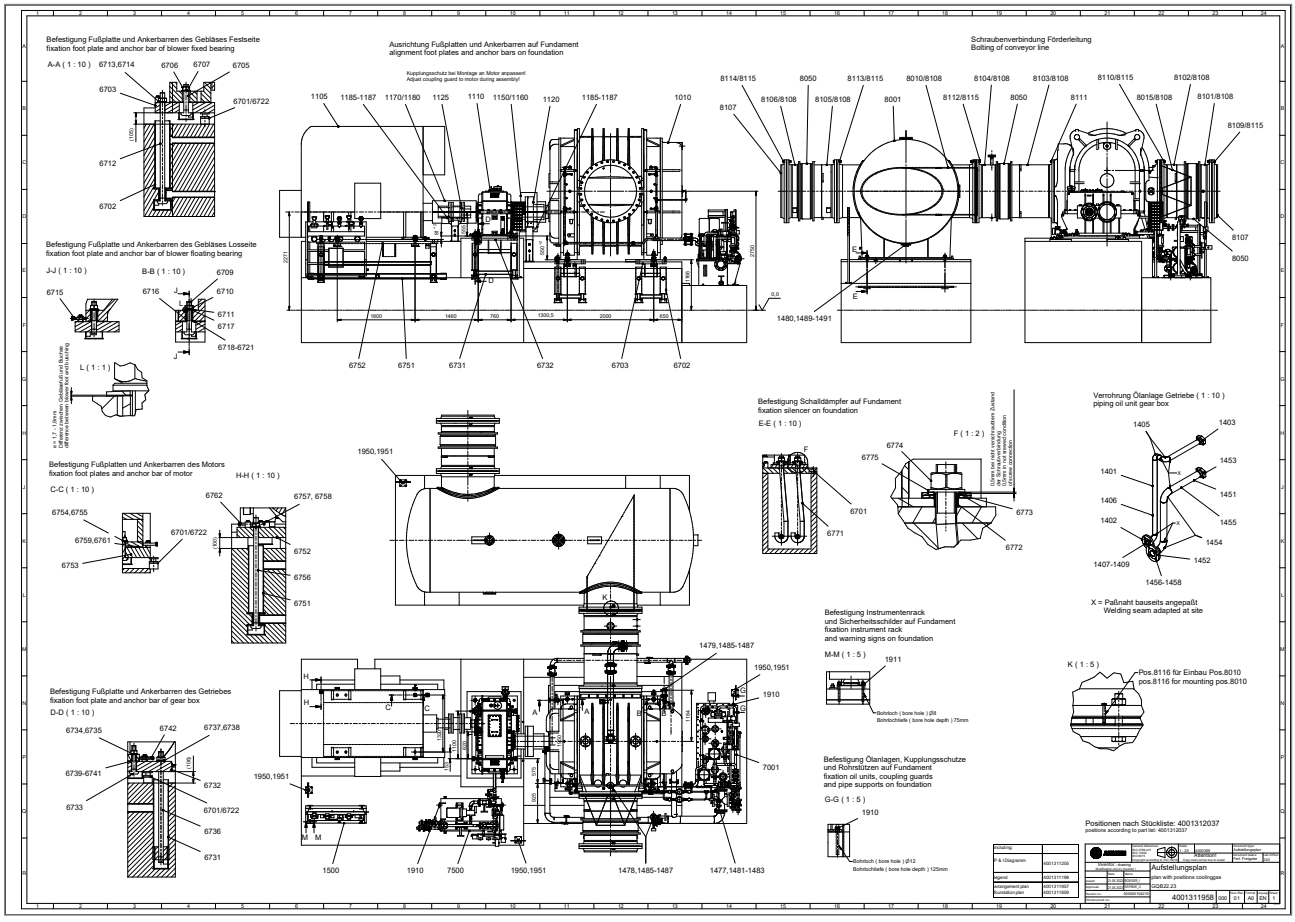
Stage 1



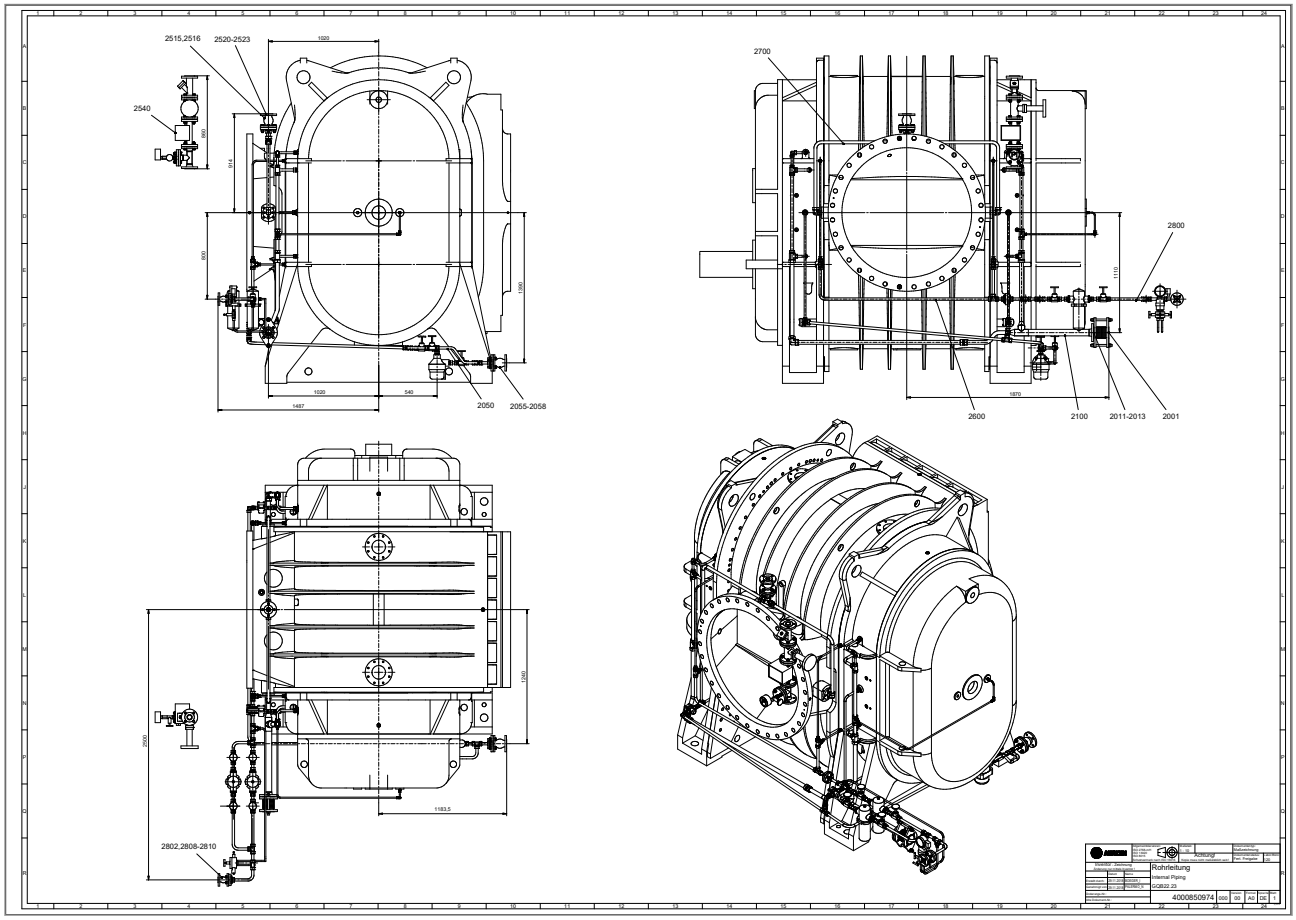
Stage 2

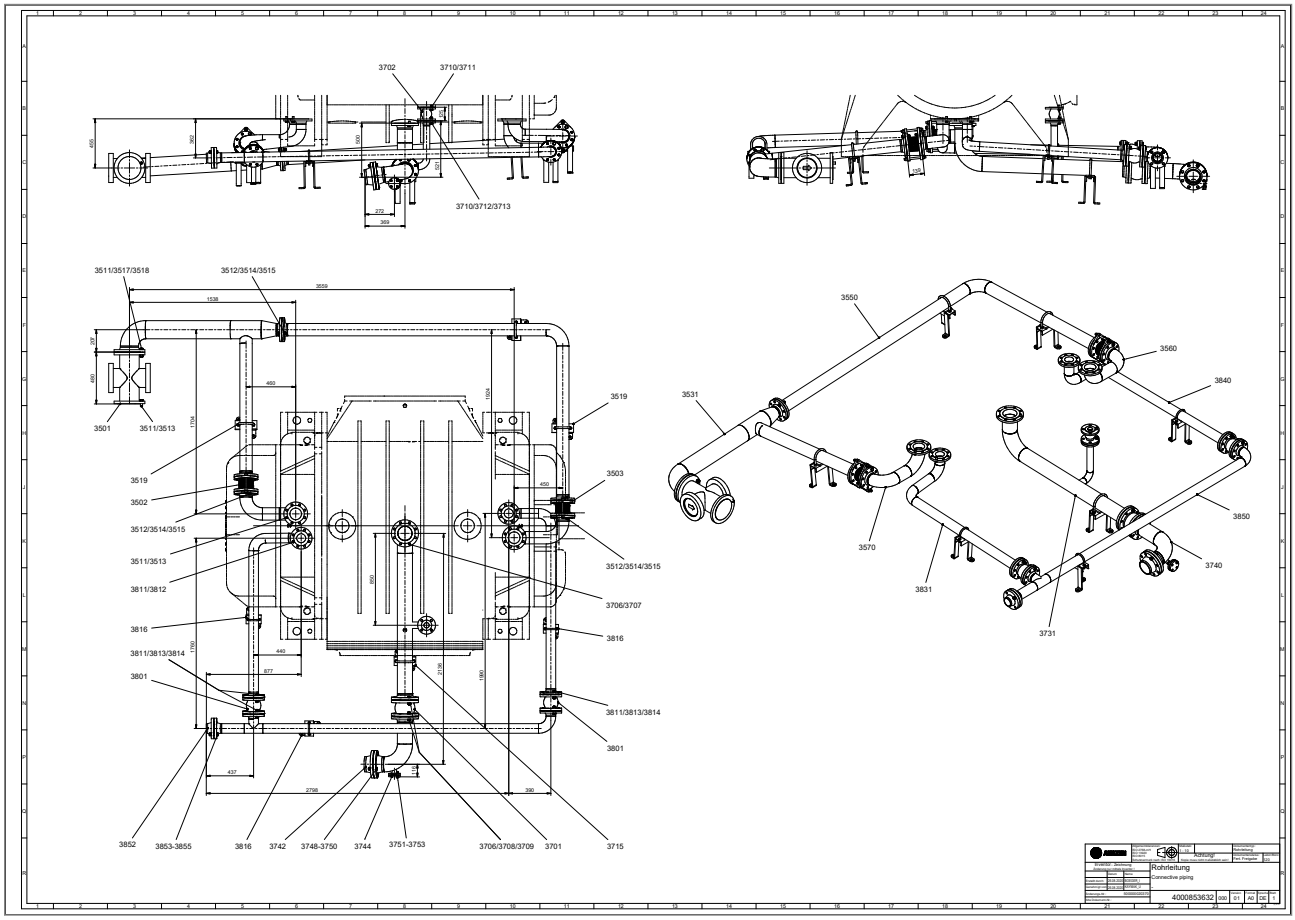


Cooling gas stage


Befestigung Fußplatte und Ankerbarren des Gebläses Festseite
fixation foot plate and anchor bar of blower fixed bearing
A-A (1 : 10)
Ausrichtung Fußplatten und Ankerbarren auf Fundament
alignment foot plates and anchor bars on foundation
Schraubenverbindung Förderleitung
Bolting of conveyor line
Befestigung Fußplatte und Ankerbarren des Gebläses Losseite
fixation foot plate and anchor bar of blower floating bearing
J-J (1 : 10)
B-B (1 : 10)
L (1 : 1)
Befestigung Fußplatten und Ankerbarren des Motors
fixation foot plates and anchor bar of motor
C-C (1 : 10)
H-H (1 : 10)
Befestigung Fußplatte und Ankerbarren des Getriebes
fixation foot plate and anchor bar of gear box
D-D (1 : 10)
Befestigung Schalldämpfer auf Fundament
fixation silencer on foundation
E-E (1 : 10)
F (1 : 2)
Verrohrung Ölanlage Getriebe (1 : 10)
piping oil unit gear box
X = Paßnaht bauseits angepaßt
Welding seam adapted at site
Befestigung Instrumentenrack
und Sicherheitsschilder auf Fundament
fixation instrument rack
and warning signs on foundation
M-M (1 : 5)
Bohrloch (bore hole) Ø8
Bohrlochtiefe (bore hole depth) 75mm
K (1 : 5)
Pos.8116 für Einbau Pos.8010
pos.8116 for mounting pos.8010
Befestigung Ölanlagen, Kupplungsschutze
und Rohrstützen auf Fundament
fixation oil units, coupling guards
and pipe supports on foundation
G-G (1 : 5)
Bohrloch (bore hole) Ø12
Bohrlochtiefe (bore hole depth) 125mm
Positionen nach Stückliste: 4001312037
positions according to part list: 4001312037
Aufstellungsplan
plan with positions coolingges
4001311958

All stages


2515,2516
2520-2523
2540
2700
2800
2050
2055-2058
2600
2100
2011-2013
2001
2802,2808-2810
Rohrleitung
Internal Piping
GGB22.23
4000850974


3702
3710/3711
3710/3712/3713
3511/3517/3518
3512/3514/3515
3501
3511/3513
3519
3502
3503
3706/3707
3816
3811/3812
3811/3813/3814
3801
3852
3853-3855
3742
3748-3750
3744
3751-3753
3706/3708/3709
3701
3715
3550
3560
3840
3531
3850
3740
3570
3831
3731
Rohrleitung
Connective piping
4000853632

B.1.3 Parts list

Stage 1

Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 1st stage**	**4001310638**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311200,4001311201 4001311202,4000851177,4000853632 4001308604,4001308605,4001308606		-	01		
released	Colusso	05.04.2022			4001310601			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
1000			**main components**					
1010		1	blower		GQb 22.23 xz			035232000
1100			**main components arrangement**					
1105		1	motor		VEM DKRES 6340-4WG			Customer
1110		1	gear box		ASR450-R-CCW	Pekrun		2000064788
1120		1	coupling (blower/gear box)		BOKU-N A10.000	KWD	St	2000065320
1125		1	coupling (gear box/motor)		GMK 4.300-6 DE-AA-300	KWD	St	2000065341
1150		1	coupling guard(blower/gear box)			4001310076	Ms	2000067466
1160		1	support for coupling guard			4001310081	St	2000067478
1170		1	coupling guard (gear box/motor)			4001310086	Ms	2000067475
1180		1	support for coupling guard			4001310091	St	2000067479
1185		20	hexagon screw	4 spare parts	M8x30		8.8 A2F	115047000
1186		20	hexagon nut	4 spare parts	M8		8-A2F	115779000
1187		20	wascher	4 spare parts	8	din-en-iso7090	St.zinced	119132000
1250		1	electrical asseccories kit	provided with blower	3RN1010-1CW00			121905000
1251		2	vibration monitoring	provided with blower	PCH 1275/ATEX, Eex			178453000
1252		2	adapter for vibration monitoring	provided with blower	M12/M16		St	179976000
1400			**piping forward oil gear box**	loose delivered and adjusted at mounting				
1401		1	pipe connection					
1402		1	welding neck flange		DN50/PN16/ type11	din-en1092-1	1.4301	2000053696

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 1st stage**	**4001310638**	**4000369**	**GQb22.23xz**		
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released	Colusso	05.04.2022			4001310601			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
1403		1	SAE flange	with O-ring and set of screws	1½" | AFX-106 SMX	ISO 6162	1.4404	2000053697
1404		1	reducing piece		K60,3x2,9 / 48,3x2,6	din-en10253-2	1.4301	2000064520
1405		3	pipe elbow		90-60,3x2,9	din-en10253-2	1.4301	2000053711
1406		2000mm	pipe		60,3x2,9	din-en10220	1.4301	972257000
1407		2	flat gasket	1 spare part	DN50/PN40	din-en1514-1	IFG 5500	159870000
1408		4	hexagon screw		M16x55	din-en-iso4014	5.6-A2F	162068000
1409		4	hexagon nut		M16	din-en-iso4032	5-2 A2F	121529000
1450			**piping return oil gear box**	loose delivered and adjusted at mounting				
1451		1	pipe connection					
1452		1	welding neck flange		DN50/PN16/ type11	din-en1092-1	1.4301	2000053696
1453		1	SAE flange	with O-ring and set of screws	2" | AFX-108 SMX	ISO 6162	1.4404	2000053715
1454		2	pipe elbow		90-60,3x2,9	din-en10253-2	1.4301	2000053711
1455		1500mm	pipe		60,3x2,9	din-en10220	1.4301	972257000
1456		2	flat gasket	1 spare part	DN50/PN40	din-en1514-1	IFG 5500	159870000
1457		4	hexagon screw		M16x55	din-en-iso4014	5.6-A2F	162068000
1458		4	hexagon nut		M16	din-en-iso4032	5-2 A2F	121529000
1475			**counterflanges**	loose delivered				
1477		1	welding neck flange	counter flange TP103	DN20/PN40 type 11	din-en1092-1	1.4541	2000063867
1478		3	welding neck flange	counter flange TP104/107	DN40/PN40 type 11	din-en1092-1	1.4541	2000063868
1479		1	welding neck flange	counter flange TP111	DN40/PN40 type 11	din-en1092-1	1.4541	2000063868

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
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released	Colusso	05.04.2022			4001310601			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
1480		2	welding neck flange	counter flange TP112.1/112.2	DN100/PN16 type 11	din-en1092-1	S235JRG2	2000041656
1481		2	flat gasket		DN20/PN40	din-en1514-1	IFG 5500	179911000
1482		4	hexagon screw		M12 x 50	din-en-iso4014	A2-70	115095000
1483		4	hexagon nut		M12	din-en-iso4032	A2-70	121288000
1485		4	flat gasket		DN40 PN40	din-en1514-1	IFG 5500	121359000
1486		12	hexagon screw		M16 x 65	din-en-iso4014	A2-70	2000059050
1487		12	hexagon nut		M16	din-en-iso4032	A2-70	2000027483
1489		2	flat gasket with inner ring		DN100 PN16	din-en1514-1	IFG 5500	2000026214
1490		8	hexagon screw		M16 x 65	din-en-iso4014	A2-70	2000059050
1491		8	hexagon nut		M16	din-en-iso4032	A2-70	2000027483
1500		1	instrumentation process	see attached P&I		4000346805	ELOG	2000064012
1510		1	emergency switch off feeler				GFK	947880000
1511		1	2/2-way magnetic valve		3/4" NPT			2000031230
1512			heating control	for all heaters in CG				
1900			**fastening**	Loose delivered				
1910		66	straddling dowel	oil units, Coupling gards, pipe supports	M12x115, T fix=10mm	Hilti / HST3-BW		2000043631
1911		15	straddling dowel	instrument rack support warning sign	M8x75, T fix=10mm	Hilti / HST3-BW		2000062145
1950		4	warning signs			4001247059		2000062022
1951		4	support for warning signs			4001438331		2000067220
2000			**Forward oil blower**	Loose delivered				

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released	Colusso	05.04.2022			4001310601			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
2001		1	Lateral expansion joints		RN0050/16/L010/F/ F-139	HKS	1.4541	
2010			**Fastening**	Loose delivered				
2011		2	Flat gasket		DN50 PN16 / Form IBC	din-en1514-1	IFG 5500	
2012		8	Hexagon screw		M16 x 65	din-en-iso4014	A2-70	
2013		8	Hexagon nut		M16	din-en-iso4032	A2-70	
2050			**oil leckage mechanical seal**					
2055		1	rubber expansion joints type A-1	loose delivered	DN40,PN16	STENFLEX	1.4541/NBR	
2056		1	flat gasket		DN40 PN40	din-en1514-1	IFG 5500	
2057		4	hexagon screw		M16 x 65	din-en-iso4014	A2-70	
2058		4	hexagon nut		M16	din-en-iso4032	A2-70	
2100			**piping forward oil blower**					
2350			**piping oil leckage mechanical seal**					
2515			**water injection**	loose delivered				
2516		1	rubber expansion joints type A-1		DN40/PN16	STENFLEX	1.4541/NBR	
2520			**fastening**	loose delivered				
2521		4	hexagon screw		M16 x 65	din-en-iso4014	A2-70	
2522		4	hexagon nut		M16	din-en-iso4032	A2-70	
2523		1	flat gasket		DN40/PN40	din-en1514-1	IFG 5500	
2540		1	**assembly device**	loose delivered				
2600			**piping forward water labyrinth**					

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
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Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
2700			**piping water injection**					
2800			**piping forward water labyrinth with filter**					
2802		1	rubber expansion joints type A-1	loose delivered	DN20/PN40	STENFLEX	1.4541/NBR	
2808		2	flat gasket		DN20/PN40	din-en1514-1	IFG 5500	
2809		8	hexagon screw	for pos.2806+2802	M12 x 50	din-en-iso4014	A2-70	
2810		8	hexagon nut		M12	din-en-iso4032	A2-70	
3500			**return oil blower**	loose delivered				
3501		1	flow indicator		DN150/PN10	VENTEK	EN-GJL	
3502		1	expansion joint		DN100/PN16		HKS	
3503		1	expansion joint		DN100/PN16		HKS	
3510			**fastening**	loose delivered				
3511		3	flat gasket	1 spare part	DN150/PN16	din-en1514-1	IFG 5500	
3512		8	flat gasket	1 spare part	DN100/PN16	din-en1514-2	IFG 5500	
3513		16	hexagon screw		M16x40	din-en -iso4017	5.6-A2F	
3514		40	hexagon screw		M16x65	din-en -iso4015	5.6-A2F	
3515		40	hexagon nut		M16	din-en -iso4032	5-2 A2F	
3516		8	hexagon screw		M20x50	din-en -iso4017	5.6-A2F	
3517		8	hexagon screw		M20x70	din-en -iso4014	5.6-A2F	
3518		8	hexagon nut		M20	din-en -iso4032	5-2 A2F	
3519		3	support for pipe connection		DN100		St	
3530			**return oil blower piping**	loose delivered				

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
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Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
3531		1	pipe connection		DN150/DN100/PN16			
3550		1	pipe connection		DN100/PN16			
3560		1	pipe connection		DN100/PN16			
3570		1	pipe connection		DN100/PN16			
3700			**water return conveying chamber**	loose delivered				
3701		1	flex bellow		DN125/PN16	Stahlflex	stainless steel	
3702		1	flex bellow		DN50/PN40	Stahlflex	stainless steel	
3705			**fastening**	loose delivered				
3706		4	flat gasket	1 spare part	DN125/PN40	din-en1514-2	IFG 5500	
3707		8	hexagon screw		M16x40	din-en-iso4017	5.6-A2F	
3708		16	hexagon screw		M16x70	din-en-iso4015	5.6-A2F	
3709		16	hexagon nut		M16	din-en-iso4032	5-2 A2F	
3710		3	flat gasket	1 spare part	DN50/PN40	din-en1514-1	IFG 5500	
3711		4	hexagon screw		M16x35	din-en-iso4017	5.6-A2F	
3712		4	hexagon screw		M16x55	din-en-iso4014	5.6-A2F	
3713		4	hexagon nut		M16	din-en-iso4032	5-2 A2F	
3715		1	support for pipe connection		DN125		St	
3730			**water return conveying chamber piping**	loose delivered				
3731		1	pipe connection piece		DN125			
3740		1	pipe connection piece		DN125 / 5"			
3742		2	welding neck flange		ANSI 5", 150lbs	ANSI B16,5	1.4301	

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 1st stage**	**4001310638**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311200,4001311201 4001311202,4000851177,4000853632 4001308604,4001308605,4001308606		-	01		
released	Colusso	05.04.2022			4001310601			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
3744		1	blind flange		ANSI 1", 150lbs	ANSI B16,6	1.4302	
3748		2	spiral wound gasket with inner ring	1 spare part	5"	ASME B 16.20	Graphite SS316L	
3749		8	stud bolt		3/4"-10UNC x 5"	ANSI B 16.5	1.4571	
3750		16	hexagon nut		3/4"-10UNC	ANSI B 18.2.2	1.4571	
3751		2	spiral wound gasket with inner ring	1 spare part	1"	ASME B 16.20	Graphite SS316L	
3752		4	stud bolt		1/2"-13UNC x 2,75"	ANSI B 16.5	1.4571	
3753		8	hexagon nut		1/2"-13UNC		1.4571	
3800			**water return side plates**	loose delivered				
3801		2	flex bellow		DN80/PN16	Stahlflex	stainless steel	
3810			**fastening**	loose delivered				
3811		7	flat gasket	1 spare part	DN80/PN40	din-en1514-1	IFG 5500	
3812		16	hexagon screw		M16x40	din-en-iso4013	5.6-A2F	
3813		32	hexagon screw		M16x65	din-en-iso4014	5.6-A2F	
3814		32	hexagon nut		M16	din-en-iso4032	5-2 A2F	
3816		3	support for pipe connection		DN80	2SG-4191	St	
3830			**water return side plates piping**	loose delivered				
3831		1	pipe connection piece		DN80/PN16			
3840		1	pipe connection piece		DN80/PN16			
3850		1	pipe connection piece		DN80/PN16			
3852		2	welding neck flange		ANSI 3", 150lbs	ANSI B16,5	1.4301	

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 1st stage**	**4001310638**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311200,4001311201 4001311202,4000851177,4000853632 4001308604,4001308605,4001308606		-	01		
released	Colusso	05.04.2022			4001310601			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
3853		2	spiral wound gasket with inner ring	1 spare part	3"	ASME B 16.20	Graphite SS316L	
3854		4	stud bolt		5/8"-11UNC x 3 3/4"	ANSI B 16.5	5.6-A2F	
3855		8	hexagon nut		5/8"-11UNC	ANSI B 18.2.2	5-2 A2F	
6700			**mounting on foundation**					
6701		30	jack screw	2 spare parts	KS 4040 C		St	164754000
6702		2	anchor bar blower			4000114679		Customer
6703		2	foot plate blower			4000114685		Customer
6704			**fixed bearing**					
6705		3	tee-head bolt with square neck	1 spare part	M42x260	din7992	5.6-A2F	180003000
6706		3	hexagon nut	1 spare part	M42	din-en-iso4032	5-A2F	179992000
6707		3	disk	1 spare part	42	din-en-iso7090	St,zinced	121926000
6708			**floating bearing**					
6709		3	tee-head bolt with square neck	1 spare part	M42x280	din7992	5.6-A2F	180002000
6710		3	hexagon nut	1 spare part	M42	din-en-iso4032	5-A2F	179992000
6711		3	disk	1 spare part	42	din-en-iso7090	St,zinced	121926000
6712		10	tee-head bolt with square neck	2 spare parts	M42x1000	din7992	5.6-A2F	180001000
6713		20	hexagon nut	4 spare parts	M42	din-en-iso4032	5-A2F	179992000
6714		20	disk	4 spare parts	42	din-en-iso7090	St,zinced	121926000
6715		10	hexagon screw with full dog point	2 spare parts	AM20x120 mit Zapfen		8.8-A2F	122593000
6716		2	bushing for footscrew	blower foot	54x44x115lg.		1.4541	164760000
6717		2	disk spring		90x46x5 Lo=7mm		St	164714000

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 1st stage**	**4001310638**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311200,4001311201 4001311202,4000851177,4000853632 4001308604,4001308605,4001308606		-	01		
released	Colusso	05.04.2022			4001310601			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
6718		2	disk				St	140470001
6719		40	shim		0,25x200x365		S235JR	140495000
6720		20	shim		1,0x200x365		S235JR	140496000
6721		10	shim		2,0x200x365	140489	S235JR	140497000
6722		2	set of shims		(40parts)	4sg-2789	St	878294000
6730			**anchor bar and foot plate for gear box**					
6731		1	anchor bar gear box			4001309871		Customer
6732		1	foot plate gear box			4001309872		Customer
6733		7	tee-head bolt with square neck	1 spare part	M36x240	din7992	5.6-A2F	935130000
6734		7	hexagon nut	1 spare part	M36	din-en-iso4032	5-A2F	119140000
6735		7	disk	1 spare part	36	din-en-iso7090	St,zinced	122945000
6736		5	tee-head bolt with square neck	1 spare part	M42x1000	din7992	5.6-A2F	180001000
6737		10	hexagon nut	2 spare parts	M42	din-en-iso4032	5-A2F	179992000
6738		10	disk	2 spare parts	42	din-en-iso7090	St,zinced	121926000
6739		40	shim		0,25x120x200, Nr.13		S235JR	183080000
6740		20	shim		1,0x120x200, Nr.14		S235JR	183081000
6741		10	shim		2,0x120x200, Nr.15		S235JR	183082000
6742		10	hexagon screw with full dog point	2 spare parts	AM20x120 mit Zapfen	din561	8.8-A2F	122593000
6750			**anchor bar and foot plates for motor**					
6751		1	anchor bar motor			4001309874		Customer

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 1st stage**	**4001310638**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311200,4001311201 4001311202,4000851177,4000853632 4001308604,4001308605,4001308606		-	01		
released	Colusso	05.04.2022			4001310601			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
6752		1	foot plate motor			4001309873		Customer
6753		5	tee-head bolt with square neck	1 spare part	M42x240	din7992	5.6-A2F	2000043618
6754		5	hexagon nut		M42	din-en-iso4032	5-A2F	179992000
6755		5	disk		42	din-en-iso7090	St,zinced	121926000
6756		5	tee-head bolt with square neck		M42x1000	din7992	5.6-A2F	180001000
6757		10	hexagon nut		M42	din-en-iso4032	5-A2F	179992000
6758		10	disk		42	din-en-iso7090	St,zinced	121926000
6759		40	shim		0,25x220x350	4sg-3761	S235JR	878373000
6760		20	shim		1,0x220x350	4sg-3761	S235JR	878374000
6761		10	shim		2,0x220x350	4sg-3761	S235JR	878375000
6762		10	hexagon screw with full dog point	2 spare parts	AM20x120 mit Zapfen	din561	8.8-A2F	122593000
6770			**fixation silenser**					
6771		10	anchor srew	2 spare parts	M36x800	din529, formB		2000043619
6772		9	bolt spacer	1 spare part	Ø42,4xØ38,4x26,8	4000679784		2000043620
6773		20	disk spring	4 spare parts	90x46x5 Lo=7mm		St	164714000
6774		10	hexagon nut	2 spare parts	M36		5-A2F	119140000
6775		10	disk	2 spare parts	36		St,zinced	122945000
7000			**oil units**					
7001		1	oil unit for blower					2000064848
7500		1	oil unit for gear box					2000064862
8000			**component parts conveyor line**					

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 1st stage**	**4001310638**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311200,4001311201 4001311202,4000851177,4000853632 4001308604,4001308605,4001308606		-	01		
released	Colusso	05.04.2022			4001310601			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
8001		1	silencer		DN1200/PN10		customer	2000064641
8010		1	pipe connection piece	diffusor for silencer	DS/DN1200/PN10			2000065300
8015		1	starting strainer		DN1200/PN10		stainless steel	2000042396
8050		3	sliding sleeve		DN1200, Rohr 1220	Building type PS	steel, zinced	2000037401
8100			**piping parts conveyor line**					
8101		1	pipe connection piece		DN1200x400		St	2000065126
8102		1	pipe connection piece		DN1200x650		St	2000065128
8103		1	pipe connection piece		DN1200x754		St	2000065260
8104		1	pipe connection piece		DN1200x580		St	2000065281
8105		1	pipe connection piece		DN1200x650		St	2000065128
8106		1	pipe connection piece		DN1200x400		St	2000065282
8107		2	welding neck flange	counterflange	DN1200/PN10/Typ11	din-en1092-1	P250GH	2000042442
8108		11	flat gasket	1 spare part	DN1200/PN10	din-en1514-2	IFG 5500	2000042443
8109		32	hexagon srew		M36x180	din-en-iso4014	5.6-A2F	2000054936
8110		32	hexagon srew		M36x200	din-en-iso4014	5.6-A2F	174323000
8111		32	hexagon srew		M36x100	din-en-iso4017	5.6-A2F	2000043248
8112		32	hexagon srew		M36x200	din-en-iso4014	5.6-A2F	174323000
8113		32	hexagon srew		M36x150	din-en-iso4014	5.6-A2F	2000043246
8114		32	hexagon srew		M36x180	din-en-iso4014	5.6-A2F	2000054936
8115		160	hexagon nut		M36	din-en-iso4032	5-2 A2F	119140000
8116		3	hexagon srew		M12x80	din-en-iso4017	8.8-A2F	170120000

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 1st stage**	**4001310638**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311200,4001311201 4001311202,4000851177,4000853632 4001308604,4001308605,4001308606		-	01		
released	Colusso	05.04.2022			4001310601			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse

name	date	rev	modification	revision number
Böger	04.06.2022	01	**Pos. 6705 + 6709** exchanged	104210

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Stage 2

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
1000			**main components**					
1010		1	blower		GQb 22.23 xz			035232000
1100			**main components arrangement**					
1105		1	motor		VEM DKRES 6336-4WG			Customer
1110		1	gear box		ASR450-R-CCW	Pekrun		2000064792
1120		1	coupling (blower/gear box)		BOKU-N A10.000	KWD	St	2000065353
1125		1	coupling (gear box/motor)		GMK 4.300-6 DE-AA-300	KWD	St	2000065371
1150		1	coupling guard(blower/gear box)			4001310076	Ms	2000067466
1160		1	support for coupling guard			4001310081	St	2000067478
1170		1	coupling guard (gear box/motor)			4001310086	Ms	2000067475
1180		1	support for coupling guard			4001310091	St	2000067479
1185		20	hexagon screw	4 spare parts	M8x30		8.8 A2F	115047000
1186		20	hexagon nut	4 spare parts	M8		8-A2F	115779000
1187		20	wascher	4 spare parts	8	din-en-iso7090	St,zinced	119132000
1250		1	electrical asseccories kit	provided with blower	3RN1010-1CW00			121905000
1251		2	vibration monitoring	provided with blower	PCH 1275/ATEX, Eex			178453000
1252		2	adapter for vibration monitoring	provided with blower	M12/M16		St	179976000
1400			**piping forward oil gear box**	loose delivered and adjusted at mounting				
1401		1	pipe connection					
1402		1	welding neck flange		DN50/PN16/ type11	din-en1092-1	1.4301	2000053696

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
1403		1	SAE flange	with O-ring and set of screws	1½" | AFX-106 SMX	ISO 6162	1.4404	2000053697
1404		1	reducing piece		K60,3x2,9 / 48,3x2,6	din-en10253-2	1.4301	2000064520
1405		3	pipe elbow		90-60,3x2,9	din-en10253-2	1.4301	2000053711
1406		2000mm	pipe		60,3x2,9	din-en10220	1.4301	972257000
1407		2	flat gasket	1 spare part	DN50/PN40	din-en1514-1	IFG 5500	159870000
1408		4	hexagon screw		M16x55	din-en-iso4014	5.6-A2F	162068000
1409		4	hexagon nut		M16	din-en-iso4032	5-2 A2F	121529000
1450			**piping return oil gear box**	loose delivered and adjusted at mounting				
1451		1	pipe connection					
1452		1	welding neck flange		DN50/PN16/ type11	din-en1092-1	1.4301	2000053696
1453		1	SAE flange	with O-ring and set of screws	2" | AFX-108 SMX	ISO 6162	1.4404	2000053715
1454		2	pipe elbow		90-60,3x2,9	din-en10253-2	1.4301	2000053711
1455		1500mm	pipe		60,3x2,9	din-en10220	1.4301	972257000
1456		2	flat gasket	1 spare part	DN50/PN40	din-en1514-1	IFG 5500	159870000
1457		4	hexagon screw		M16x55	din-en-iso4014	5.6-A2F	162068000
1458		4	hexagon nut		M16	din-en-iso4032	5-2 A2F	121529000
1475			**counterflanges**	loose delivered				
1477		1	welding neck flange	counter flange TP103	DN20/PN40 type 11	din-en1092-1	1.4541	2000063867
1478		3	welding neck flange	counter flange TP104/107	DN40/PN40 type 11	din-en1092-1	1.4541	2000063868
1479		1	welding neck flange	counter flange TP111	DN40/PN40 type 11	din-en1092-1	1.4541	2000063868

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
1480		2	welding neck flange	counter flange TP112.1/112.2	DN100/PN16 type 11	din-en1092-1	S235JRG2	2000041656
1481		2	flat gasket		DN20/PN40	din-en1514-1	IFG 5500	179911000
1482		4	hexagon screw		M12 x 50	din-en-iso4014	A2-70	115095000
1483		4	hexagon nut		M12	din-en-iso4032	A2-70	121288000
1485		4	flat gasket		DN40 PN40	din-en1514-1	IFG 5500	121359000
1486		12	hexagon screw		M16 x 65	din-en-iso4014	A2-70	2000059050
1487		12	hexagon nut		M16	din-en-iso4032	A2-70	2000027483
1489		2	flat gasket with inner ing		DN100 PN16	din-en1514-1	IFG 5500	2000026214
1490		8	hexagon screw		M16 x 65	din-en-iso4014	A2-70	2000059050
1491		8	hexagon nut		M16	din-en-iso4032	A2-70	2000027483
1500		1	instrumentation process	see attached P&I		4000346805	ELOG	2000064012
1510		1	emergency switch off feeler				GFK	947880000
1511		1	2/2-way magnetic valve		3/4" NPT			2000031230
1512			heating control	for all heaters in CG				
1900			**fastening**	Loose delivered				
1910		66	straddling dowel	oil units, Coupling gards, pipe supports	M12x115, T fix=10mm	Hilti / HST3-BW		2000043631
1911		15	straddling dowel	instrument rack support for warning signs	M8x75, T fix=10mm	Hilti / HST3-BW		2000062145
1950		4	warning signs			4001247059		2000062022
1951		4	support for warning signs			4001348331		2000067220
2000			**Forward oil blower**	Loose delivered				

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
2001		1	Lateral expansion joints		RN0050/16/L010/F/ F-139	HKS	1.4541	
2010			**Fastening**	Loose delivered				
2011		2	Flat gasket		DN50 PN16 / Form IBC	din-en1514-1	IFG 5500	
2012		8	Hexagon screw		M16 x 65	din-en-iso4014	A2-70	
2013		8	Hexagon nut		M16	din-en-iso4032	A2-70	
2050			**oil leckage mechanical seal**					
2055		1	rubber expansion joints type A-1	loose delivered	DN40,PN16	STENFLEX	1.4541/NBR	
2056		1	flat gasket		DN40 PN40	din-en1514-1	IFG 5500	
2057		4	hexagon screw		M16 x 65	din-en-iso4014	A2-70	
2058		4	hexagon nut		M16	din-en-iso4032	A2-70	
2100			**piping forward oil blower**					
2350			**piping oil leckage mechanical seal**					
2515			**water injection**	loose delivered				
2516		1	rubber expansion joints type A-1		DN40/PN16	STENFLEX	1.4541/NBR	
2520			**fastening**	loose delivered				
2521		4	hexagon screw		M16 x 65	din-en-iso4014	A2-70	
2522		4	hexagon nut		M16	din-en-iso4032	A2-70	
2523		1	flat gasket		DN40/PN40	din-en1514-1	IFG 5500	
2540		1	**assembly device**	loose delivered				
2600			**piping forward water labyrinth**					

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
2700			**piping water injection**					
2800			**piping forward water labyrinth with filter**					
2802		1	rubber expansion joints type A-1	loose delivered	DN20/PN40	STENFLEX	1.4541/NBR	
2808		2	flat gasket		DN20/PN40	din-en1514-1	IFG 5500	
2809		8	hexagon screw	for pos.2806+2802	M12 x 50	din-en-iso4014	A2-70	
2810		8	hexagon nut		M12	din-en-iso4032	A2-70	
3500			**return oil blower**	loose delivered				
3501		1	flow indicator		DN150/PN10	VENTEK	EN-GJL	
3502		1	expansion joint		DN100/PN16		HKS	
3503		1	expansion joint		DN100/PN16		HKS	
3510			**fastening**	loose delivered				
3511		3	flat gasket	1 spare part	DN150/PN16	din-en1514-1	IFG 5500	
3512		8	flat gasket	1 spare part	DN100/PN16	din-en1514-2	IFG 5500	
3513		16	hexagon screw		M16x40	din-en -iso4017	5.6-A2F	
3514		40	hexagon screw		M16x65	din-en -iso4015	5.6-A2F	
3515		40	hexagon nut		M16	din-en -iso4032	5-2 A2F	
3516		8	hexagon screw		M20x50	din-en -iso4017	5.6-A2F	
3517		8	hexagon screw		M20x70	din-en -iso4014	5.6-A2F	
3518		8	hexagon nut		M20	din-en -iso4032	5-2 A2F	
3519		3	support for pipe connection		DN100		St	
3530			**return oil blower piping**	loose delivered				

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
3531		1	pipe connection		DN150/DN100/PN16			
3550		1	pipe connection		DN100/PN16			
3560		1	pipe connection		DN100/PN16			
3570		1	pipe connection		DN100/PN16			
3700			**water return conveying chamber**	loose delivered				
3701		1	flex bellow		DN125/PN16	Stahlflex	stainless steel	
3702		1	flex bellow		DN50/PN40	Stahlflex	stainless steel	
3705			**fastening**	loose delivered				
3706		4	flat gasket	1 spare part	DN125/PN40	din-en1514-2	IFG 5500	
3707		8	hexagon screw		M16x40	din-en-iso4017	5.6-A2F	
3708		16	hexagon screw		M16x70	din-en-iso4015	5.6-A2F	
3709		16	hexagon nut		M16	din-en-iso4032	5-2 A2F	
3710		3	flat gasket	1 spare part	DN50/PN40	din-en1514-1	IFG 5500	
3711		4	hexagon screw		M16x35	din-en-iso4017	5.6-A2F	
3712		4	hexagon screw		M16x55	din-en-iso4014	5.6-A2F	
3713		4	hexagon nut		M16	din-en-iso4032	5-2 A2F	
3715		1	support for pipe connection		DN125		St	
3730			**water return conveying chamber piping**	loose delivered				
3731		1	pipe connection piece		DN125			
3740		1	pipe connection piece		DN125 / 5"			
3742		2	welding neck flange		ANSI 5", 150lbs	ANSI B16,5	1.4301	

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
3744		1	blind flange		ANSI 1", 150lbs	ANSI B16,6	1.4302	
3748		2	spiral wound gasket with inner ring	1 spare part	5"	ASME B 16.20	Graphite SS316L	
3749		8	stud bolt		3/4"-10UNC x 5"	ANSI B 16.5	1.4571	
3750		16	hexagon nut		3/4"-10UNC	ANSI B 18.2.2	1.4571	
3751		2	spiral wound gasket with inner ring	1 spare part	1"	ASME B 16.20	Graphite SS316L	
3752		4	stud bolt		1/2"-13UNC x 2,75"	ANSI B 16.5	1.4571	
3753		8	hexagon nut		1/2"-13UNC		1.4571	
3800			**water return side plates**	loose delivered				
3801		2	flex bellow		DN80/PN16	Stahlflex	stainless steel	
3810			**fastening**	loose delivered				
3811		7	flat gasket	1 spare part	DN80/PN40	din-en1514-1	IFG 5500	
3812		16	hexagon screw		M16x40	din-en-iso4013	5.6-A2F	
3813		32	hexagon screw		M16x65	din-en-iso4014	5.6-A2F	
3814		32	hexagon nut		M16	din-en-iso4032	5-2 A2F	
3816		3	support for pipe connection		DN80	2SG-4191	St	
3830			**water return side plates piping**	loose delivered				
3831		1	pipe connection piece		DN80/PN16			
3840		1	pipe connection piece		DN80/PN16			
3850		1	pipe connection piece		DN80/PN16			
3852		2	welding neck flange		ANSI 3", 150lbs	ANSI B16,5	1.4301	

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
3853		2	spiral wound gasket with inner ring	1 spare part	3"	ASME B 16.20	Graphite SS316L	
3854		4	stud bolt		5/8"-11UNC x 3 3/4"	ANSI B 16.5	5.6-A2F	
3855		8	hexagon nut		5/8"-11UNC	ANSI B 18.2.2	5-2 A2F	
6700			**mounting on foundation**					
6701		30	jack screw	2 spare parts	KS 4040 C		St	164754000
6702		2	anchor bar blower			4000114679		Customer
6703		2	foot plate blower			4000114685		Customer
6704			**fixed bearing**					
6705		3	tee-head bolt with square neck	1 spare part	M42x260	din7992	5.6-A2F	180003000
6706		3	hexagon nut	1 spare part	M42	din-en-iso4032	5-A2F	179992000
6707		3	disk	1 spare part	42	din-en-iso7090	St,zinced	121926000
6708			**floating bearing**					
6709		3	tee-head bolt with square neck	1 spare part	M42x280	din7992	5.6-A2F	180002000
6710		3	hexagon nut	1 spare part	M42	din-en-iso4032	5-A2F	179992000
6711		3	disk	1 spare part	42	din-en-iso7090	St,zinced	121926000
6712		10	tee-head bolt with square neck	2 spare parts	M42x1000	din7992	5.6-A2F	180001000
6713		20	hexagon nut	4 spare parts	M42	din-en-iso4032	5-A2F	179992000
6714		20	disk	4 spare parts	42	din-en-iso7090	St,zinced	121926000
6715		10	hexagon screw with full dog point	2 spare parts	AM20x120 mit Zapfen		8.8-A2F	122593000
6716		2	bushing for footscrew	blower foot	54x44x115lg.		1.4541	164760000
6717		2	disk spring		90x46x5 Lo=7mm		St	164714000

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
6718		2	disk				St	140470001
6719		40	shim		0,25x200x365		S235JR	140495000
6720		20	shim		1,0x200x365		S235JR	140496000
6721		10	shim		2,0x200x365	140489	S235JR	140497000
6722		2	set of shims		(40parts)	4sg-2789	St	878294000
6730			**anchor bar and foot plate for gear box**					
6731		1	anchor bar gear box			4001311669		Customer
6732		1	foot plate gear box			4001311670		Customer
6733		7	tee-head bolt with square neck	1 spare part	M36x240	din7992	5.6-A2F	935130000
6734		7	hexagon nut	1 spare part	M36	din-en-iso4032	5-A2F	119140000
6735		7	disk	1 spare part	36	din-en-iso7090	St,zinced	122945000
6736		5	tee-head bolt with square neck	1 spare part	M42x1000	din7992	5.6-A2F	180001000
6737		10	hexagon nut	2 spare parts	M42	din-en-iso4032	5-A2F	179992000
6738		10	disk	2 spare parts	42	din-en-iso7090	St,zinced	121926000
6739		40	shim		0,25x120x200, Nr.13		S235JR	183080000
6740		20	shim		1,0x120x200, Nr.14		S235JR	183081000
6741		10	shim		2,0x120x200, Nr.15		S235JR	183082000
6742		10	hexagon screw with full dog point	2 spare parts	AM20x120 mit Zapfen	din561	8.8-A2F	122593000
6750			**anchor bar and foot plates for motor**					
6751		1	anchor bar motor			4001311672		Customer

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
6752		1	foot plate motor			4001311671		Customer
6753		5	tee-head bolt with square neck	1 spare part	M42x240	din7992	5.6-A2F	2000043618
6754		5	hexagon nut		M42	din-en-iso4032	5-A2F	179992000
6755		5	disk		42	din-en-iso7090	St,zinced	121926000
6756		5	tee-head bolt with square neck		M42x1000	din7992	5.6-A2F	180001000
6757		10	hexagon nut		M42	din-en-iso4032	5-A2F	179992000
6758		10	disk		42	din-en-iso7090	St,zinced	121926000
6759		40	shim		0,25x220x350	4sg-3761	S235JR	878373000
6760		20	shim	40	1,0x220x350	4sg-3761	S235JR	878374000
6761		10	shim		2,0x220x350	4sg-3761	S235JR	878375000
6762		10	hexagon screw with full dog point	2 spare parts	AM20x120 mit Zapfen	din561	8.8-A2F	122593000
6770			**fixation silenser**					
6771		10	anchor srew	2 spare parts	M36x800	din529, formB		2000043619
6772		9	bolt spacer	1 spare part	Ø42,4xØ38,4x26,8	4000679784		2000043620
6773		20	disk spring	4 spare parts	90x46x5 Lo=7mm		St	164714000
6774		10	hexagon nut	2 spare parts	M36		5-A2F	119140000
6775		10	disk	2 spare parts	36		St,zinced	122945000
7000			**oil units**					
7001		1	oil unit for blower					2000064848
7500		1	oil unit for gear box					2000064862
8000			**component parts conveyor line**					

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
8001		1	silencer		DN1200/PN10		customer	2000064641
8010		1	pipe connection piece	diffusor for silencer	DS/DN1200/PN10			2000065300
8015		1	starting strainer		DN1200/PN10		stainless steel	2000042396
8050		3	sliding sleeve		DN1200, Rohr 1220	Building type PS	steel, zinced	2000037401
8100			**piping parts conveyor line**					
8101		1	pipe connection piece		DN1200x400		St	2000065126
8102		1	pipe connection piece		DN1200x650		St	2000065128
8103		1	pipe connection piece		DN1200x754		St	2000065273
8104		1	pipe connection piece		DN1200x580		St	2000065281
8105		1	pipe connection piece		DN1200x650		St	2000065128
8106		1	pipe connection piece		DN1200x400		St	2000065282
8107		2	welding neck flange	counterflange	DN1200/PN10/Typ11	din-en1092-1	P250GH	2000042442
8108		11	flat gasket	1 spare part	DN1200/PN10	din-en1514-2	IFG 5500	2000042443
8109		32	hexagon srew		M36x180	din-en-iso4014	5.6-A2F	2000054936
8110		32	hexagon srew		M36x200	din-en-iso4014	5.6-A2F	174323000
8111		32	hexagon srew		M36x100	din-en-iso4017	5.6-A2F	2000043248
8112		32	hexagon srew		M36x200	din-en-iso4014	5.6-A2F	174323000
8113		32	hexagon srew		M36x150	din-en-iso4014	5.6-A2F	2000043246
8114		32	hexagon srew		M36x180	din-en-iso4014	5.6-A2F	2000054936
8115		160	hexagon nut		M36	din-en-iso4032	5-2 A2F	119140000
8116		3	hexagon srew		M12x80	din-en-iso4017	8.8-A2F	170120000

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation 2nd stage**	**4001312029**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311203,4001311204 4000851177,4000853632 4001311578,4001311579,4001311580		-	01		
released	Colusso	05.04.2022			4001312028			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse

name	date	rev	modification	revision number
Böger	04.06.2022	01	**Pos.6705 + 6709** exchanged	104210

Cooling gas stage

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
1000			**main components**					
1010		1	blower		GQb 22.23 xz			035232000
1100			**main components arrangement**					
1105		1	motor		VEM DKRES 6325-4WG			Customer
1110		1	gear box		ASR450-R-CCW	Pekrun		2000064793
1120		1	coupling (blower/gear box)		BOKU-N A10.000	KWD	St	2000065385
1125		1	coupling (gear box/motor)		GMK 4.300-6 DE-AA-300	KWD	St	2000065382
1150		1	coupling guard(blower/gear box)			4001315486	Ms	2000067474
1160		1	support for coupling guard			4001310081	St	2000067478
1170		1	coupling guard (gear box/motor)			4001310086	Ms	2000067475
1180		1	support for coupling guard			4001310091	St	2000067479
1185		20	hexagon screw	4 spare parts	M8x30		8.8 A2F	115047000
1186		20	hexagon nut	4 spare parts	M8		8-A2F	115779000
1187		20	wascher	4 spare parts	8	din-en-iso7090	St,zinced	119132000
1250		1	electrical asseccories kit	provided with blower	3RN1010-1CW00			121905000
1251		2	vibration monitoring	provided with blower	PCH 1275/ATEX, Eex			178453000
1252		2	adapter for vibration monitoring	provided with blower	M12/M16		St	179976000
1400			**piping forward oil gear box**	loose delivered and adjusted at mounting				
1401		1	pipe connection					
1402		1	welding neck flange		DN32/PN16/ type11	din-en1092-1	1.4301	2000053905

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
1403		1	SAE flange	with O-ring and set of screws	1½" | AFX-106 SMX	ISO 6162	1.4404	2000053697
1405		3	pipe elbow		90-42,4x2,6	din-en10253-2	1.4301	2000053909
1406		1500mm	pipe		42,4x2,6	din-en10220	1.4301	2000053912
1407		2	flat gasket	1 spare part	DN32/PN40	din-en1514-1	IFG 5500	159883000
1408		4	hexagon screw		M16x55	din-en-iso4014	5.6-A2F	162068000
1409		4	hexagon nut		M16	din-en-iso4032	5-2 A2F	121529000
1450			**piping return oil gear box**	loose delivered and adjusted at mounting				
1451		1	pipe connection					
1452		1	welding neck flange		DN50/PN16/ type11	din-en1092-1	1.4301	2000053696
1453		1	SAE flange	with O-ring and set of screws	2" | AFX-108 SMX	ISO 6162	1.4404	2000053715
1454		2	pipe elbow		90-60,3x2,9	din-en10253-2	1.4301	2000053711
1455		1500mm	pipe		60,3x2,9	din-en10220	1.4301	972257000
1456		2	flat gasket	1 spare part	DN50/PN40	din-en1514-1	IFG 5500	159870000
1457		4	hexagon screw		M16x55	din-en-iso4014	5.6-A2F	162068000
1458		4	hexagon nut		M16	din-en-iso4032	5-2 A2F	121529000
1475			**counterflanges**	loose delivered				
1477		1	welding neck flange	counter flange TP103	DN20/PN40 type 11	din-en1092-1	1.4541	2000063867
1478		3	welding neck flange	counter flange TP104/107	DN40/PN40 type 11	din-en1092-1	1.4541	2000063868
1479		1	welding neck flange	counter flange TP111	DN40/PN40 type 11	din-en1092-1	1.4541	2000063868

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
1480		2	welding neck flange	counter flange TP112.1/112.2	DN100/PN16 type 11	din-en1092-1	S235JRG2	2000041656
1481		2	flat gasket		DN20/PN40	din-en1514-1	IFG 5500	179911000
1482		4	hexagon screw		M12 x 50	din-en-iso4014	A2-70	115095000
1483		4	hexagon nut		M12	din-en-iso4032	A2-70	121288000
1485		4	flat gasket		DN40 PN40	din-en1514-1	IFG 5500	121359000
1486		12	hexagon screw		M16 x 65	din-en-iso4014	A2-70	2000059050
1487		12	hexagon nut		M16	din-en-iso4032	A2-70	2000027483
1489		2	flat gasket with inner ring		DN100 PN16	din-en1514-1	IFG 5500	2000026214
1490		8	hexagon screw		M16 x 65	din-en-iso4014	A2-70	2000059050
1491		8	hexagon nut		M16	din-en-iso4032	A2-70	2000027483
1500		**1**	**instrumentation process**	see attached P&I		4000346805	ELOG	2000064012
1510		1	emergency switch off feeler				GFK	947880000
1511		1	2/2-way magnetic valve		3/4" NPT			2000031230
1512			heating control	for all heaters				2000052583
1900			**fastening**	Loose delivered				
1910		66	straddling dowel	oil units, Coupling gards, pipe supports	M12x115, T fix=10mm	Hilti / HST3-BW		2000043631
1911		15	straddling dowel	instrument rack support for warning sign	M8x75, T fix=10mm	Hilti / HST3-BW		2000062145
1950		4	warning signs			4001247059		2000062022
1951		4	support for warning signs			4001348331		2000067220

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
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prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
2000			**Forward oil blower**	Loose delivered				
2001		1	Lateral expansion joints		RN0050/16/L010/F/ F-139	HKS	1.4541	
2010			**Fastening**	Loose delivered				
2011		2	Flat gasket		DN50 PN16 / Form IBC	din-en1514-1	IFG 5500	
2012		8	Hexagon screw		M16 x 65	din-en-iso4014	A2-70	
2013		8	Hexagon nut		M16	din-en-iso4032	A2-70	
2050			**oil leckage mechanical seal**					
2055		1	rubber expansion joints type A-1	loose delivered	DN40,PN16	STENFLEX	1.4541/NBR	
2056		1	flat gasket		DN40 PN40	din-en1514-1	IFG 5500	
2057		4	hexagon screw		M16 x 65	din-en-iso4014	A2-70	
2058		4	hexagon nut		M16	din-en-iso4032	A2-70	
2100			**piping forward oil blower**					
2350			**piping oil leckage mechanical seal**					
2515			**water injection**	loose delivered				
2516		1	rubber expansion joints type A-1		DN40/PN16	STENFLEX	1.4541/NBR	
2520			**fastening**	loose delivered				
2521		4	hexagon screw		M16 x 65	din-en-iso4014	A2-70	
2522		4	hexagon nut		M16	din-en-iso4032	A2-70	
2523		1	flat gasket		DN40/PN40	din-en1514-1	IFG 5500	
2540		1	**assembly device**	loose delivered				

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
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released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
2600			**piping forward water labyrinth**					
2700			**piping water injection**					
2800			**piping forward water labyrinth with filter**					
2802		1	rubber expansion joints type A-1	loose delivered	DN20/PN40	STENFLEX	1.4541/NBR	
2808		2	flat gasket		DN20/PN40	din-en1514-1	IFG 5500	
2809		8	hexagon screw	for pos.2806+2802	M12 x 50	din-en-iso4014	A2-70	
2810		8	hexagon nut		M12	din-en-iso4032	A2-70	
3500			**return oil blower**	loose delivered				
3501		1	flow indicator		DN150/PN10	VENTEK	EN-GJL	
3502		1	expansion joint		DN100/PN16		HKS	
3503		1	expansion joint		DN100/PN16		HKS	
3510			**fastening**	loose delivered				
3511		3	flat gasket	1 spare part	DN150/PN16	din-en1514-1	IFG 5500	
3512		8	flat gasket	1 spare part	DN100/PN16	din-en1514-2	IFG 5500	
3513		16	hexagon screw		M16x40	din-en -iso4017	5.6-A2F	
3514		40	hexagon screw		M16x65	din-en -iso4015	5.6-A2F	
3515		40	hexagon nut		M16	din-en -iso4032	5-2 A2F	
3516		8	hexagon screw		M20x50	din-en -iso4017	5.6-A2F	
3517		8	hexagon screw		M20x70	din-en -iso4014	5.6-A2F	
3518		8	hexagon nut		M20	din-en -iso4032	5-2 A2F	
3519		3	support for pipe connection		DN100		St	

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
3530			**return oil blower piping**	loose delivered				
3531		1	pipe connection		DN150/DN100/PN16			
3550		1	pipe connection		DN100/PN16			
3560		1	pipe connection		DN100/PN16			
3570		1	pipe connection		DN100/PN16			
3700			**water return conveying chamber**	loose delivered				
3701		1	flex bellow		DN125/PN16	Stahlflex	stainless steel	
3702		1	flex bellow		DN50/PN40	Stahlflex	stainless steel	
3705			**fastening**	loose delivered				
3706		4	flat gasket	1 spare part	DN125/PN40	din-en1514-2	IFG 5500	
3707		8	hexagon screw		M16x40	din-en-iso4017	5.6-A2F	
3708		16	hexagon screw		M16x70	din-en-iso4015	5.6-A2F	
3709		16	hexagon nut		M16	din-en-iso4032	5-2 A2F	
3710		3	flat gasket	1 spare part	DN50/PN40	din-en1514-1	IFG 5500	
3711		4	hexagon screw		M16x35	din-en-iso4017	5.6-A2F	
3712		4	hexagon screw		M16x55	din-en-iso4014	5.6-A2F	
3713		4	hexagon nut		M16	din-en-iso4032	5-2 A2F	
3715		1	support for pipe connection		DN125		St	
3730			**water return conveying chamber piping**	loose delivered				
3731		1	pipe connection piece		DN125			
3740		1	pipe connection piece		DN125 / 5"			

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
3742		2	welding neck flange		ANSI 5", 150lbs	ANSI B16,5	1.4301	
3744		1	blind flange		ANSI 1", 150lbs	ANSI B16,6	1.4302	
3748		2	spiral wound gasket with inner ring	1 spare part	5"	ASME B 16.20	Graphite SS316L	
3749		8	stud bolt		3/4"-10UNC x 5"	ANSI B 16.5	1.4571	
3750		16	hexagon nut		3/4"-10UNC	ANSI B 18.2.2	1.4571	
3751		2	spiral wound gasket with inner ring	1 spare part	1"	ASME B 16.20	Graphite SS316L	
3752		4	stud bolt		1/2"-13UNC x 2,75"	ANSI B 16.5	1.4571	
3753		8	hexagon nut		1/2"-13UNC		1.4571	
3800			**water return side plates**	loose delivered				
3801		2	flex bellow		DN80/PN16	Stahlflex	stainless steel	
3810			**fastening**	loose delivered				
3811		7	flat gasket	1 spare part	DN80/PN40	din-en1514-1	IFG 5500	
3812		16	hexagon screw		M16x40	din-en-iso4013	5.6-A2F	
3813		32	hexagon screw		M16x65	din-en-iso4014	5.6-A2F	
3814		32	hexagon nut		M16	din-en-iso4032	5-2 A2F	
3816		3	support for pipe connection		DN80	2SG-4191	St	
3830			**water return side plates piping**	loose delivered				
3831		1	pipe connection piece		DN80/PN16			
3840		1	pipe connection piece		DN80/PN16			
3850		1	pipe connection piece		DN80/PN16			

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
3852		2	welding neck flange		ANSI 3", 150lbs	ANSI B16,5	1.4301	
3853		2	spiral wound gasket with inner ring	1 spare part	3"	ASME B 16.20	Graphite SS316L	
3854		4	stud bolt		5/8"-11UNC x 3 3/4"	ANSI B 16.5	5.6-A2F	
3855		8	hexagon nut		5/8"-11UNC	ANSI B 18.2.2	5-2 A2F	
6700			**mounting on foundation**					
6701		30	jack screw	2 spare parts	KS 4040 C		St	164754000
6702		2	anchor bar blower			4000114679		Customer
6703		2	foot plate blower			4000114685		Customer
6704			**fixed bearing**					
6705		3	tee-head bolt with square neck	1 spare part	M42x260	din7992	5.6-A2F	180003000
6706		3	hexagon nut	1 spare part	M42	din-en-iso4032	5-A2F	179992000
6707		3	disk	1 spare part	42	din-en-iso7090	St,zinced	121926000
6708			**floating bearing**					
6709		3	tee-head bolt with square neck	1 spare part	M42x280	din7992	5.6-A2F	180002000
6710		3	hexagon nut	1 spare part	M42	din-en-iso4032	5-A2F	179992000
6711		3	disk	1 spare part	42	din-en-iso7090	St,zinced	121926000
6712		10	tee-head bolt with square neck	2 spare parts	M42x1000	din7992	5.6-A2F	180001000
6713		20	hexagon nut	4 spare parts	M42	din-en-iso4032	5-A2F	179992000
6714		20	disk	4 spare parts	42	din-en-iso7090	St,zinced	121926000
6715		10	hexagon screw with full dog point	2 spare parts	AM20x120 mit Zapfen		8.8-A2F	122593000
6716		2	bushing for footscrew	blower foot	54x44x115lg.		1.4541	164760000

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
6717		2	disk spring		90x46x5 Lo=7mm		St	164714000
6718		2	disk				St	140470001
6719		40	shim		0,25x200x365		S235JR	140495000
6720		20	shim		1,0x200x365		S235JR	140496000
6721		10	shim		2,0x200x365	140489	S235JR	140497000
6722		2	set of shims		(40parts)	4sg-2789	St	878294000
6730			**anchor bar and foot plate for gear box**					
6731		1	anchor bar gear box			4001311996		Customer
6732		1	foot plate gear box			4001311995		Customer
6733		7	tee-head bolt with square neck	1 spare part	M36x240	din7992	5.6-A2F	935130000
6734		7	hexagon nut	1 spare part	M36	din-en-iso4032	5-A2F	119140000
6735		7	disk	1 spare part	36	din-en-iso7090	St,zinced	122945000
6736		5	tee-head bolt with square neck	1 spare part	M42x1000	din7992	5.6-A2F	180001000
6737		10	hexagon nut	2 spare parts	M42	din-en-iso4032	5-A2F	179992000
6738		10	disk	2 spare parts	42	din-en-iso7090	St,zinced	121926000
6739		40	shim		0,25x120x200, Nr.13		S235JR	183080000
6740		20	shim		1,0x120x200, Nr.14		S235JR	183081000
6741		10	shim		2,0x120x200, Nr.15		S235JR	183082000
6742		10	hexagon screw with full dog point	2 spare parts	AM20x120 mit Zapfen	din561	8.8-A2F	122593000
6750			**anchor bar and foot plates for motor**					

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Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
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prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
6751		1	anchor bar motor			4001311998		Customer
6752		1	foot plate motor			4001311997		Customer
6753		5	tee-head bolt with square neck	1 spare part	M42x240	din7992	5.6-A2F	2000043618
6754		5	hexagon nut		M42	din-en-iso4032	5-A2F	179992000
6755		5	disk		42	din-en-iso7090	St,zinced	121926000
6756		5	tee-head bolt with square neck		M42x1000	din7992	5.6-A2F	180001000
6757		10	hexagon nut		M42	din-en-iso4032	5-A2F	179992000
6758		10	disk		42	din-en-iso7090	St,zinced	121926000
6759		40	shim		0,25x220x350	4sg-3761	S235JR	878373000
6760		20	shim		1,0x220x350	4sg-3761	S235JR	878374000
6761		10	shim		2,0x220x350	4sg-3761	S235JR	878375000
6762		10	hexagon screw with full dog point	2 spare parts	AM20x120 mit Zapfen	din561	8.8-A2F	122593000
6770			**fixation silenser**					
6771		10	anchor srew	2 spare parts	M36x800	din529, formB		2000043619
6772		9	bolt spacer	1 spare part	Ø42,4xØ38,4x26,8	4000679784		2000043620
6773		20	disk spring	4 spare parts	90x46x5 Lo=7mm		St	164714000
6774		10	hexagon nut	2 spare parts	M36		5-A2F	119140000
6775		10	disk	2 spare parts	36		St,zinced	122945000
7000			**oil units**					
7001		1	oil unit for blower					2000064848
7500		1	oil unit for gear box					2000064868

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4001312037 | ZTD | 01

Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
8000			**component parts conveyor line**					
8001		1	silencer		DN1200/PN10		customer	2000064641
8010		1	pipe connection piece	diffusor for silencer	DS/DN1200/PN10			2000065300
8015		1	starting strainer		DN1200/PN10		stainless steel	2000042396
8050		3	sliding sleeve		DN1200, Rohr 1220	Building type PS	steel, zinced	2000037401
8100			**piping parts conveyor line**					
8101		1	pipe connection piece		DN1200x400		St	2000065126
8102		1	pipe connection piece		DN1200x650		St	2000065128
8103		1	pipe connection piece		DN1200x754		St	2000065270
8104		1	pipe connection piece		DN1200x580		St	2000065281
8105		1	pipe connection piece		DN1200x650		St	2000065128
8106		1	pipe connection piece		DN1200x400		St	2000065282
8107		2	welding neck flange	counterflange	DN1200/PN10/Typ11	din-en1092-1	P250GH	2000042442
8108		11	flat gasket	1 spare part	DN1200/PN10	din-en1514-2	IFG 5500	2000042443
8109		32	hexagon srew		M36x180	din-en-iso4014	5.6-A2F	2000054936
8110		32	hexagon srew		M36x200	din-en-iso4014	5.6-A2F	174323000
8111		32	hexagon srew		M36x100	din-en-iso4017	5.6-A2F	2000043248
8112		32	hexagon srew		M36x200	din-en-iso4014	5.6-A2F	174323000
8113		32	hexagon srew		M36x150	din-en-iso4014	5.6-A2F	2000043246
8114		32	hexagon srew		M36x180	din-en-iso4014	5.6-A2F	2000054936
8115		160	hexagon nut		M36	din-en-iso4032	5-2 A2F	119140000

4001312037 | ZTD | 01

Benennung / designation			Bezeichnung 2/ designation 2	Dokument Nr. AM/doc no. AM	Auftrags-Nr./ job no	Typ/ typ	AERZEN	
Stückliste / Part list			**Installation CG**	**4001312037**	**4000369**	**GQb22.23xz**		
	name	date	zugehörige Dokum./ related documents	Dokum. Nr. Kunde / document no. CU	Dokum.- Nr. alt/ Docum. no. Old	Rev.	Projekt/ project	Kunde/ purchaser
prepared	Böger	05.04.2022	4001311199,4001311205 4000851177,4000853632 4001311957,4001311958,4001311959		-	01		
released	Colusso	05.04.2022			4001312036			
Pos. Nr./ item no.	tech.Spezif./ tec.spec.	Stckz./ qty. Einh./ unit	Benennung/ designation	Variable Benennung/ additional designation	Abmessung/ dimension	Norm, Dwg/ norm, dwg	Mat.-Nr., Spezif./ mat.-no., spec.	material/ diverse
8116		3	hexagon srew		M12x80	din-en-iso4017	8.8-A2F	170120000

name	date	rev	modification	revision number
Böger	04.06.2022	01	**Pos.6705 + 6709** exchanged	104210

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B.1.4 Process design

Stage 1

B.1.5 Quality documentation

B.1.5.1 Material certificates

Stage 1

Serial no. 4112784

Fertigungsauftrag/ Order: 1307569 ESNR / Mat. No. Stage: 35232000

FBNR / Serialni.: 4112784 Registrierung von Stempelungen

Typ/Type: GQb 22.23 FENR / Workplace: 1321 Gem. QH00469

Führungsliste / Compilation list

AERZEN

Gebläse / Blower

Bezeichnung / Description	Materialnummer / Material No.	Charge / Schmelze / Heat No. / Probe / Sample / Gießdatum / Casting date	Rohteilnummer / No. Raw material
Zahnradpaar / Gear	140241000	11-20210003 BL 31	
Zylinder / Cylinder	171904000	1012350009 01.04.2022	
Radkasten / Wheel cover	157178000	151021 17	
Gehäusedeckel-OT / Housing cover	157179000	836221	
Gehäusedeckel-UT / Housing cover		818921	
A-Kolben / Male piston	184271000	69295	
N-Kolben / Female piston	184272000	69333	
A-Welle / Drive shaft		QH0047/00296/Rev-01	
N-Welle / Driven shaft		29129/1785/BNR.4500469436/1Nr.584222000	
Seitenplatte AS / Sideplate	141094000	19012022	
Seitenplatte RS / Sideplate	171905000	120921	
Gleitringdichtung / Mechanical seal	2000054906	1663854	
Gleitringdichtung / Mechanical seal	2000054906	1663855	
Gleitringdichtung / Mechanical seal	2000054906	1663856	
Gleitringdichtung / Mechanical seal	2000054906	1663857	

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: (order nr.) 4500490105

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: (date of order) 15.10.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28
DE 31855 Aerzen

Zeichnungs-Nr.: (drawing nr.) 4900005222"05"

unsere Komm.-Nr.: (work order nr.) 10001465

☐ **Werkszeugnis** (test report) nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** (inspection certificate) nach DIN 10204-3.1

Nr.: 15389

Nr. (item)	Stückzahl (number)	Erzeugnis (product)	Modell-Nr (pattern nr.)	Werkstoff (material)	Stück-Nr. (part nr.)	Schmelze-Nr (melt nr.)
1	1	Zylinder GQB22.23	4900005222"05"	EN-GJS-400-18-LT	1012355 0009	01042206

	lfd. Nr. (item)	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,68	2,2	0,24	0,028	0,007	0,048	0,035	0,003	0,031	0,031	

	lfd. Nr. (item)	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		380	230	15		9	9	9	12		
act.	1	383	248	23,6	140	13	13	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 14.04.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig /
This document has been created and is valid without signature

HegerGuss GmbH

HEGERGUSS	Prüfprotokoll EN Test cartificate 10204	3.1	Ultraschallprüfung Ultrasonic Examination	Fehlermeldung Nr.	Blatt 1

Gußstück: casting:	Zylinder GQB22.23	**Besteller-Nr.** Order-Nr.	4500490105	**Koppelmittel:** couplant: ☒ Kleister/glue ☐ Öl/oil	**Auftrags Nr:** 10001465
Werkstoff material	EN - GJS - 400 - 18 LT	**Besteller:** purchaser	Aerzener Maschinenfabrik	**Verfahren:** method: ☒ AVG-Diagramm	
Ident.-Nr.	4900005222"04"	**Prüfumfang:** extent of testing:	☒ Anweisung / Zeichnung / Prüfplan instruction / drawing / I & T plan		
Wärmebehandelt heat treated	☐ ja/yes ☒ nein/no	**Anweisungen:** instructions:	☒ DIN EN 12680-3, Gütestufe 2 ☐	Prüfplan/I & T plan	
Oberflächenzustand surface condition	gestrahlt blasted	**Gerät-Nr.** instrument	☒ USM 35 ☐ USN58L	**Stück-Nr.** item no.	1012355 0009

Prüfkopf probe	MHz	Kontrollkörper ref. block	Bezugsempfindlichkeit ref. sens. (dB)	Schallweg sound path (mm)	Schallweg St. sound path piece (mm)	Prüfempfindlichkeit testing sensit. (dB)	ERG Ø	QB Ø	Einsch. Richtung direction of incid.	Anzeige Nr. Display No.	Blatt Nr. Page No.
SEB2S	2	Bauteil/casting	34	100	80	25	3		A		

	Prüfergebnis / results
X	**keine registrierpflichtigen Anzeigen** non recordable indications
	registrierpflichtige Anzeigen recordable indications
	Bewertungspflichtige Anzeigen inadmissible indications
	Befund lt. Beilage result see addendum

Bemerkungen /remarks

Alle Maße von der Rohgußkontur
all measures from the raw casting

Schallgeschwindigkeit: Sound velocity: 5632 m/s

Datum date	Prüfer examiner	Prüfaufsicht supervisor	Datum date	Kunde customer
12.04.2022	HEGERGUSS GmbH Qualitätsstelle Eilmes 12			

— 2. —

olsberg
innovativ. seit 1577

Olsberg GmbH, Postfach 1362, 59932 Olsberg

Aerzener Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Olsberg GmbH
Hüttenstraße 38
59939 Olsberg

Telefon 0049 2962/805-0
Fax 0049 2962/805-181
Unsere Abteilung/
Our Department: **GQF**
Hausruf/ Tel. Ext.: **0049 2962/ 805-261**

Datum/ Date: **02.November.2021**

Abnahmeprüfzeugnis
Inspection Certificate
EN 10204 3.1
(DIN 50049 3.1B)

Nr./ No.
6274/ 33660

Zeichen des Herstellers/
Mark of Manufacture: **oh**

Benennung / designation: **Radkasten**
Modell-Nr. / pattern-no: **140300-8 (557178000)**
Olsberg- Nr/Olsberg-part-no: **53/1026.1410**

Besteller / customer:
Aerzener Maschinenfabrik GmbH

Bestellungs-Nr./ Order No.: **4500485515**
vom/ of: **24.09.2021**

Auftrags-Nr./ Order No.: **2021/217544/1**

Werkstoff/ DIN/ Spezification:
EN-GJS-400-15U DIN EN 1563
GGG-40 DIN 1693

Erschmelzungsart/ Melting-furace: **Elektroofen/ Electric furace/**

Lieferbedingungen/ Terms of Delivery
lt. Vereinbarung / according to agreement

Erzeugnisform/ Product: **Rohguß / Raw Casting**

Anzahl/ Quantity	Gegenstand/ Description	Masse pro Teil/ Weight per part (kg)	Schmelzen-Nr. Cast-No Los-Nr./ Lot-No.	Chemische Zusammensetzung (Schmelzanalyse) Chemische Composition of Coast (in %) C	Si	Mn	P	S	Mg
1	140300-8 (557178000)	1415	15.10.2021	3,663	1,956	0,163	0,044	0,014	0,056

Zugfestigkeit/ Tensile strength [MPa]	Dehngrenze/ Proof Stress Rp0,2 [MPa]	Bruchdehnung/ Elongation A5 [%]	Härte/Hardness [HBW 5/750] DIN EN ISO 6506-1		Kerbschlagarbeit / Impact Value KV² in Joule bei -20° C DIN EN ISO 148-1			
Zugversuch nach /Tensile testing according DIN EN ISO 6892-1					1	2	3	x-quer
uWD50	418	265	17,1	uWD50	135			

Bemerkung/ remark: **aufgegossenes Gießdatum: 151021 17**

Lieferung gemäß/ delivery according	Vorschrift / rule	Index	vom/date
☐ QP00200 - Vorschrift für die Lieferung von Gussrohteilen		03	26.07.2016
☐ QT01714		01	
☐ QH-00510 Grundierung in Friazink-SikaCor Zinc von Sika		05	21.12.2016

Olsberg GmbH
i.V.
Digital unterschrieben von i.V. Burkhard Rüther
DN: cn=i.V. Burkhard Rüther, o=Olsberg GmbH, ou=QM Gusstechnik, email=burkhard.ruether@olsberg.com, c=DE
Datum: 2021.11.02 13:01:04 +01'00'
rue

Abnahmebeauftragter / manufacturer's authorized representative

Es wird bestätigt, daß die Lieferung geprüft wurde und den Vereinbarungen der Bestellannahme entspricht.

Hereby we confirm, that the delivery was checked and complies with the declarations of the purchase order.

incoming-inspection@aerzen.com
Fax-Nr.: +49 5154 819191 gefaxt: ☐ **Seite** *1* **von** *1*

10.1.F21 Rev. 9

Olsberg GmbH, 59939 Olsberg; Amtsgericht Arnsberg HRB 3730; Geschäftsführer Ulrich Herrmann und Stefan Osebold

– 3. –

SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 01.12.21

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét ..... :2 Gehäusedeckel Oberteil
Bestell-Nr./ Order No./ Commande No. ..... :4500488511
Modell-Nr./ Pattern No./ Modèle No ..... :140301-8
Kom.-Nr./ Our Order No./ Notre commande No ..... :21023735.20
Kunden-Art-Nr./Customer-Ref-No./Client-No ..... :557181000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8189-21	3,74	2,24	0,16	0,043	0,011	0,053			2	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8189-21	289	409	23						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Spharitisierung Spheroidal Spheroídal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

This document has been digitally signed and will therefore not have handwritten signatures.

- 4. -

SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 14.01.22

Abnahmeprüfzeugnis 3.1

EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét..... :2 Gehäusedeckel Unterteil
Bestell-Nr./ Order No./ Commande No. ..... :4500491087
Modell-Nr./ Pattern No./ Modèle No..... :140302-8
Kom.-Nr./ Our Order No./ Notre commande No..... :21023898.10
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557180000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8362-21	3,54	2,21	0,15	0,042	0,010	0,041			2	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8362-21	296	429	25						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Sphäritisierung Spheroidal Spheroidal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

This document has been digitally signed and will therefore not have handwritten signatures.

- 5. -

Pleissner Guss
GMH GRUPPE

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1
inspection certificate acc. To DIN - EN 10204 - 3.1

Zeugnis-Nr.: certificate no.:	1021326/2022	Seite page	1/3
Kunde: customer:	2001718 Aerzener Maschinenfabrik GmbH	Kd.-Auftrag: customer commission:	3911009665 / 000010
Kd.-Bestell-Nr.: order no.: vom / of:	4500474524 / 10 23.06.2021	Fertigungsauftrag: production order:	390001021326
		Modell-Nr.: pattern no.:	171908-01
Material-Nr. material no.	39V0317190840	Kundenmaterialnr.: customer material no.:	3719080 00
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Kundenprojekt: customer project:	
Spez.: spec.:	QP00294 Rev.00/1 u. 2816 Rev.5	Zeichen des Lieferwerks: sign of the manufacturer:	P
Qualität: material:	GX4CrNi13-4+QT1 (1.4317)	Kenn-Nr.: code no.:	1/1
Stückzahl: number of pieces:	1	Stückgewicht: piece weight:	3.600,000 kg

Kenn-Nr.: code no.:	Charge: heat no.:	Proben-Nr.: sample no.:	Wärmebehandlungs-Charge: heat treatment no.:
1/1	69295	2M7Z	01-08783-1, 03-08307-1, 05-57230-1, 06-06611-1, 01-08869-1

Chemische Analyse in % - chemical analysis in %

Erschmelzungsart - melting technology: VOD-Konverter - VOD converter

Charge:	C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu		
heat no:						12,00		3,50				
	0,060	1,00	1,00	0,035	0,025	13,50	0,700	5,00	0,080	0,300		
69295	0,053	0,49	0,72	0,018	0,004	12,72	0,585	4,17	0,037	0,093		

Bemerkung / remark:

- 5. -

Pleissner Guss
GMH GRUPPE

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. To DIN - EN 10204 - 3.1

Zeugnis-Nr.: certificate no.:	1021326/2022	Seite page	2/3

Mechanische Eigenschaften - mechanical properties:

Zugversuch nach DIN EN ISO 6892-1:2020 B - tensile test according to DIN EN ISO 6892-1:2020 B

Charge: heat no:	Proben-Nr.: sample no.:	Dehngrenze yield point [Mpa]		Zugfestigkeit tensile strength [Mpa]	Dehnung elongation [%]	Einschnürung reduction of area [%]
		$Rp_{0,2}$	$Rp_{1,0}$	Rm	A	Z
Soll-Wert: requirements:		550		760	15,0	
				960		
69295	**2M7Z**	**637**		**831**	**21**	**62**

Bemerkung / remark:

Kerbschlagbiegeversuch nach DIN EN ISO 148-1 - charpy impact test according to DIN EN ISO 148-1

Charge: heat no:	Proben-Nr.: sample no.:	Temperatur temperature [°C]	Hammerfinne striker Radius / radius [mm]	Kerbschlagarbeit impact energy [J]		
Soll-Wert: requirements:		20	2	50		
69295	**2M7Z**	**20**	**2**	**104**	**116**	**119**

Bemerkung / remark:

Härteprüfung nach DIN EN ISO 6506-1 - hardness test according to DIN EN ISO 6506-1

Kenn-Nr.: code no.:	Härte hardness [HB]			Kenn-Nr.: code no.:	Härte hardness [HB]		
1/1	**255**	**250**	**259**				

Bemerkung / remark:

- 5. -

Pleissner Guss
GMH GRUPPE

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. To DIN - EN 10204 - 3.1

Zeugnis-Nr.: certificate no.:	1021326/2022	Seite page	3/3

Wärmebehandlung - heat treatment:

WBH-Charge heat treatment no.	Wärmebehandlung-Art Heat treatment type	Temperatur temperature [°C]	Zeit time [h]	Medium medium
05-57230-1	Weichglühen / soft annealing	620	8,0	ruhende Luft/still air
03-08307-1	Härten / hardening	1050	5,0	bewegte Luft/moved air
01-08783-1	Anlassen / tempering	675	7,0	ruhende Luft/still air
06-06611-1	Anlassen / tempering	620	7,0	Wasser/water
01-08869-1	Spannungsarmglühen / pwht	600	6,0	ruhende Luft/still air

Sonstige Prüfungen - other tests:

Magnetpulverprüfung: Magnetic particle testing:	
Farbeindringprüfung Penetrant Testing	gemäß DIN EN 1371-1, PS1-3 acc to DIN EN 1371-1, PS1-3
Ultraschallprüfung: ultrasonic testing:	gemäß EN 12680-1 -UV1-3- acc to EN 12680-1 -UV1-3-
Durchstrahlungsprüfung: Radiographic testing	
Sicht-Prüfung: Visual testing:	gemäß QP00294 §6.6.1 acc to QP00294 §6.6.1
Gefügebeurteilung: Microstructure analysis:	

Bemerkung / remark:

Maßprüfung durchgeführt: Maße entsprechen der Bestellung und den Zeichnungsvorgaben
Dimensional check carried out: dimensions meet the order and drawing requirements

37412 Herzberg am Harz, 10.02.22

Dittrich

Abnahmebeauftragter:
competent representive:

– 5. –

Pleissner Guss Gießerei
GMH GRUPPE

FE-Protokoll / PT-Report		Protokoll Nr.: report no.:	PT 87/2022	Blatt: page:	1/1
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order-no.:	4500474524/10 vom 23.06.2021	Kd.-Auftrag: customer commission:	3911009665/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69295		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	1/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021326		

Angaben zur Prüftechnik / examination technique

Prüfung nach: testing to:	DIN EN 1371-1; acc to QP00294 §6.6.3 and 2816(CS-0006) §1.1	Eindringzeit: penetration time:	30 min
Beurteilung nach: assessment by:	Flächen A: SP1; Flächen B: SP2; Restflächen & unbearb. Fl.: SP3	Entwicklerzeit: developer time:	30 min
Prüfumfang: inspection:	100%	Oberflächenzustand: surface condition:	geschliffen und/oder gestrahlt / ground and/or shotblasted

Angaben zum Prüfsystem / examination system

Vor-, Endreiniger (Hersteller/Typ/Chargen-Nr.): preliminary, final cleaning (manufacturer / type / batch no.)	Wasser - water	
Eindringmittel (Hersteller/Typ/Chargen-Nr.): penetrant (manufacturer / type / batch no.):	MR 67	67/1080G
Zwischenreinigung (Hersteller/Typ/Chargen-Nr.): between cleaning (manufacturer / type / batch no.)	Wasser - water	
Entwickler (Hersteller/Typ/Chargen-Nr.): developer (manufacturer / type / batch no.):	MR 70	70/1297G

Angaben zu den Kontrollen/indications concerning checks

Kontrollkörper für die Empfindlichkeit Kontrolle (Norm/Typ/Nr.): inspection body for the sensitivity control (standard / type / no.)	Kontrollkörper nach DIN EN ISO 3452-3 control body acc. to DIN EN ISO 3452-3
Ergebniss am Kontrollkörper (Anzahl und Größe der Anzeige): result on the control body (number and size of the display):	5
Inspektion Bedingung (Luxmeter/Wert der Beleuchtungsstärke): inspection condition (Luxmeter / value of illuminance)	1000 Lux
ggf. sonstige Prüfparameter (z.B. Wasserdruck, Temp. usw.) other test parameters if necessary (e.g. water pressure, temp etc..)	

Prüfergebnis/test result

Prüfergebnis result of examination	Es wird bestätigt, dass die Ergebnisse der angegebenen Spez. entsprechen (ohne registrierpflichtige Anzeigen). / We confirm that the results are in conformity with the indicated specification (without indications to be documented).

Datum: date:	08.02.2022	Prüfdatum: Test date:	07.02.2022
Schulze Level II	Prüfer / inspector	Wehmeyer Level II	Prüfaufsicht / special supervisor

- 5. -

Pleissner Guss Gießerei
GMH GRUPPE

US-Protokoll / UT-Report		Protokoll Nr.: report no.:	UT 54/2022	Blatt: page:	1/1
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500474524/10 vom 23.06.2021	Kd.-Auftrag: customer commission:	3911009665/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69295		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	1/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021326		

Angaben zum Prüfsystem / examination system

Gerät: apparatus:	Krautkrämer USN 58L	Kopplung: couplant:	Kleister / paste
Prüfköpfe: assessment by:	B2S MSEB4-0°S TS 60°- 4	Prüfbereich: examined area:	100, 250, 500mm
Justierung: calibration:	Am Prüfstück in Verbindung mit dem AVG Datenblatt,WPK Gußkante 80% BSH + 6dB / on the test piece in connection with the AVG data sheet,angle beam probe casting edge 80% screen hight + 6dB		

Angaben zur Prüfung / Information about the test

Prüfvorschrift: test procedure:	gem. QP00294 §6.6.5 und CS-00006 §1.1 ; DIN EN 12680-1 Fläche A -UV1- ; Fläche B -UV2- ; Fläche C -UV3-
Registrierschwelle: reference line:	Gemäß DIN EN 12680-1 / according to DIN EN 12680-1 Fläche A -UV1- ; Fläche B -UV2- ; Fläche C -UV3-
Prüfumfang: volume of operation:	100% soweit prüftechnisch möglich / as far as technically possible
Prüfflächenzustand: surface condition:	geschliffen und/oder gestrahlt / ground and/or shotblasted
WBH - Zustand: heat treatment state:	nach letzter Warmbehandlung / after last heat treatment

Prüfergebnis / test result

Prüfergebnis: result of examination	Es wird bestätigt, dass die Ergebnisse der angegebenen Spez. entsprechen (ohne registrierpflichtige Anzeigen). / We confirm that the results are in conformity with the indicated specification (without indications to be documented).
Bemerkung: remark:	

Datum: date:	08.02.2022	Prüfdatum: Test date:	07.02.2022
	Bierbaum Level 2 Prüfer / inspector		Wehmeyer Level 3 Prüfaufsicht / special supervisor

- 6. -

Duderstädter Straße 17
D-37412 Herzberg am Harz
Telefon (0 55 21) 83 -0
Telefax (0 55 21) 83 - 203

www.pleissner-guss.de

Pleissner Guss
GMH GRUPPE

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.: certificate no.:	1021327/2022	Seite: Page:	1 / 3
Kunde: customer:	2001718 Aerzener Maschinenfabrik GmbH	Kundenauftrag: customer commission:	3911009665 / 000020
Kd.-Bestell-Nr.: order no.:	4500474524 / 20	Fertigungsauftrag: production order:	390001021327
vom/of:	23.06.2021	Modell-Nr.: pattern no.:	171908-01
Materialnummer: material no.:	39V0317190840	Kundenmaterialnr.: customer material no.:	371908000
Bezeichnung: Item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Kundenprojekt: customer project:	
Spez.: spec.:	QP00294 Rev.00/1 u. 2816 Rev.5	Zeichen des Lieferwerks: sign of the manufacturer:	P
Qualität: material:	GX4CrNi13-4+QT1 (1.4317)	Kenn-Nr.: code no.:	2/1
Stückzahl: number of pieces:	1	Stückgewicht: piece weight:	3.600,000 kg

Kenn-Nr.: code no.:	Charge: heat no.:	Proben-Nr.: sample no.:	Wärmebehandlungs-Charge: heat treatment no.:
2/1	69333	2MG4-1	01-08865-1,03-09390-1,05-57266-1,06-06735-1

Chemische Analyse in % - Chemical analysis in %

Erschmelzungsart - melting technology: VOD-Konverter - VOD converter

Charge:	C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu		
heat no.:						12,00		3,50				
	0,060	1,00	1,00	0,035	0,025	13,50	0,700	5,00	0,080	0,300		
69333	**0,054**	**0,51**	**0,71**	**0,019**	**0,004**	**13,15**	**0,541**	**4,39**	**0,052**	**0,100**		

Bemerkung / remark:

- 6. -

Duderstädter Straße 17
D-37412 Herzberg am Harz
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Pleissner Guss
GMH GRUPPE

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.: / certificate no.: 1021327/2022 — Seite: / Page: 2 / 3

Mechanische Eigenschaften - mechanical properties

Zugversuch nach DIN EN ISO 6892-1:2020 B - tensile test according to DIN EN ISO 6892-1:2020 B

Charge: heat no.:	Proben-Nr.: sample no.:	Dehngrenze yield point [MPa]		Zugfestigkeit tensile strength [MPa]	Dehnung elongation [%]	Einschnürung reduction of area [%]
		$Rp_{0,2}$	$Rp_{1,0}$	R_m	A	Z
Soll-Wert: requirements:	min.	550		760	15,0	
	max.			960		
69333	2MG4-1	612		854	21	65

Bemerkung / remark:

Kerbschlagbiegeversuch nach DIN EN ISO 148-1 - charpy impact test according to DIN EN ISO 148-1

Charge: heat no.:	Proben-Nr.: sample no.:	Temperatur temperature [°C]	Hammerfinne striker Radius / radius [mm]	Kerbschlagarbeit impact energy [J]		
Soll-Wert: requirements:		20 20	2 2	27 50		
69333	2MG4-1	20	2	128	125	125

Bemerkung / remark:

Härteprüfung nach DIN EN ISO 6506-1 - Hardness test according to DIN EN ISO 6506-1

Kenn-Nr.: code no.:	Härte hardness [HB]			Kenn-Nr.: code no.:	Härte hardness [HB]		
Soll-Wert: requirements:				Soll-Wert: requirements:			
2/1	250	259	255				

Bemerkung / remark:

- 6. -

Duderstädter Straße 17
D-37412 Herzberg am Harz
Telefon (0 55 21) 83 -0
Telefax (0 55 21) 83 - 203

www.pleissner-guss.de

Pleissner Guss
GMH GRUPPE

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.:
certificate no.: **1021327/2022**

Seite:
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Wärmebehandlung - heat treatment

WBH-Charge heat treatment no.	Wärmebehandlung-Art heat treatment type	Temperatur temperature [°C]	Zeit time [h]	Medium medium
05-57266-1	Weichglühen / soft annealing	620	8,0	ruhende Luft/still air
01-08865-1	Härten / hardening	1050	5,0	bewegte Luft/moved air
06-06735-1	Spannungsarmglühen / pwht	620	6,0	ruhende Luft/still air
03-09390-1	Anlassen / tempering	620	7,0	ruhende Luft/still air

Bemerkung / remark:

Sonstige Prüfungen - Other tests

Magnetpulverprüfung: magnetic particle testing:	
Farbeindringprüfung: penetrant testing:	gemäß DIN EN 1371-1, PS1-3 acc. to DIN EN 1371-1, PS1-3
Ultraschallprüfung: ultrasonic testing:	gemäß EN 12680-1 -UV1-3- acc. to EN 12680-1 -UV1-3-
Durchstrahlungsprüfung: Radiographic testing:	
Sichtprüfung: Visual testing:	gemäß QP00294 §6.6.1 acc. to QP00294 §6.6.1
Gefügebeurteilung: Microstructure analysis:	

Bemerkung / remark:
Maßprüfung durchgeführt: Maße entsprechen der Bestellung und den Zeichnungsvorgaben
Dinemsional check carried out: dimensions meet the order and drawing requirements

37412 Herzberg am Harz, 16.03.2022

Dittrich

Abnahmebeauftragter:
competent representative:

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Pleissner Guss Gießerei
GMH GRUPPE

FE-Protokoll / PT-Report		Protokoll Nr.: report no.:	PT 171/2022	Blatt: page:	1/1
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order-no.:	4500474524/20 vom 23.06.2021	Kd.-Auftrag: customer commission:	3911009665/20		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69333		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	2/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021327		

Angaben zur Prüftechnik / examination technique

Prüfung nach: testing to:	DIN EN 1371-1; acc to QP00294 §6.6.3 and 2816(CS-0006) §1.1	Eindringzeit: penetration time:	20 min
Beurteilung nach: assessment by:	Flächen A: SP1; Flächen B: SP2; Restflächen & unbearb. Fl.: SP3	Entwicklerzeit: developer time:	20 min
Prüfumfang: inspection:	100%	Oberflächenzustand: surface condition:	geschliffen und/oder gestrahlt / ground and/or shotblasted

Angaben zum Prüfsystem / examination system

Vor-, Endreiniger (Hersteller/Typ/Chargen-Nr.): preliminary, final cleaning (manufacturer / type / batch no.)	Wasser - water	
Eindringmittel (Hersteller/Typ/Chargen-Nr.): penetrant (manufacturer / type / batch no.):	MR 67	67/1081G
Zwischenreinigung (Hersteller/Typ/Chargen-Nr.): between cleaning (manufacturer / type / batch no.)	Wasser - water	
Entwickler (Hersteller/Typ/Chargen-Nr.): developer (manufacturer / type / batch no.):	MR 70	70/1306G

Angaben zu den Kontrollen/indications concerning checks

Kontrollkörper für die Empfindlichkeit Kontrolle (Norm/Typ/Nr.): inspection body for the sensitivity control (standard / type / no.)	Kontrollkörper nach DIN EN ISO 3452-3 control body acc. to DIN EN ISO 3452-3	
Ergebniss am Kontrollkörper (Anzahl und Größe der Anzeige): result on the control body (number and size of the display):	5	
Inspektion Bedingung (Luxmeter/Wert der Beleuchtungsstärke): inspection condition (Luxmeter / value of illuminance)	1721 Lux mit Taschenlampe	
ggf. sonstige Prüfparameter (z.B. Wasserdruck, Temp. usw.) other test parameters if necessary (e.g. water pressure, temp etc..)	Temperatur Bauteil : 17 Grad Temperatur Prüfhalle : 20 Grad	Testo 925 Inventar-Nr.5016

Prüfergebnis/test result

Prüfergebnis result of examination	Es wird bestätigt, dass die Ergebnisse der angegebenen Spez. entsprechen (ohne registrierpflichtige Anzeigen). / We confirm that the results are in conformity with the indicated specification (without indications to be documented).

Datum: date:	15.03.2022	Prüfdatum: Test date:	15.03.2022
Michaelis Level II	Prüfer / inspector	Wehmeyer Level II	Prüfaufsicht / special supervisor

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Pleissner Guss Gießerei
GMH GRUPPE

US-Protokoll / UT-Report		Protokoll Nr.: report no.:	UT 112/2022	Blatt: page:	1/1
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500474524/20 vom 23.06.2021	Kd.-Auftrag: customer commission:	3911009665/20		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69333		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	2/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021327		

Angaben zum Prüfsystem / examination system

Gerät: apparatus:	Krautkrämer USN 58L	Kopplung: couplant:	Kleister / paste
Prüfköpfe: assessment by:	B2S MSEB4-0°S TS 60°- 4	Prüfbereich: examined area:	100, 250, 500mm
Justierung: calibration:	Am Prüfstück in Verbindung mit dem AVG Datenblatt,WPK Gußkante 80% BSH + 6dB / on the test piece in connection with the AVG data sheet,angle beam probe casting edge 80% screen hight + 6dB		

Angaben zur Prüfung / Information about the test

Prüfvorschrift: test procedure:	gem. QP00294 §6.6.5 und CS-00006 §1.1 ; DIN EN 12680-1 Fläche A -UV1- ; Fläche B -UV2- ; Fläche C -UV3-
Registrierschwelle: reference line:	Gemäß DIN EN 12680-1 / according to DIN EN 12680-1 Fläche A -UV1- ; Fläche B -UV2- ; Fläche C -UV3-
Prüfumfang: volume of operation:	100% soweit prüftechnisch möglich / as far as technically possible
Prüfflächenzustand: surface condition:	geschliffen und/oder gestrahlt / ground and/or shotblasted
WBH - Zustand: heat treatment state:	nach letzter Warmbehandlung / after last heat treatment

Prüfergebnis / test result

Prüfergebnis: result of examination	Es wird bestätigt, dass die Ergebnisse der angegebenen Spez. entsprechen (ohne registrierpflichtige Anzeigen). / We confirm that the results are in conformity with the indicated specification (without indications to be documented).
Bemerkung: remark:	

Datum: date:	15.03.2022	Prüfdatum: Test date:	15.03.2022
	Bierbaum Level 2		Wehmeyer Level 3
	Prüfer / inspector		Prüfaufsicht / special supervisor

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Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No. K21610554/1/1
Referénce usine

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Erzeugnis/Lieferbedingung Product/Terms of order Produit/Stipulations de la commande

Rundstahl, geschmiedet, fixlang ges□gt, verg□tet nach Norm (+QT), spannungsarmgegl□ht (+SR), Gl□htemperatur bei ca. 540 - 560□C, Grenztemperatur < 623□C, vorgedreht, Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560□C, limit temperature < 623□C, preturned
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Herstellerzeichen
Suppliers Mark
Marque d usine

Positions-Nr Item Poste	Anzahl Quantity Nombre	Abmessung - Dimension - Dimension [mm]	Schmelze-Nr. Heat No. Coulée No.	Probe-Nr. Test No. No. d essai
1	5	VDM: □ 280 -0/+10 x 3486 mm	30225	115 139

Schmelze-Nr. Heat No. Coulée No.	Chemische Zusammensetzung in % - Chemical Composition % - Composition chimique %										
	C	Si	Mn	P	S	Cr	Mo				
Min.	0,38		0,60			0,90	0,15				
Max.	0,45	0,40	0,90	0,035	0,0350	1,20	0,30				
30225	0,43	0,27	0,74	0,003	0,0010	1,12	0,23				

Probe-Nr. Test-No. No. d essai	Ergebnis der mechanischen Prüfungen - Result of mechanical tests - Resultats des essais mécaniques											
	Zugversuch - Tensile test - Essai de traction						Kerbschlagarbeit - Impact test - Résilience					
	Probenabm. Dim. of test Dim.de l'épr [mm]	Streckgren Yield point Lim. d' elast [N/mm²]	Zugfestigkeit Tensile str. Résistance [N/mm²]	Dehnung Elongatio Allongme %	Einschnüru Red. of Are Striction %	Prüftemp.: Test-temp. Temp. d'e °C	Probenform Sample Eprouvette	Pr.-Richtu Test directi Sens d' es	Einzelwerte Indiv. results Valeurs indiv. J	J	J	Prüftemp. Test-temp. Temp. d'e °C
Soll-Required		500	750	14					30			
115	10x50	703	895	21.6	65.3	20	ISO-V	längs longitudinal	130	132	119	20
Soll-Required		500	750-900	14	55				35			
139	10x50	631	837	21.3	62.3	20	ISO-V	längs longitudinal	88	68	27	20

Chem. Zusammensetzung entspr. Zeugnis Vorlieferant.
Chemical composition according to the original supplier's certificate.
Composition chimique suivant certificat du fournisseur original.

Zeichen des Werksachverständigen
Inspectors Stamps
Sigle d' Inspect. usine

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Seite: 1 (2)

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Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No. K21610554/1/1
Référénce usine

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Sonstige Angaben - Remarks - Remarques

US-gepr□ft nach EN 10228-3 100%, Qualit□tsklasse 3 / US-tested acc. to EN 10228-3 100%, quality class 3

Verformungsgrad / reduction ratio:: 8,37

Erschmelzungsart: Elektrostahl, Blockguss, vakuumentgast
Melting procedure: Electro steel, ingot casting, vacuum degassed

Mengenkontrakt Pos.10
Material: 584221000

Es wird hiermit bestätigt, daß die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.
Nous certifions que les produits indiqués ci dessus sont conformes à la commande.

Herr Stieglitz

Essen, 10.03.2022

Seite: 2 (2)

- 8. -

Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to
Certificat prévu
DIN EN 10204 / 3.1

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen AG • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No.
Referénce usine
K21605675/1/1

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
4500469436

Erzeugnis/Lieferbedingung Product/Terms of order Produit/Stipulations de la commande

Rundstahl, geschmiedet mit allseitiger Bearbeitungszugabe gemäß QP00296 Rev. 01 und QH00476, fixlang gesägt, vorgedreht auf die vorgenannten Vordrehmaße gemäß QP00296 Rev. 01 und QH00476, vergütet gemäß QP00296 Rev. 01 und QH00476, spannungsarmgeglüht (+SR) nach dem Sägen und der mechanischen Vorbearbeitung, Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C
roundbar, forged with machening alloance on all sides acc. to QP00296 Rev. 01 and QH00476, sawn fixed length, preturned dimension acc. to QP00296 Rev. 01 and QH00476, quenched and tempered acc. to QP00296 Rev. 01 and QH00476, stressed relieved (+SR) after cutting and mechaning, annealing temperature approx 540 - 560°C, limit temperature < 623°C
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Herstellerzeichen
Suppliers Mark
Marque d usine

Positions-Nr Item Poste	Anzahl Quantity Nombre	Abmessung - Dimension - Dimension [mm]	Schmelze-Nr. Heat No. Coulée No.	Probe-Nr. Test No. No. d essai	Härteprüfung Hardness test Contrôle de dureté HB
1	1	Ø 285 x 2864 mm	28807	1786	255
1	1	Ø 285 x 2864 mm	29129	1785	239

Schmelze-Nr. Heat No. Coulée No.	Chemische Zusammensetzung in % - Chemical Composition % - Composition chimique %										
	C	Si	Mn	P	S	Cr	Mo				
Min.	0,38		0,60			0,90	0,15				
Max.	0,45	0,40	0,90	0,035	0,0350	1,20	0,30				
28807	0,41	0,25	0,74	0,004	0,0019	1,14	0,23				
29129	0,41	0,26	0,74	0,006	0,0014	1,13	0,23				

Probe-Nr. Test-No. No. d essai	Ergebnis der mechanischen Prüfungen - Result of mechanical tests - Resultats des essais mécaniques											
	Zugversuch - Tensile test - Essai de traction						Kerbschlagarbeit - Impact test - Résilience					
	Probenabm. Dim. of test Dim.de l'épr [mm]	Streckgren Yield point Lim. d' elast [N/mm²]	Zugfestigkeit Tensile str. Résistance [N/mm²]	Dehnung Elongatio Allongme %	Einschnüru Red. of Are Striction %	Prüftemp.: Test-temp. Temp. d'e °C	Probenform Sample Eprouvette	Pr.-Richtu Test directi Sens d' es	Einzelwerte Indiv. results Valeurs indiv. J	J	J	Prüftemp. Test-temp. Temp. d'e °C
Soll-Required		500	750-900	14	55				35			
1786	10x50	607	806	22.1	61.4	20	ISO-V	längs longitudinal	53	64	94	20
Soll-Required		500	750-900	14	55				35			
1785	10x50	668	839	17.8	65.3	20	ISO-V	längs longitudinal	141	138	140	20

Seite: 1 (2)

– 8. –

Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen AG • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No. K21605675/1/1
Référénce usine

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
4500469436

Chem. Zusammensetzung entspr. Zeugnis Vorlieferant.
Chemical composition according to the original supplier's certificate.
Composition chimique suivant certificat du fournisseur original.

Sonstige Angaben - Remarks - Remarques

US-geprüft nach QP00296 Rev. 01 und QH00476

Verformungsgrad / reduction ratio: 6,31

Erschmelzungsart: Elektrostahl, Blockguss, vakuumentgast
Melting procedure: Electro steel, ingot casting, vacuum degassed

Pos. 10
Material: 584222000

Zeichen des Werksachverständigen
Inspectors Stamps
Sigle d' Inspect. usine

15

Es wird hiermit bestätigt, daß die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.
Nous certifions que les produits indiqués ci dessus sont conformes à la commande.

Herr Stieglitz

Essen, 24.11.2021

Seite: 2 (2)

— 8. —

von schaewen

von Schaewen AG • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hersteller / Producer:
von Schaewen AG
Kronprinzenstr. 14 · 45128 Essen

Essen, 24.11.2021

Ihr Ansprechpartner / Your contact:
Durchwahl / Phone: 0201/8110 -

Herr Stieglitz - 395
Telefax - 352

US - Prüfzeugnis / US - testcertificate

Bestellnmmer / Customer Order No.:	4500469436		
Auftragsnummer / Works Order No.:	K21605675/1/1		
Prüfort, Datum / Test location in time:	Essen, 04.11.2021		
Prüfgerät / Testing set:	USM 36		
Prüfung gemäß / Testing acc.:	QP00296 Rev. 01 und QH00476 / QP00296 Rev. 01 and QH00476		
Koppelmedium / Coupling medium:	Öl / oil		
Prüfbereich / Test scope:	0 - 300 mm		
Prüfkopf / Test head:	B2S		
Prüfer / Examiner:	Herr Stieglitz	DIN EN ISO 9712 Stufe/Level:	3
Prüfaufsicht / Test supervisors:	Herr Stieglitz	DIN EN ISO 9712 Stufe/Level:	3

Rundstahl, geschmiedet mit allseitiger Bearbeitungszugabe gemäß QP00296 Rev. 01 und QH00476, fixlang gesägt, vorgedreht auf die vorgenannten Vordrehmaße gemäß QP00296 Rev. 01 und QH00476, vergütet gemäß QP00296 Rev. 01 und QH00476, spannungsarmgeglüht (+SR) nach dem Sägen und der mechanischen Vorbearbeitung, Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C
roundbar, forged with machening alloance on all sides acc. to QP00296 Rev. 01 and QH00476, sawn fixed length, preturned dimension acc. to QP00296 Rev. 01 and QH00476, quenched and tempered acc. to QP00296 Rev. 01 and QH00476, stressed relieved (+SR) after cutting and mechaning, annealing temperature approx 540 - 560°C, limit temperature < 623°C

Werkstoff / Material: 42CRMO4/DIN EN 10250

Schmelze-Nr. Heat No.	Anzahl Qty.	Abmessung Dimension	Bezugsecho Reference Echo
29129	1	Ø 285 x 2864 mm	58 dB; ohne Beanstandung / without objection
28807	1	Ø 285 x 2864 mm	58 dB; ohne Beanstandung / without objection

sonstige Angaben / Remarks: Pos. 10
Material: 584222000

Seite / Page: 1 (2)

- 8. -

von schaewen

US - Prüfzeugnis / US - testcertificate

Auftragsnummer /
Works Order No.
K21605675/1/1

Essen
24.11.2021

von Schaewen AG

Seite / Page: 2 (2)

- 8. -

von schaewen

von Schaewen AG • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hersteller / Producer:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

Hückeswagen, 24.11.2021

Ihr Ansprechpartner / Your contact:
Durchwahl / Phone: 0201/8110 -

Herr Pohlmann -552
Fax -534

Warmbehandlungsbescheinigung
Certification of heat treatment

Bescheinigung gemäß DIN EN 10204/3.1
Certification acc. to DIN EN 10204/3.1

Bestellnummer / Customer Order No.:	4500469436
Auftragsnummer / Works Order No.:	K21605675/1/1
Fertigungsauftrag / FA No.:	376593, 386940
Schmelze Nr. / Heat No.:	29129, 28807
Werkstoff / Material:	42CRMO4/DIN EN 10250
Abmessung / Dimension:	Ø 285 x 2864 mm
Anzahl / Quantity:	1; 1
Zeichnung / Drawing No.:	

Rundstahl, geschmiedet mit allseitiger Bearbeitungszugabe gemäß QP00296 Rev. 01 und QH00476, fixlang gesägt, vorgedreht auf die vorgenannten Vordrehmaße gemäß QP00296 Rev. 01 und QH00476, vergütet gemäß QP00296 Rev. 01 und QH00476, spannungsarmgeglüht (+SR) nach dem Sägen und der mechanischen Vorbearbeitung, Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C
roundbar, forged with machening alloance on all sides acc. to QP00296 Rev. 01 and QH00476, sawn fixed length, preturned dimension acc. to QP00296 Rev. 01 and QH00476, quenched and tempered acc. to QP00296 Rev. 01 and QH00476, stressed relieved (+SR) after cutting and mechaning, annealing temperature approx 540 - 560°C, limit temperature < 623°C

Schmelze Nr. / Heat No.: 29129

Wärmebehandlung Heat treatment	Temperatur Temperature	Haltezeit Holding time	Abkühlmedium Cooling medium
Härten / hardening	860 °C	6 h	Polymer / Polymer
Anlassen / termpering	620 °C	12 h	Luft / Air
Entspannen / thermal stress relief	550 °C	6 h	Ofen / Furnace

Sonstige Angaben - Remarks
Pos. 10
Material: 584222000

SSK von Schaewen Hückeswagen GmbH

Herr Pohlmann

Seite / Page: 1 (2)

— 8. —

von schaewen

Warmbehandlungsbescheinigung
Certification of heat treatment

Auftragsnummer / Works Order No.:	Datum / Date
K21605675	24.11.2021

Es wird hiermit bestätigt, dass die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.

Seite / Page: 2 (2)

- 9. -

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500486422

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 29.09.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28

Zeichnungs-Nr.: drawing nr. 4900000677"7"

unsere Komm.-Nr.: work order nr. 10001428

DE 31855 Aerzen

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 14835

Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0044	19012215

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,7	2,13	0,21	0,023	0,004	0,046	0,024	0,001	0,031	0,026	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	388	252	26,0	143	13	14	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 04.02.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig /
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HegerGuss GmbH

-10-

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500486416

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 29.09.2021

Aerzener Maschinenfabrik GmbH
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Zeichnungs-Nr.: drawing nr. 4900000677"7"

Reherweg 28

unsere Komm.-Nr.: work order nr. 10001424

DE 31855 Aerzen

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 13997

	Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
	1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0023	12092105

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,64	2,16	0,16	0,023	0,003	0,039	0,013	0,002	0,028	0,023	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	370	244	26,2	137	15	15	15	15	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 24.06.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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HegerGuss GmbH

Serial no.4113138

Fertigungsauftrag/ Order:	1307569	ESNR / Mat. No. Stage:	35232000
FBNR / Serialni.:	4113138		
Typ/Type:	GQb 22.23	FENR / Workplace:	1321

Führungsliste / Compilation list

Registrierung von Stempelungen

Gem. QH00469

AERZEN
Gebläse / Blower

Bezeichnung / Description	Materialnummer / Material No.	Charge / Schmelze / Heat No. / Probe / Sample / Gießdatum / Casting date	Rohteilnummer / No. Raw material
Zahnradpaar / Gear	140241000	42121006	
Zylinder / Cylinder	171904000	10123550006 18012022 IIQ	
Radkasten / Wheel cover	157178000	18221021	
Gehäusedeckel-OT / Housing cover	157179000	832121	
Gehäusedeckel-UT / Housing cover	157179000	818921	
A-Kolben / Male piston	184271000	1020524 / 2252	
N-Kolben / Female piston	184272000	1020524 / 2252	
A-Welle / Drive shaft	184271000	30225 58421000 4500514297	
N-Welle / Driven shaft	184271000	30122 2195 4500514298	
Seitenplatte AS / Sideplate	141094000	10123540040 261121 II	
Seitenplatte RS / Sideplate	171905000	10123540040 161121 II	
Gleitringdichtung / Mechanical seal	2000054906	1663870	
Gleitringdichtung / Mechanical seal	2000054906	1663871	
Gleitringdichtung / Mechanical seal	2000054906	1663872	
Gleitringdichtung / Mechanical seal	2000054906	2663873	

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Aerzener Maschinenfabrik GmbH
--
Reherweg 28
DE 31855 Aerzen

Nr.: 14834

Bestell-Nr.: (order nr.) 4500490104
Bestelltag: (date of order) 15.10.2021
Zeichnungs-Nr.: (drawing nr.) 4900005222"05"
unsere Komm.-Nr.: (work order nr.) 10001463

☐ **Werkszeugnis** (test report) nach DIN 10204-2.2
☒ **Abnahmeprüfzeugnis** (inspection certificate) nach DIN 10204-3.1

Nr. (item)	Stückzahl (number)	Erzeugnis (product)	Modell-Nr (pattern nr.)	Werkstoff (material)	Stück-Nr. (part nr.)	Schmelze-Nr (melt nr.)
1	1	Zylinder GQB22.23	4900005222"05"	EN-GJS-400-18-LT	1012355 0006	18012212

	lfd. Nr. (item)	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,68	2,18	0,21	0,024	0,004	0,046	0,019	0,002	0,02	0,025	

	lfd. Nr. (item)	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		380	230	15		9	9	9	12		
act.	1	386	247	25,3	143	14	14	15	14	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 22.02.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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HegerGuss GmbH

HEGERGUSS	Prüfprotokoll EN Test cartificate 10204	3.1	Ultraschallprüfung Ultrasonic Examination	Fehlermeldung Nr.	Blatt 1

Gußstück: casting:	Zylinder GQB22.23	**Besteller-Nr.** Order-Nr.	4500490104	**Koppelmittel:** couplant:	☒ Kleister/glue ☐ Öl/oil
Auftrags Nr:	10001463				
Werkstoff material	EN - GJS - 400 - 18 LT	**Besteller:** purchaser	Aerzener Maschinenfabrik	**Verfahren:** method:	☒ AVG-Diagramm
Ident.-Nr.	4900005222"04"	**Prüfumfang:** extent of testing:	☒ Anweisung / Zeichnung / Prüfplan instruction / drawing / I & T plan		
Wärmebehandelt heat treated	☐ ja/yes ☒ nein/no	**Anweisungen:** instructions:	☒ DIN EN 12680-3, Gütestufe 2 ☐	**Prüfplan/I & T plan**	
Oberflächenzustand surface condition	gestrahlt blasted	**Gerät-Nr.** instrument	☒ USM 35 ☐ USN58L	**Stück-Nr.** item no.	1012355 0006

Prüfkopf probe	MHz	Kontrollkörper ref. block	Bezugsempfindlichkeit ref. sens. (dB)	Schallweg sound path (mm)	Schallweg St. sound path piece (mm)	Prüfempfindlichkeit testing sensit. (dB)	ERG Ø	QB Ø	Einsch. Richtung direction of incid.	Anzeige Nr. Display No.	Blatt Nr. Page No.
SEB2S	2	Bauteil/casting	34	100	80	25	3		A		

	Prüfergebnis / results	**Bemerkungen** /remarks
X	**keine registrierpflichtigen Anzeigen** non recordable indications	
	registrierpflichtige Anzeigen recordable indications	**Alle Maße von der Rohgußkontur** all measures from the raw casting
	Bewertungspflichtige Anzeigen inadmissible indications	
	Befund lt. Beilage result see addendum	

Schallgeschwindigkeit: Sound velocity: 5628 m/s

Datum date	Prüfer examiner	Prüfaufsicht supervisor	Datum date	Kunde customer
17.02.2022	HEGERGUSS GmbH Qualitätsstelle Eilmes 12			

— 2. —

olsberg
innovativ. seit 1577

Olsberg GmbH, Postfach 1362, 59932 Olsberg

Aerzener Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Olsberg GmbH
Hüttenstraße 38
59939 Olsberg

Telefon 0049 2962/805-0
Fax 0049 2962/805-181
Unsere Abteilung/
Our Department: **GQF**
Hausruf/ Tel. Ext.: **0049 2962/ 805-261**

Datum/ Date: **02.November.2021**

Abnahmeprüfzeugnis
Inspection Certificate
EN 10204 3.1
(DIN 50049 3.1B)

Nr./ No.
6275/ 33687

Zeichen des Herstellers/
Mark of Manufacture: **oh**

Benennung / designation: **Radkasten**
Modell-Nr. / pattern-no: **140300-8 (557178000)**
Olsberg- Nr/Olsberg-part-no: **53/1026.1410**

Besteller / customer:
Aerzener Maschinenfabrik GmbH

Bestellungs-Nr./ Order No.: **4500485515**
vom/ of: **24.09.2021**

Auftrags-Nr./ Order No.: **2021/217544/1**

Werkstoff/ DIN/ Spezification:
EN-GJS-400-15U **DIN EN 1563**
GGG-40 **DIN 1693**

Erschmelzungsart/ Melting-furace: **Elektroofen/ Electric furace/**

Lieferbedingungen/ Terms of Delivery
lt. Vereinbarung / according to agreement

Erzeugnisform/ Product: **Rohguß / Raw Casting**

Anzahl/ Quantity	Gegenstand/ Description	Masse pro Teil/ Weight per part (kg)	Schmelzen-Nr. Cast-No Los-Nr./ Lot-No.	Chemische Zusammensetzung (Schmelzanalyse) Chemische Composition of Coast (in %) C	Si	Mn	P	S	Mg
1	140300-8 (557178000)	1415	22.10.2021	3,652	1,779	0,140	0,018	0,008	0,054

Zugfestigkeit/ Tensile strength [MPa]	Dehngrenze/ Proof Stress Rp0,2 [MPa]	Bruchdehnung/ Elongation A5 [%]	Härte/Hardness [HBW 5/750] DIN EN ISO 6506-1		Kerbschlagarbeit / Impact Value KV² in Joule bei -20° C DIN EN ISO 148-1			
Zugversuch nach /Tensile testing according DIN EN ISO 6892-1					1	2	3	x-quer
uWD50	429	257	17,1	uWD50	161			

Bemerkung/ remark: **aufgegossenes Gießdatum: 221021 18**

Lieferung gemäß/ delivery according	Vorschrift / rule	Index	vom/date
QP00200 - Vorschrift für die Lieferung von Gussrohteilen		03	26.07.2016
QT01714		01	
QH-00510 Grundierung in Friazink-SikaCor Zinc von Sika		05	21.12.2016

Olsberg GmbH
i.V.
Digital unterschrieben von i.V. Burkhard Rüther
DN: cn=i.V. Burkhard Rüther, o=Olsberg GmbH, ou=QM Gusstechnik, email=burkhard.ruether@olsberg.com, c=DE
Datum: 2021.11.02 13:02:21 +01'00'
rue

Abnahmebeauftragter / manufacturer's authorized representative

Es wird bestätigt, daß die Lieferung geprüft wurde und den Vereinbarungen der Bestellannahme entspricht.

Hereby we confirm, that the delivery was checked and complies with the declarations of the purchase order.

incoming-inspection@aerzen.com
Fax-Nr.: +49 5154 819191 gefaxt: ☐ **Seite** *1* **von** *1*

10.1.F21 Rev. 9

Olsberg GmbH, 59939 Olsberg; Amtsgericht Arnsberg HRB 3730; Geschäftsführer Ulrich Herrmann und Stefan Osebold

– 3. –

SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 01.12.21

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét..... :2 Gehäusedeckel Oberteil
Bestell-Nr./ Order No./ Commande No. ..... :4500488511
Modell-Nr./ Pattern No./ Modèle No..... :140301-8
Kom.-Nr./ Our Order No./ Notre commande No..... :21023735.20
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557181000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8189-21	3,74	2,24	0,16	0,043	0,011	0,053			2	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8189-21	289	409	23						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Sphäritisierung Spheroidal Spheroídal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

This document has been digitally signed and will therefore not have handwritten signatures.

- 4. -

SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 23.06.22

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét..... :1 Gehäusedeckel Unterteil
Bestell-Nr./ Order No./ Commande No. ..... :4500488515
Modell-Nr./ Pattern No./ Modèle No..... :140302-8
Kom.-Nr./ Our Order No./ Notre commande No..... :21023734.10
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557180000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8321-21	3,74	2,34	0,15	0,044	0,011	0,046			1	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8321-21	292	422	24						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Sphäritisierung Spheroidal Spheroidal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

This document has been digitally signed and will therefore not have handwritten signatures.

– 5./6. –

SCHMOLZ + BICKENBACH

SCHMOLZ+BICKENBACH GUSS GmbH,
Werk Krefeld • Postfach 10 20 51 • 47720 Krefeld

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Abnahmeprüfzeugnis
Inspection Certificate/Certificat de reception
nach/according/suivant DIN EN 10204 – 3.1

Nr. /No. 5982/22 Lip Rev. 01

Bestellung/Order-No./Commande-No. 4500490973 — **vom**/from 20.10.2021

Auftrags-Nr./Our Order-No./Notre No. de Commande: 3230016570 (50048502)

Menge/Quantity/Quanite: 2 — **Kund-Ident-Nr.**/Ident-No./No. d´identification: 371908000

Gegenstand/Object/Objet: Drehkolben GQ22.23-2

Zeichnungs-Nr./Drawing-No./Plan-No.: 4900005224/000/ Vers. 05

Modell-Nr./Pattern-No./Modele-No.: 148579/136

Werkstoff/Material/Matière: 1.4317 / GX4CrNi13-4
gemäß./ acc. to EN 10213 / EN 10283 & QP00294

Abnahmevorschrift/Spezification/Cond.de reception
Qualitätsvorschrift/ Quality Instruction; QP00294 Rev. 00; CS-00006
Wärmebehandlung 1.4317 + QT1 gem. EN 10283, in Anlehnung an QP00294 Rev. 00

Gütestufe: *Quality Level*	**Oberflächenrißprüfung – MT -** DIN EN 1369:1996 - an für die MT unzugänglichen Bereichen **Oberflächenrißprüfung – PT –** DIN EN 1371-1:1997	**SM1 / SP1**	mit **„A“** gekennzeichnete Flächen gem. CS-0006
		SM2 / SP2	mit **„B“** gekennzeichnete Flächen gem. CS-0006
		SM3 / SP3	unbearbeitete Flächen
Gütestufe: *Quality Level*	**Volumenprüfung - UT -** EN 12680-1	**1 #**	mit **„A“** gekennzeichnete Bereiche gem. CS-0006 *# - im Tiefenbereich späterer Bearbeitung*
		2	mit **„B“** gekennzeichnete Bereiche gem. CS-0006
		3	restliche und unbearbeitete Bereiche

Wärmebehandlung/ *Heat treatment/Traitement thermique*		**Glühbericht Nr.** *Heat treatment-No.*	**Temperatur [°C]** *Temperature*	**Haltezeit [h]** *Holding time*	**Abkühlung** *Cooling down*
Härten/*Quenching hardening treatment*	☒	**12604**	**1050**	**6**	**Ventilator / fan**
Anlassen/*Tempering*	☒	**12615**	**620**	**8**	**Luft / air**
Spannungsarmglühen/*Stress relieving*	☒	**12701**	**600**	**8**	**Luft / air**

sonstige Wärmebehandlungen/*Other heat treatment steps: 675 °C / 8 h / Luftabkühlung/ cooling on air*

Schmelzanalyse : *Ladle analysis/Analyse de la Charge:* — **Erschmelzungsart : Induktionsofen** *Melting Practice/procédure :* induction furnace/induction four de fusion

Charge-Nr. *Heat-No. No de la Charge*	**Guß-Nr.** *Casting-No Coulee-No*	% C	% Si	% Mn	% P	% S	% Cr	% Mo	% Ni	% Cu	% V
Soll/*Required/Exigé:*	min:						12.00		3.50		
	max:	0.060	1.00	1.00	0.035	0.025	13.50	0.70	5.00	0.30	0.08
1020524	**50048502**	**0,060**	**0,48**	**0,75**	**0,022**	**0,005**	**12,56**	**0,45**	**4,07**	**0,14**	**0,04**

Mechanisch-technologische Prüfung bei Prüftemperatur/*Mechanique Testing at temperature/ Mécanique test*

Charge-Nr. *Heat-No./ No de la Charge*	**Proben-Nr.** *Test-No Eprouv-No.*	**Probenabm./Temp.** *Sample dimens./temp Dimens.d'eprouv/temp..*	**Rp0,2**	**Rm**	**A5**	**AV ISO-V Probe**	**Härte HB**	
		∅ / l_0 [mm] / °C	N/mm²	N/mm²	%	J	HB	
Soll/*Required/Exigé*	min:		550	760	15	27	260	
	max:			960			285	
1020524	**43369**	**10/50/20**	**761**	**931**	**18,8**	**86/82/90**	**265**	

Zerstörungsfreie Prüfung/*Nondestructive Testing/Examen non destructif:*

☒ **Magnetpulverprüfung** *Magnetic Particle Inspection Exam. au Magnaflux* — ☒ **Farbeindringprüfung** *Liquid Penetrant Inspection Exam. au Ressuage* — ☐ **Durchstrahlungsprüfung** *Radiographic Inspection Exam. au Radiographique* — ☒ **US-Prüfung** *Ultrasonic Testing Exam. au Ultra son.* — ☒ **Sichtprüfung** *Visual test contrôle visuel*

Ergebnis / *Result / Résultat:* **Es wurden keine Fehler festgestellt, die die Verwendbarkeit beeinträchtigen**
No faults were found, which would impair the usability/Il n´existe pas de défauls nuisibles à l´utilisation des piecès

sonstige Prüfungen/*Other Testings/Autres examens: Maßkontrolle gem. o.a. Zeichnung und Liefervorschrift – ohne Beanstandung.*

Kennzeichnung erfolgt durch: 371908000 (Sach-Nr.) / 1.4317 (Werkstoffbezeichnung) / S+B Zeichen / 1020524 (Chargen-Nr.) / 148579/136 (Modell-Nr.) / **48502** - auf innerer Lasche nur Chargen-Nr. + Teil-Nr.

Kunde/Abnahmegesellschaft *Customer/Inspection authority/Client/Organisme de réception*	***Datum***/*Date/Date* **23.06.2022**	**SCHMOLZ+BICKENBACH GUSS GmbH** Werk Krefeld • Hülser Straße 810 • 47803 Krefeld Martina Lipphardt **Abnahmebeauftragte/r** *Works Inspector/Le respondsable de l'usine:*

Zertifiziert entsprechend der Europäischen Richtlinie für Druckgeräte 2014/68/EU Anhang I, 4.3 durch die TÜV-Zertifizierungsstelle für Druckgeräte des TÜV Rheinland Industrie Service GmbH – Notifizierte Stelle 0035- mit der Zertifikatsnummer 01 202 617/Q-08 0100/02

Vorlage Drehkolben 20.04.2021.dotx

— 7. —

Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to
Certificat prévu
DIN EN 10204 / 3.1

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No.
Reférénce usine
K21610554/1/1

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Erzeugnis/Lieferbedingung Product/Terms of order Produit/Stipulations de la commande

Rundstahl, geschmiedet, fixlang ges□gt, verg□tet nach Norm (+QT), spannungsarmgegl□ht (+SR), Gl□htemperatur bei ca. 540 - 560□C, Grenztemperatur < 623□C, vorgedreht, Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560□C, limit temperature < 623□C, preturned
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Herstellerzeichen
Suppliers Mark
Marque d usine

Positions-Nr Item Poste	Anzahl Quantity Nombre	Abmessung - Dimension - Dimension [mm]	Schmelze-Nr. Heat No. Coulée No.	Probe-Nr. Test No. No. d essai
1	5	VDM: □ 280 -0/+10 x 3486 mm	30225	115 139

Schmelze-Nr. Heat No. Coulée No.	Chemische Zusammensetzung in % - Chemical Composition % - Composition chimique %										
	C	Si	Mn	P	S	Cr	Mo				
Min.	0,38		0,60			0,90	0,15				
Max.	0,45	0,40	0,90	0,035	0,0350	1,20	0,30				
30225	0,43	0,27	0,74	0,003	0,0010	1,12	0,23				

Probe-Nr. Test-No. No. d essai	Ergebnis der mechanischen Prüfungen - Result of mechanical tests - Resultats des essais mécaniques Zugversuch - Tensile test - Essai de traction						Kerbschlagarbeit - Impact test - Résilience					
	Probenabm. Dim. of test Dim.de l'épr [mm]	Streckgren Yield point Lim. d' elast [N/mm²]	Zugfestigkeit Tensile str. Résistance [N/mm²]	Dehnung Elongatio Allongme %	Einschnüru Red. of Are Striction %	Prüftemp.: Test-temp. Temp. d'e °C	Probenform Sample Eprouvette	Pr.-Richtu Test directi Sens d' es	Einzelwerte Indiv. results Valeurs indiv. J	J	J	Prüftemp. Test-temp. Temp. d'e °C
Soll-Required		500	750	14					30			
115	10x50	703	895	21.6	65.3	20	ISO-V	längs longitudinal	130	132	119	20
Soll-Required		500	750-900	14	55				35			
139	10x50	631	837	21.3	62.3	20	ISO-V	längs longitudinal	88	68	27	20

Chem. Zusammensetzung entspr. Zeugnis Vorlieferant.
Chemical composition according to the original supplier's certificate.
Composition chimique suivant certificat du fournisseur original.

Zeichen des Werksachverständigen
Inspectors Stamps
Sigle d' Inspect. usine

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Seite: 1 (2)

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Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to
Certificat prévu
DIN EN 10204 / 3.1

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No.
Référénce usine
K21610554/1/1

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Sonstige Angaben - Remarks - Remarques

US-gepr□ft nach EN 10228-3 100%, Qualit□tsklasse 3 / US-tested acc. to EN 10228-3 100%, quality class 3

Verformungsgrad / reduction ratio:: 8,37

Erschmelzungsart: Elektrostahl, Blockguss, vakuumentgast
Melting procedure: Electro steel, ingot casting, vacuum degassed

Mengenkontrakt Pos.10
Material: 584221000

Es wird hiermit bestätigt, daß die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.
Nous certifions que les produits indiqués ci dessus sont conformes à la commande.

Herr Stieglitz

Essen, 10.03.2022

Seite: 2 (2)

– 8. –

von schaewen

Lierferwerk / supply site:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

von Schaewen GmbH · Postfach 10 35 62 · 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hückeswagen, 29.03.2021
Ihr Ansprechpartner / your contact:

Durchwahl:+49 0201/8110 -

Herr / Mr Yzerman	-431
Herr / Mr Kunz	-597
Fax	-439
Fax	-352

Umstempel-Bescheinigung / Remark Certification

Best.-Nr. 4500514298

Auftragsnummer / our order no.:	**K22610554/2/2**
Fertigungsauftrag / production no.:	408536; 408537
Bestellnummer / order no.:	4600001935 Pos. 20
Notizen / notes:	US-geprüft nach DIN EN 10228-3 100%, Qualitätsklasse 3 US-tested acc. to EN 10228-3 100%, quality class 3

Wir bestätigen / we confirm that the pieces delivered

2 Stück / piece(s)	Ø 280 - 0/+ 10 x 2864 mm
Werkstoff / material grade:	42CrMo4
Artikel Nr. / article no.:	Rundstahl, gesägt / roundbar, sawn

aus folgenden Abmessungen gefertigt wurden / were made of the following dimensions:

Abmessungen/dimension	Werkstoff/material grade	Schmelze/heat no.	Probe/test no.
1 Stk. aus /piece(s) from 280 RD x 2864 mm	42CrMo4	30122	2195
1Stk. Aus / piece(s) from 280 RD x 2864 mm	42CrMo4	258299	2286

APZ DIN EN 10204/3.1, Zeugnis Nr. / certification no. K21610554/2/1 gemäß der Firma / of company
SSK von Schaewen Hückeswagen GmbH

9 - Herr Kunz 14 - Herr Pohlmann

Seite: 1 (2)

- 8. -

von schaewen

Umstempel-Bescheinigung	Auftragsnummer	Druckdatum
Remark Certification	Order Number	date of printing
	K22610554/2/2	04/03/2022

Die Stempelung wurde vor dem Trennen ordnungsgemäß übertragen.
Zum Zeichen der ordnungsgemäßen Umstempelung wurden die Teile mit unserem Stempel versehen.
Die Umstempelung erfolgt mit der Zustimmung des TÜV Nord, Essen.
Unser Unternehmen ist nach EN ISO 9001 zertifiziert.

The marking was duly transferred before disjunction.
In order to prove the marking is copied according to the original the material was marked by our die. The marking was effected with the consent of TÜV Nord, Essen.
Our company is certified by ISO 9001.

von Schaewen GmbH

Kurz -

Seite: 2 (2)

- 8 -

Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to
Certificat prévu
DIN EN 10204 / 3.1

von schaewen

Hersteller - Producer - Fabricant
SSK von Schaewen
Hückeswagen GmbH
Stahlschmidtsbrücke 20
42499 Hückeswagen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No.
Referénce usine
K21610554/2/2

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Erzeugnis/Lieferbedingung Product/Terms of order Produit/Stipulations de la commande

Rundstahl, geschmiedet, fixlang gesägt, vergütet nach Norm (+QT), spannungsarmgeglüht (+SR), Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C, vorgedreht
Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560°C, limit temperature < 623°C, preturned
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Herstellerzeichen
Suppliers Mark
Marque d usine

Positions-Nr Item Poste	Anzahl Quantity Nombre	Abmessung - Dimension - Dimension [mm]	Schmelze-Nr. Heat No. Coulée No.	Probe-Nr. Test No. No. d essai	Härteprüfung Hardness test Contrôle de dureté HB
2	1	Ø 280 -0/+10 x 2864 mm	258299	2286	255
2	1	Ø 280 -0/+10 x 2864 mm	30122	2195	266

Schmelze-Nr. Heat No. Coulée No.	Chemische Zusammensetzung in % - Chemical Composition % - Composition chimique %										
	C	Si	Mn	P	S	Cr	Mo				
Min.	0,38		0,60			0,90	0,15				
Max.	0,45	0,40	0,90	0,035	0,0350	1,20	0,30				
258299	0,43	0,27	0,71	0,010	0,0060	1,11	0,24				
30122	0,43	0,29	0,74	0,004	0,0010	1,14	0,22				

Probe-Nr. Test-No. No. d essai	Ergebnis der mechanischen Prüfungen - Result of mechanical tests - Resultats des essais mécaniques											
	Zugversuch - Tensile test - Essai de traction						Kerbschlagarbeit - Impact test - Résilience					
	Probenabm. Dim. of test Dim.de l'épr [mm]	Streckgren Yield point Lim. d' elast [N/mm²]	Zugfestigkeit Résistance [N/mm²]	Dehnung Elongatio Allongme %	Einschnüru Red. of Are Striction %	Prüftemp.: Test-temp. Temp. d'e °C	Probenform Sample Eprouvette	Pr.-Richtu Test directi Sens d' es	Einzelwerte Indiv. results Valeurs indiv. J	J	J	Prüftemp. Test-temp. Temp. d'e °C
Soll-Required		500	750-900	10	30				16			
2286	10x50	602	811	17.5	42.2	20	ISO-V	quer transverse	33	46	50	20
Soll-Required		500	750-900	14	55				35			
2195	10x50	666	857	18.5	61	20	ISO-V	längs longitudinal	113	132	89	20

Chem. Zusammensetzung entspr. Zeugnis Vorlieferant.
Chemical composition according to the original supplier's certificate.
Composition chimique suivant certificat du fournisseur original.

Zeichen des Werksachverständigen
Inspectors Stamps
Sigle d' Inspect. usine

Seite: 1 (2)

– 8. –

Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to
Certificat prévu
DIN EN 10204 / 3.1

von schaewen

Hersteller - Producer - Fabricant
SSK von Schaewen
Hückeswagen GmbH
Stahlschmidtsbrücke 20
42499 Hückeswagen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No.
Référénce usine
K21610554/2/2

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Sonstige Angaben - Remarks - Remarques

US-geprüft nach EN 10228-3 100%, Qualitätsklasse 3 / US-tested acc. to EN 10228-3 100%, quality class 3

T. R.

14

Verformungsgrad / reduction ratio:
Charge / heat 30122 = 6,2; Charge / heat 258299 = 6,4

Erschmelzungsart: Elektrostahl, Blockguss, vakuumentgast
Melting procedure: Electro steel, ingot casting, vacuum degassed

Mengenkontrakt Pos. 20
Material: 584222000

Es wird hiermit bestätigt, daß die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.
Nous certifions que les produits indiqués ci dessus sont conformes à la commande.

Herr Pohlmann

Hückeswagen, 04.03.2022

Seite: 2 (2)

— 8. —

von schaewen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hersteller / Producer:
von Schaewen GmbH
Kronprinzenstr. 14 · 45128 Essen

Essen, 04.03.2022

Ihr Ansprechpartner / Your contact:
Durchwahl / Phone: 0201/8110 -

Herr Stieglitz - 395
Telefax - 352

US - Prüfzeugnis / US - testcertificate

Bestellnmmer / Customer Order No.:	Beleg-Nr.: 4600001935 -Mengenkontrakt-		
Auftragsnummer / Works Order No.:	K21610554/2/2		
Prüfort, Datum / Test location in time:	Essen, 31.01.2022		
Prüfgerät / Testing set:	USM 36		
Prüfung gemäß / Testing acc.:	DIN EN 10228-3; Tab. 3: Typ 1a, 100%; Tabelle 5; Qualitätsklasse 3 / table 3; type 1a, 100% quality class 3		
Koppelmedium / Coupling medium:	Öl / oil		
Prüfbereich / Test scope:	0 - 325 mm		
Prüfkopf / Test head:	B2S		
Prüfer / Examiner:	Herr Stieglitz	DIN EN ISO 9712 Stufe/Level:	3
Prüfaufsicht / Test supervisors:	Herr Stieglitz	DIN EN ISO 9712 Stufe/Level:	3

Rundstahl, geschmiedet, fixlang gesägt, vergütet nach Norm (+QT), spannungsarmgeglüht (+SR), Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C, vorgedreht
Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560°C, limit temperature < 623°C, preturned
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Mengenkontrakt Pos. 20
Material: 584222000
***
Abruf 4500512177 Pos 10
Datum: 20.01.2022
1 St

Abruf 4500514298 Pos 10
1 St

Werkstoff / Material: 42CRMO4

Schmelze-Nr. Heat No.	Anzahl Qty.	Abmessung Dimension	Bezugsecho Reference Echo
30122	1	Ø 280 -0/+10 x 2864 mm	51 dB; ohne Beanstandung / without objection
258299	1	Ø 280 -0/+10 x 2864 mm	51 dB; ohne Beanstandung / without

Seite / Page: 1 (2)

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von schaewen

US - Prüfzeugnis / US - testcertificate

Auftragsnummer / Works Order No.
K21610554/2/2

Essen
04.03.2022

Schmelze-Nr. Heat No.	Anzahl Qty.	Abmessung Dimension	Bezugsecho Reference Echo
			objection

von Schaewen GmbH

Seite / Page: 2 (2)

— 8. —

von schaewen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hersteller / Producer:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

Hückeswagen, 04.03.2022

Ihr Ansprechpartner / Your contact:
Durchwahl / Phone: 0201/8110 -

Herr Pohlmann -552
Fax -534

Warmbehandlungsbescheinigung
Certification of heat treatment

Bescheinigung gemäß DIN EN 10204/3.1
Certification acc. to DIN EN 10204/3.1

Bestellnummer / Customer Order No.:	Beleg-Nr.: 4600001935 -Mengenkontrakt-
Auftragsnummer / Works Order No.:	K21610554/2/2
Fertigungsauftrag / FA No.:	408536, 408537
Schmelze Nr. / Heat No.:	30122, 258299
Werkstoff / Material:	42CRMO4
Abmessung / Dimension:	Ø 280 -0/+10 x 2864 mm
Anzahl / Quantity:	1; 1
Zeichnung / Drawing No.:	

Rundstahl, geschmiedet, fixlang gesägt, vergütet nach Norm (+QT), spannungsarmgeglüht (+SR), Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C, vorgedreht
Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560°C, limit temperature < 623°C, preturned

Schmelze Nr. / Heat No.: 30122

Wärmebehandlung Heat treatment	Temperatur Temperature	Haltezeit Holding time	Abkühlmedium Cooling medium
Härten / hardening	860 °C	6 h	Polymer / Polymer
Anlassen / termpering	620 °C	12 h	Luft / Air
Entspannen / thermal stress relief	550 °C	6 h	Ofen / Furnace

Schmelze Nr. / Heat No.: 258299

Wärmebehandlung Heat treatment	Temperatur Temperature	Haltezeit Holding time	Abkühlmedium Cooling medium
Härten / hardening	860 °C	6 h	Polymer / Polymer
Anlassen / termpering	620 °C	12 h	Luft / Air
Entspannen / thermal stress relief	550 °C	6 h	Ofen / Furnace

Sonstige Angaben - Remarks
Mengenkontrakt Pos. 20
Material: 584222000

Seite / Page: 1 (2)

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von schaewen

Warmbehandlungsbescheinigung
Certification of heat treatment

Auftragsnummer / Works Order No.: K21610554

Datum / Date 04.03.2022

SSK von Schaewen Hückeswagen GmbH

Herr Pohlmann

Es wird hiermit bestätigt, dass die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.

Seite / Page: 2 (2)

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500486420

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 29.09.2021

Aerzener Maschinenfabrik GmbH
--

Zeichnungs-Nr.: drawing nr. 4900000677"7"

Reherweg 28

unsere Komm.-Nr.: work order nr. 10001427

DE 31855 Aerzen

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 14601

Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0041	26112102

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,7	2,16	0,24	0,025	0,006	0,054	0,025	0,003	0,03	0,028	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	375	242	24,5	135	15	15	14	15	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 14.01.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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HegerGuss GmbH

— 10. —

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500486419

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 29.09.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28

Zeichnungs-Nr.: drawing nr. 4900000677"7"

unsere Komm.-Nr.: work order nr. 1001426

DE 31855 Aerzen

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 14541

	Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
	1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0040	23112103

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,78	2,21	0,28	0,026	0,009	0,051	0,04	0,003	0,031	0,029	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	389	260	24,9	140	13	11	11	12	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 17.12.2021
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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HegerGuss GmbH

Serial no.4003561

Fertigungsauftrag/ Order:	1307571	ESNR / Mat. No. Stage:	35232000
FBNR / Serialni.:	4113561		
Typ/Type:	GQb 22.23	FENR / Workplace:	FE 1321

Führungsliste / Compilation list

Registrierung von Stempelungen

Gem. QH00469

AERZEN

Gebläse / Blower

Bezeichnung / Description	Materialnummer / Material No.	Charge / Schmelze / Heat No. / Probe / Sample / Gießdatum / Casting date	Rohteilnummer / No. Raw material
Zahnradpaar / Gear	140241000	01-2022 005	
Zylinder / Cylinder	171904000	1012355 0012 HQ 14042022	
Radkasten / Wheel cover	157178000	24021221	
Gehäusedeckel-OT / Housing cover	157179000	CH833321	
Gehäusedeckel-UT / Housing cover	157179000	CH836121	
A-Kolben / Male piston	184271000	1020577	
N-Kolben / Female piston	184272000	1020569	
A-Welle / Drive shaft	184271000	30225/139/4500514297/584221000	
N-Welle / Driven shaft	184272000	28807/1786/1500469436/384222000	
Seitenplatte AS / Sideplate	141094000	08 04 2022	
Seitenplatte RS / Sideplate	171905000	17 02 2022	
Gleitringdichtung / Mechanical seal	2000054906	1664394	
Gleitringdichtung / Mechanical seal	2000054906	1664395	
Gleitringdichtung / Mechanical seal	2000054906	1664396	
Gleitringdichtung / Mechanical seal	2000054906	1664397	

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500490108

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 15.10.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28
DE 31855 Aerzen

Zeichnungs-Nr.: drawing nr. 4900005222"05"

unsere Komm.-Nr.: work order nr. 10001471

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15485

	Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
	1	1	Zylinder GQB22.23	4900005222"05"	EN-GJS-400-18-LT	1012355 0012	14042206

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,64	2,24	0,2	0,024	0,004	0,054	0,031	0,003	0,027	0,025	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		380	230	15		9	9	9	12		
act.	1	381	249	22,7	137	13	13	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 03.05.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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HegerGuss GmbH

HEGERGUSS	Prüfprotokoll EN Test cartificate 10204	3.1	Ultraschallprüfung Ultrasonic Examination	Fehlermeldung Nr.	Blatt 1

Gußstück: casting:	**Zylinder GQB22.23**	**Besteller-Nr.** Order-Nr.	**4500490108**	**Koppelmittel:** couplant: ☒ **Kleister**/glue ☐ **Öl**/oil	**Auftrags Nr: 10001471**
Werkstoff material	**EN - GJS - 400 - 18 LT**	**Besteller:** purchaser	**Aerzener Maschinenfabrik**	**Verfahren:** method: ☒ **AVG-Diagramm**	
Ident.-Nr.	**4900005222"04"**	**Prüfumfang:** extent of testing:	☒ **Anweisung / Zeichnung / Prüfplan** **instruction / drawing / I & T plan**		
Wärmebehandelt heat treated	☐ **ja/yes** ☒ **nein/no**	**Anweisungen:** instructions:	☒ **DIN EN 12680-3, Gütestufe 2** ☐	**Prüfplan/I** & T plan	
Oberflächenzustand surface condition	**gestrahlt** blasted	**Gerät-Nr.** instrument	☒ **USM 35** ☐ **USN58L**	**Stück-Nr.** item no.	**1012355 0012**

Prüfkopf probe	MHz	Kontrollkörper ref. block	Bezugsempfindlichkeit ref. sens. (dB)	Schallweg sound path (mm)	Schallweg St. sound path piece (mm)	Prüfempfindlichkeit testing sensit. (dB)	ERG Ø	QB Ø	Einsch. Richtung direction of incid.	Anzeige Nr. Display No.	Blatt Nr. Page No.
SEB2S	**2**	**Bauteil/casting**	**34**	**100**	**80**	**25**	**3**		**A**		

	Prüfergebnis / results	**Bemerkungen /**remarks
X	**keine registrierpflichtigen Anzeigen** non recordable indications	
	registrierpflichtige Anzeigen recordable indications	**Alle Maße von der Rohgußkontur** all measures from the raw casting
	Bewertungspflichtige Anzeigen inadmissible indications	
	Befund lt. Beilage result see addendum	

Schallgeschwindigkeit: Sound velocity: **5632 m/s**

Datum date	Prüfer examiner	Prüfaufsicht supervisor	Datum date	Kunde customer
02.05.2022	HEGERGUSS GmbH Qualitätsstelle Eilmes 12			

— 2. —

olsberg
innovativ. seit 1577

Olsberg GmbH, Postfach 1362, 59932 Olsberg

Aerzener Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Olsberg GmbH
Hüttenstraße 38
59939 Olsberg

Telefon 0049 2962/805-0
Fax 0049 2962/805-181

Unsere Abteilung/
Our Department: **GQF**
Hausruf/ Tel. Ext.: **0049 2962/ 805-261**

Datum/ Date: **13.Dezember.2021**

Abnahmeprüfzeugnis
Inspection Certificate
EN 10204 3.1
(DIN 50049 3.1B)

Nr./ No.
6315/ 33785

Zeichen des Herstellers
Mark of Manufacture: **oh**

Benennung / designation: **Radkasten**
Modell-Nr. / pattern-no: **140300-8 (557178000)**
Olsberg- Nr/Olsberg-part-no: **53/1026.1410**

Besteller / customer:
Aerzener Maschinenfabrik GmbH

Bestellungs-Nr./ Order No.: **4500490101**
vom/ of: **15.10.2021**

Auftrags-Nr./ Order No.: **2021/219539/1**

Werkstoff/ DIN/ Spezification:
EN-GJS-400-15U **DIN EN 1563**
GGG-40 **DIN 1693**

Erschmelzungsart/ Melting-furace: **Elektroofen/ Electric furace/**

Lieferbedingungen/ Terms of Delivery
lt. Vereinbarung / according to agreement

Erzeugnisform/ Product: **Rohguß / Raw Casting**

Anzahl/ Quantity	Gegenstand/ Description	Masse pro Teil/ Weight per part (kg)	Schmelzen-Nr. Cast-No Los-Nr./ Lot-No.	Chemische Zusammensetzung (Schmelzanalyse) Chemische Composition of Coast (in %) C	Si	Mn	P	S	Mg	
1	140300-8 (557178000)	1415	02.12.2021	3,583	1,901	0,157	0,016	0,007	0,055	

Zugfestigkeit/ Tensile strength [MPa]		Dehngrenze/ Proof Stress Rp0,2 [MPa]	Bruchdehnung/ Elongation A5 [%]	Härte/Hardness [HBW 5/750] DIN EN ISO 6506-1		Kerbschlagarbeit / Impact Value KV² in Joule bei -20° C DIN EN ISO 148-1			
Zugversuch nach /Tensile testing according DIN EN ISO 6892-1						1	2	3	x-quer
uWD50	447	267	16,4	uWD50	164				

Bemerkung/ remark: **aufgegossenes Gießdatum: 021221 24**

Lieferung gemäß/ delivery according	Vorschrift / rule	Index	vom/date
☐ QH00510A Rev01 Vorschrift für den Beschichtungsaufbau		01	02.11.2021
☐ QP00200 - Vorschrift für die Lieferung von Gussrohteilen		03	26.07.2016
☐ QT01714		01	

Olsberg GmbH
i.V.
Digital unterschrieben von i.V. Burkhard Rüther
DN: cn=i.V. Burkhard Rüther, o=Olsberg GmbH, ou=QM Gusstechnik, email=burkhard.ruether@olsberg.com, c=DE
Datum: 2021.12.15 13:09:34 +01'00'
FH

Abnahmebeauftragter / manufacturer's authorized representative

Es wird bestätigt, daß die Lieferung geprüft wurde und den Vereinbarungen der Bestellannahme entspricht.

Hereby we confirm, that the delivery was checked and complies with the declarations of the purchase order.

incoming-inspection@aerzen.com
Fax-Nr.: +49 5154 819191 gefaxt: ☐ **Seite** *1* **von** *1*

10.1.F21 Rev. 9

Olsberg GmbH, 59939 Olsberg; Amtsgericht Arnsberg HRB 3730; Geschäftsführer Ulrich Herrmann und Stefan Osebold

– 3. –

SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 19.01.22

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét ..... :2 Gehäusedeckel Oberteil
Bestell-Nr./ Order No./ Commande No. ..... :4500491112
Modell-Nr./ Pattern No./ Modèle No ..... :140301-8
Kom.-Nr./ Our Order No./ Notre commande No ..... :21023888.10
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557181000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8361-21	3,54	2,21	0,15	0,042	0,010	0,041			2	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8361-21	296	429	25						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Sphäritisierung Spheroidal Spheroídal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

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SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 17.12.21

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét..... :1 Gehäusedeckel Unterteil
Bestell-Nr./ Order No./ Commande No. ..... :4500488515
Modell-Nr./ Pattern No./ Modèle No..... :140302-8
Kom.-Nr./ Our Order No./ Notre commande No..... :21023734.10
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557180000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8333-21	3,74	2,31	0,16	0,046	0,009	0,050			1	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8333-21	305	438	24						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Sphäritisierung Spheroidal Spheroïdal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

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– 5. –

SCHMOLZ + BICKENBACH

SCHMOLZ+BICKENBACH GUSS GmbH,
Werk Krefeld • Postfach 10 20 51 • 47720 Krefeld

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Abnahmeprüfzeugnis
Inspection Certificate/Certificat de reception
nach/*according/suivant* DIN EN 10204 – 3.1

Nr. /*No.* 6013/22 Lip

Bestellung/*Order-No./Commande-No.* 4500490974 — **vom**/*from* 20.10.2021

Auftrags-Nr./*Our Order-No./Notre No. de Commande* 3230016572 (50048507)

Menge/*Quantity/Quanite* 1 — **Kund-Ident-Nr.**/*Ident-No./No. d´identification* 371908000

Gegenstand/*Object/Objet* Drehkolben GQ22.23-2

Zeichnungs-Nr./*Drawing-No./Plan-No.* 4900005224/000/ Vers. 05

Modell-Nr./*Pattern-No./Modele-No.* 148579/136

Werkstoff/*Material/Matière* 1.4317 / GX4CrNi13-4
gemäß./ acc. to EN 10213 / EN 10283 & QP00294

Abnahmevorschrift/*Spezification/Cond.de reception*
Qualitätsvorschrift/ Quality Instruction; QP00294 Rev. 00; CS-00006
Wärmebehandlung 1.4317 + QT1 gem. EN 10283, in Anlehnung an QP00294 Rev. 00

Gütestufe: *Quality Level*	**Oberflächenrißprüfung – MT -** DIN EN 1369:1996 - an für die MT unzugänglichen Bereichen **Oberflächenrißprüfung – PT –** DIN EN 1371-1:1997	**SM1 / SP1**	mit **„A“** gekennzeichnete Flächen gem. CS-0006
		SM2 / SP2	mit **„B“** gekennzeichnete Flächen gem. CS-0006
		SM3 / SP3	unbearbeitete Flächen
Gütestufe: *Quality Level*	**Volumenprüfung - UT -** EN 12680-1	**1 #**	mit **„A“** gekennzeichnete Bereiche gem. CS-0006 *# - im Tiefenbereich späterer Bearbeitung*
		2	mit **„B“** gekennzeichnete Bereiche gem. CS-0006
		3	restliche und unbearbeitete Bereiche

Wärmebehandlung/ *Heat treatment/Traitement thermique*		**Glühbericht Nr.** *Heat treatment-No.*	**Temperatur [°C]** *Temperature*	**Haltezeit [h]** *Holding time*	**Abkühlung** *Cooling down*
Härten/*Quenching hardening treatment*	☒	**12667**	**1050**	**7**	**Ventilator / fan**
Anlassen/*Tempering*	☒	**12677**	**620**	**8**	**Luft / air**
Spannungsarmglühen/*Stress relieving*	☒	**12740**	**600**	**7**	**Luft / air**

sonstige Wärmebehandlungen/*Other heat treatment steps: 675 °C / 8 h / Luftabkühlung/ cooling on air*

Schmelzanalyse : *Ladle analysis/Analyse de la Charge:* — **Erschmelzungsart : Induktionsofen** *Melting Practice/procédure* : induction furnace/induction four de fusion

Charge-Nr. *Heat-No. No de la Charge*	**Guß-Nr.** *Casting-No Coulee-No*		**% C**	**% Si**	**% Mn**	**% P**	**% S**	**% Cr**	**% Mo**	**% Ni**	**% Cu**	**% V**
Soll/*Required/Exigé:*		**min:**						12.00		3.50		
		max:	0.060	1.00	1.00	0.035	0.025	13.50	0.70	5.00	0.30	0.08
1020577	**50048507**		**0,043**	**0,55**	**0,77**	**0,024**	**0,003**	**12,50**	**0,50**	**4,07**	**0,12**	**0,04**

***M*echanisch-technologische Prüfung bei Prüftemperatur**/*Mechanique Testing at temperature/ Mécanique test*

Charge-Nr. *Heat-No./ No de la Charge*	**Proben-Nr.** *Test-No Eprouv-No.*		**Probenabm./Temp.** *Sample dimens./temp Dimens.d'eprouv/temp..*	**Rp0,2**	**Rm**	**A5**	**AV ISO-V Probe**	**Härte HB**	
			∅ / l_0 [mm] / °C	N/mm²	N/mm²	%	J	HB	
Soll/*Required/Exigé*		**min:**		550	760	15	27	260	
		max:			960			285	
1020577	**43435**		**10/50/20**	**812**	**939**	**18,6**	**90/98/92**	**275**	

Zerstörungsfreie Prüfung/*Nondestructive Testing/Examen non destructif:*

☒ **Magnetpulverprüfung** *Magnetic Particle Inspection Exam. au Magnaflux*
☒ **Farbeindringprüfung** *Liquid Penetrant Inspection Exam. au Ressuage*
☐ **Durchstrahlungsprüfung** *Radiographic Inspection Exam. au Radiographique*
☒ **US-Prüfung** *Ultrasonic Testing Exam. au Ultra son.*
☒ **Sichtprüfung** *Visual test contrôle visuel*

Ergebnis / *Result / Résultat:* **Es wurden keine Fehler festgestellt, die die Verwendbarkeit beeinträchtigen**
No faults were found, which would impair the usability/Il n´existe pas de défauls nuisibles à l´utilisation des piecès

sonstige Prüfungen/*Other Testings/Autres examens: Maßkontrolle gem. o.a. Zeichnung und Liefervorschrift – ohne Beanstandung.*

Kennzeichnung erfolgt durch: 371908000 (Sach-Nr.) / 1.4317 (Werkstoffbezeichnung) / S+B Zeichen / 1020577 (Chargen-Nr.) / 148579/136 (Modell-Nr.) / **48507** - auf innerer Lasche nur Chargen-Nr. + Teil-Nr.

Kunde/Abnahmegesellschaft *Customer/Inspection authority/Client/Organisme de réception*

Datum/*Date/Date* **29.04.2022**

SCHMOLZ+BICKENBACH GUSS GmbH
Werk Krefeld • Hülser Straße 810 • 47803 Krefeld
Martina Lipphardt
Abnahmebeauftragte/r
Works Inspector/Le respondsable de l'usine:

Zertifiziert entsprechend der Europäischen Richtlinie für Druckgeräte 2014/68/EU Anhang I, 4.3 durch die TÜV-Zertifizierungsstelle für Druckgeräte des TÜV Rheinland Industrie Service GmbH – Notifizierte Stelle 0035- mit der Zertifikatsnummer 01 202 617/Q-08 0100/02

Vorlage Drehkolben 20.04.2021.dotx

— 6. —

SCHMOLZ + BICKENBACH

SCHMOLZ+BICKENBACH GUSS GmbH,
Werk Krefeld • Postfach 10 20 51 • 47720 Krefeld

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Abnahmeprüfzeugnis
Inspection Certificate/Certificat de reception
nach/*according/suivant* DIN EN 10204 – 3.1

Nr. /*No.* 6012/22 Lip

Bestellung/*Order-No./Commande-No.* 4500490974 — **vom**/*from* 20.10.2021

Auftrags-Nr./*Our Order-No./Notre No. de Commande* 3230016572 (50048504)

Menge/*Quantity/Quanite* 1 — **Kund-Ident-Nr.**/*Ident-No./No. d´identification* 371908000

Gegenstand/*Object/Objet* Drehkolben GQ22.23-2

Zeichnungs-Nr./*Drawing-No./Plan-No.* 4900005224/000/ Vers. 05

Modell-Nr./*Pattern-No./Modele-No.* 148579/136

Werkstoff/*Material/Matière* 1.4317 / GX4CrNi13-4
gemäß./ acc. to EN 10213 / EN 10283 & QP00294

Abnahmevorschrift/*Spezification/Cond.de reception*
Qualitätsvorschrift/ Quality Instruction; QP00294 Rev. 00; CS-00006
Wärmebehandlung 1.4317 + QT1 gem. EN 10283, in Anlehnung an QP00294 Rev. 00

Gütestufe: *Quality Level*	**Oberflächenrißprüfung – MT -** DIN EN 1369:1996 - an für die MT unzugänglichen Bereichen **Oberflächenrißprüfung – PT –** DIN EN 1371-1:1997	**SM1 / SP1**	mit **„A“** gekennzeichnete Flächen gem. CS-0006
		SM2 / SP2	mit **„B“** gekennzeichnete Flächen gem. CS-0006
		SM3 / SP3	unbearbeitete Flächen
Gütestufe: *Quality Level*	**Volumenprüfung - UT -** EN 12680-1	**1 #**	mit **„A“** gekennzeichnete Bereiche gem. CS-0006 *# - im Tiefenbereich späterer Bearbeitung*
		2	mit **„B“** gekennzeichnete Bereiche gem. CS-0006
		3	restliche und unbearbeitete Bereiche

Wärmebehandlung/ *Heat treatment/Traitement thermique*		**Glühbericht Nr.** *Heat treatment-No.*	**Temperatur [°C]** *Temperature*	**Haltezeit [h]** *Holding time*	**Abkühlung** *Cooling down*
Härten/*Quenching hardening treatment*	☒	**12667**	**1050**	**7**	**Ventilator / fan**
Anlassen/*Tempering*	☒	**12677**	**620**	**8**	**Luft / air**
Spannungsarmglühen/*Stress relieving*	☒	**12740**	**600**	**7**	**Luft / air**

sonstige Wärmebehandlungen/*Other heat treatment steps: 675 °C / 8 h / Luftabkühlung/ cooling on air*

Charge-Nr. *Heat-No. No de la Charge* — **Guß-Nr.** *Casting-No Coulee-No* — **Schmelzanalyse :** *Ladle analysis/Analyse de la Charge:* — **Erschmelzungsart : Induktionsofen** *Melting Practice/procédure :* induction furnace/induction four de fusion

		% C	% Si	% Mn	% P	% S	% Cr	% Mo	% Ni	% Cu	% V
Soll/*Required/Exigé:*	**min:**						12.00		3.50		
	max:	0.060	1.00	1.00	0.035	0.025	13.50	0.70	5.00	0.30	0.08
1020569	**50048504**	**0,041**	**0,49**	**0,79**	**0,024**	**0,004**	**12,33**	**0,53**	**4,44**	**0,14**	**0,04**

Mechanisch-technologische Prüfung bei Prüftemperatur/*Mechanique Testing at temperature/ Mécanique test*

Charge-Nr. *Heat-No./ No de la Charge*	**Proben-Nr.** *Test-No Eprouv-No.*	**Probenabm./Temp.** *Sample dimens./temp Dimens.d'eprouv/temp..*	**Rp0,2**	**Rm**	**A5**	**AV ISO-V Probe**	**Härte HB**	
		∅ / l_0 [mm] / °C	N/mm²	N/mm²	%	J	HB	
Soll/*Required/Exigé* **min:**			550	760	15	27	260	
max:				960			285	
1020569	**43432**	**10/50/20**	**767**	**928**	**19,3**	**98/100/96**	**265**	

Zerstörungsfreie Prüfung/*Nondestructive Testing/Examen non destructif:*

☒ **Magnetpulverprüfung** *Magnetic Particle Inspection Exam. au Magnaflux* — ☒ **Farbeindringprüfung** *Liquid Penetrant Inspection Exam. au Ressuage* — ☐ **Durchstrahlungsprüfung** *Radiographic Inspection Exam. au Radiographique* — ☒ **US-Prüfung** *Ultrasonic Testing Exam. au Ultra son.* — ☒ **Sichtprüfung** *Visual test contrôle visuel*

Ergebnis / *Result / Résultat:* **Es wurden keine Fehler festgestellt, die die Verwendbarkeit beeinträchtigen**
No faults were found, which would impair the usability/Il n´existe pas de défauls nuisibles à l´utilisation des piecès

sonstige Prüfungen/*Other Testings/Autres examens: Maßkontrolle gem. o.a. Zeichnung und Liefervorschrift – ohne Beanstandung.*

Kennzeichnung erfolgt durch: 371908000 (Sach-Nr.) / 1.4317 (Werkstoffbezeichnung) / S+B Zeichen /
1020569 (Chargen-Nr.) / 148579/136 (Modell-Nr.) / **48504** - auf innerer Lasche nur Chargen-Nr. + Teil-Nr.

Kunde/Abnahmegesellschaft *Customer/Inspection authority/Client/Organisme de réception*	***Datum***/*Date/Date* **29.04.2022**	**SCHMOLZ+BICKENBACH GUSS GmbH** Werk Krefeld • Hülser Straße 810 • 47803 Krefeld Martina Lipphardt **Abnahmebeauftragte/r** *Works Inspector/Le respondsable de l'usine:*

Zertifiziert entsprechend der Europäischen Richtlinie für Druckgeräte 2014/68/EU Anhang I, 4.3 durch die TÜV-Zertifizierungsstelle für Druckgeräte des TÜV Rheinland Industrie Service GmbH – Notifizierte Stelle 0035- mit der Zertifikatsnummer 01 202 617/Q-08 0100/02

Vorlage Drehkolben 20.04.2021.dotx

- 7. -

Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to
Certificat prévu
DIN EN 10204 / 3.1

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No.
Reférénce usine
K21610554/1/1

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Erzeugnis/Lieferbedingung Product/Terms of order Produit/Stipulations de la commande

Rundstahl, geschmiedet, fixlang ges□gt, verg□tet nach Norm (+QT), spannungsarmgegl□ht (+SR), Gl□htemperatur bei ca. 540 - 560□C, Grenztemperatur < 623□C, vorgedreht, Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560□C, limit temperature < 623□C, preturned
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Herstellerzeichen
Suppliers Mark
Marque d usine

Positions-Nr Item Poste	Anzahl Quantity Nombre	Abmessung - Dimension - Dimension [mm]	Schmelze-Nr. Heat No. Coulée No.	Probe-Nr. Test No. No. d essai
1	5	VDM: □ 280 -0/+10 x 3486 mm	30225	115 139

Schmelze-Nr. Heat No. Coulée No.	Chemische Zusammensetzung in % - Chemical Composition % - Composition chimique %										
	C	Si	Mn	P	S	Cr	Mo				
Min.	0,38		0,60			0,90	0,15				
Max.	0,45	0,40	0,90	0,035	0,0350	1,20	0,30				
30225	0,43	0,27	0,74	0,003	0,0010	1,12	0,23				

Probe-Nr. Test-No. No. d essai	Ergebnis der mechanischen Prüfungen - Result of mechanical tests - Resultats des essais mécaniques Zugversuch - Tensile test - Essai de traction						Kerbschlagarbeit - Impact test - Résilience					
	Probenabm. Dim. of test Dim.de l'épr [mm]	Streckgren Yield point Lim. d' elast [N/mm²]	Zugfestigkeit Tensile str. Résistance [N/mm²]	Dehnung Elongatio Allongme %	Einschnüru Red. of Are Striction %	Prüftemp.: Test-temp. Temp. d'e °C	Probenform Sample Eprouvette	Pr.-Richtu Test directi Sens d' es	Einzelwerte Indiv. results Valeurs indiv. J	J	J	Prüftemp. Test-temp. Temp. d'e °C
Soll-Required		500	750	14					30			
115	10x50	703	895	21.6	65.3	20	ISO-V	längs longitudinal	130	132	119	20
Soll-Required		500	750-900	14	55				35			
139	10x50	631	837	21.3	62.3	20	ISO-V	längs longitudinal	88	68	27	20

Chem. Zusammensetzung entspr. Zeugnis Vorlieferant.
Chemical composition according to the original supplier's certificate.
Composition chimique suivant certificat du fournisseur original.

Zeichen des Werksachverständigen
Inspectors Stamps
Sigle d' Inspect. usine

15

Seite: 1 (2)

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Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No. K21610554/1/1
Référénce usine

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Sonstige Angaben - Remarks - Remarques

US-gepr□ft nach EN 10228-3 100%, Qualit□tsklasse 3 / US-tested acc. to EN 10228-3 100%, quality class 3

Verformungsgrad / reduction ratio:: 8,37

Erschmelzungsart: Elektrostahl, Blockguss, vakuumentgast
Melting procedure: Electro steel, ingot casting, vacuum degassed

Mengenkontrakt Pos.10
Material: 584221000

Es wird hiermit bestätigt, daß die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.
Nous certifions que les produits indiqués ci dessus sont conformes à la commande.

Herr Stieglitz

Essen, 10.03.2022

Seite: 2 (2)

— 8. —

Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to
Certificat prévu
DIN EN 10204 / 3.1

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen AG • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No.
Reférénce usine
K21605675/1/1

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
4500469436

Erzeugnis/Lieferbedingung Product/Terms of order Produit/Stipulations de la commande

Rundstahl, geschmiedet mit allseitiger Bearbeitungszugabe gemäß QP00296 Rev. 01 und QH00476, fixlang gesägt, vorgedreht auf die vorgenannten Vordrehmaße gemäß QP00296 Rev. 01 und QH00476, vergütet gemäß QP00296 Rev. 01 und QH00476, spannungsarmgeglüht (+SR) nach dem Sägen und der mechanischen Vorbearbeitung, Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C
roundbar, forged with machening alloance on all sides acc. to QP00296 Rev. 01 and QH00476, sawn fixed length, preturned dimension acc. to QP00296 Rev. 01 and QH00476, quenched and tempered acc. to QP00296 Rev. 01 and QH00476, stressed relieved (+SR) after cutting and mechaning, annealing temperature approx 540 - 560°C, limit temperature < 623°C
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Herstellerzeichen
Suppliers Mark
Marque d usine

Positions-Nr Item Poste	Anzahl Quantity Nombre	Abmessung - Dimension - Dimension [mm]	Schmelze-Nr. Heat No. Coulée No.	Probe-Nr. Test No. No. d essai	Härteprüfung Hardness test Contrôle de dureté HB
1	1	Ø 285 x 2864 mm	28807	1786	255
1	1	Ø 285 x 2864 mm	29129	1785	239

Schmelze-Nr. Heat No. Coulée No.	Chemische Zusammensetzung in % - Chemical Composition % - Composition chimique %										
	C	Si	Mn	P	S	Cr	Mo				
Min.	0,38		0,60			0,90	0,15				
Max.	0,45	0,40	0,90	0,035	0,0350	1,20	0,30				
28807	0,41	0,25	0,74	0,004	0,0019	1,14	0,23				
29129	0,41	0,26	0,74	0,006	0,0014	1,13	0,23				

Probe-Nr. Test-No. No. d essai	Ergebnis der mechanischen Prüfungen - Result of mechanical tests - Resultats des essais mécaniques Zugversuch - Tensile test - Essai de traction						Kerbschlagarbeit - Impact test - Résilience					
	Probenabm. Dim. of test Dim.de l'épr [mm]	Streckgren Yield point Lim. d' elast [N/mm²]	Zugfestigkeit Tensile str. Résistance [N/mm²]	Dehnung Elongatio Allongme %	Einschnüru Red. of Are Striction %	Prüftemp. Test-temp. Temp. d'e °C	Probenform Sample Eprouvette	Pr.-Richtu Test directi Sens d' es	Einzelwerte Indiv. results Valeurs indiv. J	J	J	Prüftemp. Test-temp. Temp. d'e °C
Soll-Required		500	750-900	14	55				35			
1786	10x50	607	806	22.1	61.4	20	ISO-V	längs longitudinal	53	64	94	20
Soll-Required		500	750-900	14	55				35			
1785	10x50	668	839	17.8	65.3	20	ISO-V	längs longitudinal	141	138	140	20

Seite: 1 (2)

— 8. —

Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen AG • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No. K21605675/1/1
Référénce usine

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
4500469436

Chem. Zusammensetzung entspr. Zeugnis Vorlieferant.
Chemical composition according to the original supplier's certificate.
Composition chimique suivant certificat du fournisseur original.

Sonstige Angaben - Remarks - Remarques

US-geprüft nach QP00296 Rev. 01 und QH00476

Verformungsgrad / reduction ratio: 6,31

Erschmelzungsart: Elektrostahl, Blockguss, vakuumentgast
Melting procedure: Electro steel, ingot casting, vacuum degassed

Pos. 10
Material: 584222000

Zeichen des Werksachverständigen
Inspectors Stamps
Sigle d' Inspect. usine

15

Es wird hiermit bestätigt, daß die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.
Nous certifions que les produits indiqués ci dessus sont conformes à la commande.

Herr Stieglitz

Essen, 24.11.2021

Seite: 2 (2)

– 8. –

von schaewen

von Schaewen AG • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hersteller / Producer:
von Schaewen AG
Kronprinzenstr. 14 · 45128 Essen

Essen, 24.11.2021

Ihr Ansprechpartner / Your contact:
Durchwahl / Phone: 0201/8110 -

Herr Stieglitz - 395
Telefax - 352

US - Prüfzeugnis / US - testcertificate

Bestellnmmer / Customer Order No.:	4500469436		
Auftragsnummer / Works Order No.:	K21605675/1/1		
Prüfort, Datum / Test location in time:	Essen, 04.11.2021		
Prüfgerät / Testing set:	USM 36		
Prüfung gemäß / Testing acc.:	QP00296 Rev. 01 und QH00476 / QP00296 Rev. 01 and QH00476		
Koppelmedium / Coupling medium:	Öl / oil		
Prüfbereich / Test scope:	0 - 300 mm		
Prüfkopf / Test head:	B2S		
Prüfer / Examiner:	Herr Stieglitz	DIN EN ISO 9712 Stufe/Level:	3
Prüfaufsicht / Test supervisors:	Herr Stieglitz	DIN EN ISO 9712 Stufe/Level:	3

Rundstahl, geschmiedet mit allseitiger Bearbeitungszugabe gemäß QP00296 Rev. 01 und QH00476, fixlang gesägt, vorgedreht auf die vorgenannten Vordrehmaße gemäß QP00296 Rev. 01 und QH00476, vergütet gemäß QP00296 Rev. 01 und QH00476, spannungsarmgeglüht (+SR) nach dem Sägen und der mechanischen Vorbearbeitung, Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C
roundbar, forged with machening alloance on all sides acc. to QP00296 Rev. 01 and QH00476, sawn fixed length, preturned dimension acc. to QP00296 Rev. 01 and QH00476, quenched and tempered acc. to QP00296 Rev. 01 and QH00476, stressed relieved (+SR) after cutting and mechaning, annealing temperature approx 540 - 560°C, limit temperature < 623°C

Werkstoff / Material: 42CRMO4/DIN EN 10250

Schmelze-Nr. Heat No.	Anzahl Qty.	Abmessung Dimension	Bezugsecho Reference Echo
29129	1	Ø 285 x 2864 mm	58 dB; ohne Beanstandung / without objection
28807	1	Ø 285 x 2864 mm	58 dB; ohne Beanstandung / without objection

sonstige Angaben / Remarks: Pos. 10
Material: 584222000

Seite / Page: 1 (2)

— 8. —

von schaewen

US - Prüfzeugnis / US - testcertificate

Auftragsnummer /
Works Order No.
K21605675/1/1

Essen
24.11.2021

von Schaewen AG

Seite / Page: 2 (2)

— 8. —

von schaewen

von Schaewen AG • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hersteller / Producer:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

Hückeswagen, 24.11.2021

Ihr Ansprechpartner / Your contact:
Durchwahl / Phone: 0201/8110 -

Herr Pohlmann -552
Fax -534

Warmbehandlungsbescheinigung
Certification of heat treatment

Bescheinigung gemäß DIN EN 10204/3.1
Certification acc. to DIN EN 10204/3.1

Bestellnummer / Customer Order No.:	4500469436
Auftragsnummer / Works Order No.:	K21605675/1/1
Fertigungsauftrag / FA No.:	376593, 386940
Schmelze Nr. / Heat No.:	29129, 28807
Werkstoff / Material:	42CRMO4/DIN EN 10250
Abmessung / Dimension:	Ø 285 x 2864 mm
Anzahl / Quantity:	1; 1
Zeichnung / Drawing No.:	

Rundstahl, geschmiedet mit allseitiger Bearbeitungszugabe gemäß QP00296 Rev. 01 und QH00476, fixlang gesägt, vorgedreht auf die vorgenannten Vordrehmaße gemäß QP00296 Rev. 01 und QH00476, vergütet gemäß QP00296 Rev. 01 und QH00476, spannungsarmgeglüht (+SR) nach dem Sägen und der mechanischen Vorbearbeitung, Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C
roundbar, forged with machening alloance on all sides acc. to QP00296 Rev. 01 and QH00476, sawn fixed length, preturned dimension acc. to QP00296 Rev. 01 and QH00476, quenched and tempered acc. to QP00296 Rev. 01 and QH00476, stressed relieved (+SR) after cutting and mechaning, annealing temperature approx 540 - 560°C, limit temperature < 623°C

Schmelze Nr. / Heat No.: 29129

Wärmebehandlung Heat treatment	Temperatur Temperature	Haltezeit Holding time	Abkühlmedium Cooling medium
Härten / hardening	860 °C	6 h	Polymer / Polymer
Anlassen / termpering	620 °C	12 h	Luft / Air
Entspannen / thermal stress relief	550 °C	6 h	Ofen / Furnace

Sonstige Angaben - Remarks
Pos. 10
Material: 584222000

SSK von Schaewen Hückeswagen GmbH

T. P.

Herr Pohlmann

Seite / Page: 1 (2)

- 8. -

von schaewen

Warmbehandlungsbescheinigung
Certification of heat treatment

Auftragsnummer / Works Order No.:	Datum / Date
K21605675	24.11.2021

Es wird hiermit bestätigt, dass die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.

Seite / Page: 2 (2)

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500490106

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 15.10.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28
DE 31855 Aerzen

Zeichnungs-Nr.: drawing nr. 4900000677"7"

unsere Komm.-Nr.: work order nr. 10001466

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15423

	Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
	1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0056	08042206

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,7	2,2	0,22	0,027	0,004	0,052	0,025	0,002	0,026	0,024	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	376	242	24,2	137	13	14	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 22.04.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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HegerGuss GmbH

— 10. —

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500486426

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 29.09.2021

Aerzener Maschinenfabrik GmbH
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Zeichnungs-Nr.: drawing nr. 4900000677"7"

Reherweg 28

unsere Komm.-Nr.: work order nr. 10001430

DE 31855 Aerzen

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15104

Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0049	17022206

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,65	2,23	0,24	0,029	0,003	0,049	0,023	0,002	0,027	0,026	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	384	242	25,8	143	13	14	14	14	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 18.03.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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HegerGuss GmbH

Stage 2
Serial no. 4115273

Fertigungsauftrag/ Order:	1307572	ESNR / Mat. No. Stage:	35232000
FBNR / Serialni.:	4115273		
Typ/Type:	GQb 22.23	FENR / Workplace:	1321

Führungsliste / Compilation list
Registrierung von Stempelungen
Gem. QH00469

AERZEN
Gebläse / Blower

Bezeichnung / Description	Materialnummer / Material No.	Charge / Schmelze / Heat No. / Probe / Sample / Gießdatum / Casting date	Rohteilnummer / No. Raw material
Zahnradpaar / Gear	140241000		
Zylinder / Cylinder	171904000	08042022 1012355011	Cert. 1 - 571904000
Radkasten / Wheel cover	157178000	250222 27	Cert.2 - 557178000
Gehäusedeckel-OT / Housing cover	157179000	CH833421	Cert. 3 - 557181000
Gehäusedeckel-UT / Housing cover	157179000	836221	Cert. 4 - 557180000
A-Kolben / Male piston	184271000	1020567 92	Cert. 5 - 37190800
N-Kolben / Female piston	184272000	1020568 94	Cert. 6 - 37190800
A-Welle / Drive shaft		30225/114/4500514297 584221000	Cert. 7 - 584221000
N-Welle / Driven shaft		30122/94/4600001935120 SR 91	Cert. 8 - 584222000
Seitenplatte AS / Sideplate	141094000	10123540062 04052022 HQ	Cert. 9 - 540299000
Seitenplatte RS / Sideplate	171905000	10123540057 27042022 HQ	Cert. 10 - 540299000
Gleitringdichtung / Mechanical seal	2000054906	1665900	
Gleitringdichtung / Mechanical seal	2000054906	1665901	
Gleitringdichtung / Mechanical seal	2000054906	1665899	
Gleitringdichtung / Mechanical seal	2000054906	1665898	

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HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500490107

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 15.10.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28

Zeichnungs-Nr.: drawing nr. 4900005222"05"

unsere Komm.-Nr.: work order nr. 10001467

DE 31855 Aerzen

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15453

	Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
	1	1	Zylinder GQB22.23	4900005222"05"	EN-GJS-400-18-LT	1012355 0011	08042205

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,68	2,28	0,22	0,026	0,004	0,052	0,027	0,005	0,026	0,025	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		380	230	15		9	9	9	12		
act.	1	386	247	24,9	140	13	13	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 28.04.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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HegerGuss GmbH

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olsberg
innovativ. seit 1577

Olsberg GmbH, Postfach 1362, 59932 Olsberg

Aerzener Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Olsberg GmbH
Hüttenstraße 38
59939 Olsberg

Telefon 0049 2962/805-0
Fax 0049 2962/805-181

Unsere Abteilung/
Our Department: **GQF**
Hausruf/ Tel. Ext.: **0049 2962/ 805-261**

Datum/ Date: **01.April.2022**

Abnahmeprüfzeugnis
Inspection Certificate
EN 10204 3.1
(DIN 50049 3.1B)

Nr./ No.
6409/ 33958

Zeichen des Herstellers
Mark of Manufacture: **oh**

Benennung / designation: **Radkasten**
Modell-Nr. / pattern-no: **140300-8 (557178000)**
Olsberg- Nr/Olsberg-part-no: **53/1026.1410**

Besteller / customer:
Aerzener Maschinenfabrik GmbH

Bestellungs-Nr./ Order No.: **4500509219**
vom/ of: **10.01.2022**

Auftrags-Nr./ Order No.: **2022/200623/1**

Werkstoff/ DIN/ Spezification:
EN-GJS-400-15U DIN EN 1563
GGG-40 DIN 1693

Erschmelzungsart/ Melting-furace: **Elektroofen/ Electric furace/**

Lieferbedingungen/ Terms of Delivery
lt. Vereinbarung / according to agreement

Erzeugnisform/ Product: **Rohguß / Raw Casting**

Anzahl/ Quantity	Gegenstand/ Description	Masse pro Teil/ Weight per part (kg)	Schmelzen-Nr. Cast-No Los-Nr./ Lot-No.	Chemische Zusammensetzung (Schmelzanalyse) Chemische Composition of Coast (in %) C	Si	Mn	P	S	Mg	
1	140300-8 (557178000)	1415	25.02.2022	3,643	2,142	0,135	0,055	0,01	0,052	

Zugfestigkeit/ Tensile strength [MPa]		Dehngrenze/ Proof Stress Rp0,2 [MPa]	Bruchdehnung/ Elongation A5 [%]	Härte/Hardness [HBW 5/750] DIN EN ISO 6506-1		Kerbschlagarbeit / Impact Value KV² in Joule bei -20° C DIN EN ISO 148-1			
Zugversuch nach /Tensile testing according DIN EN ISO 6892-1						1	2	3	x-quer
uWD50	449	284	17,7	uWD50	167				

Bemerkung/ remark: **aufgegossenes Gießdatum: 250222 27**

Lieferung gemäß/ delivery according	Vorschrift / rule	Index	vom/date
☐ QT01714		01	
☐ QP00200 Index 06 2017-04-07 Anmerkungen Olsberg		06	07.04.2017
☐ QH00510A Rev01 Vorschrift für den Beschichtungsaufbau		01	02.11.2021

Olsberg GmbH
i.V.
Digital unterschrieben von i.V. Burkhard Rüther
DN: cn=i.V. Burkhard Rüther, o=Olsberg GmbH, ou=QM Gusstechnik, email=burkhard.ruether@olsberg.com, c=DE
Datum: 2022.04.04 07:49:50 +02'00'
FH

Abnahmebeauftragter / manufacturer's authorized representative

Es wird bestätigt, daß die Lieferung geprüft wurde und den Vereinbarungen der Bestellannahme entspricht.

Hereby we confirm, that the delivery was checked and complies with the declarations of the purchase order.

incoming-inspection@aerzen.com
Fax-Nr.: +49 5154 819191

gefaxt: ☐ **Seite** *1* **von** *1*

10.1.F21 Rev. 9

Olsberg GmbH, 59939 Olsberg; Amtsgericht Arnsberg HRB 3730; Geschäftsführer Ulrich Herrmann und Stefan Osebold

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SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 10.01.22

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét..... :2 Gehäusedeckel Oberteil
Bestell-Nr./ Order No./ Commande No. ..... :4500491110
Modell-Nr./ Pattern No./ Modèle No ..... :140301-8
Kom.-Nr./ Our Order No./ Notre commande No..... :21023891.10
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557181000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8334-21	3,64	2,30	0,14	0,042	0,008	0,047			2	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8334-21	302	438	24						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Spharitisierung Spheroidal Spheroidal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

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SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 14.01.22

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét..... :2 Gehäusedeckel Unterteil
Bestell-Nr./ Order No./ Commande No. ..... :4500491087
Modell-Nr./ Pattern No./ Modèle No..... :140302-8
Kom.-Nr./ Our Order No./ Notre commande No..... :21023898.10
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557180000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8362-21	3,54	2,21	0,15	0,042	0,010	0,041			2	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8362-21	296	429	25						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Sphäritisierung Spheroidal Spheroïdal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

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SCHMOLZ + BICKENBACH

SCHMOLZ+BICKENBACH GUSS GmbH,
Werk Krefeld • Postfach 10 20 51 • 47720 Krefeld

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Abnahmeprüfzeugnis
Inspection Certificate/Certificat de reception
nach/*according/suivant* DIN EN 10204 – 3.1

Nr. */No.* 6022/22 Lip

Bestellung/*Order-No./Commande-No.* 4500490975 — **vom**/*from* 20.10.2021

Auftrags-Nr./*Our Order-No./Notre No. de Commande* 3230016573 (50048505)

Menge/*Quantity/Quanite* 1 — **Kund-Ident-Nr.**/*Ident-No./No. d´identification* 371908000

Gegenstand/*Object/Objet* Drehkolben GQ22.23-2

Zeichnungs-Nr./*Drawing-No./Plan-No.* 4900005224/000/ Vers. 05

Modell-Nr./*Pattern-No./Modele-No.* 148579/136

Werkstoff/*Material/Matière*
1.4317 / GX4CrNi13-4
gemäß./ acc. to EN 10213 / EN 10283 & QP00294

Abnahmevorschrift/*Spezification/Cond.de reception*
Qualitätsvorschrift/ Quality Instruction; QP00294 Rev. 00; CS-00006
Wärmebehandlung 1.4317 + QT1 gem. EN 10283, in Anlehnung an QP00294 Rev. 00

Gütestufe: *Quality Level*	**Oberflächenrißprüfung – MT -** DIN EN 1369:1996 - an für die MT unzugänglichen Bereichen **Oberflächenrißprüfung – PT –** DIN EN 1371-1:1997	**SM1 / SP1**	mit **„A“** gekennzeichnete Flächen gem. CS-0006
		SM2 / SP2	mit **„B“** gekennzeichnete Flächen gem. CS-0006
		SM3 / SP3	unbearbeitete Flächen
Gütestufe: *Quality Level*	**Volumenprüfung - UT -** EN 12680-1	**1 #**	mit **„A“** gekennzeichnete Bereiche gem. CS-0006 *# - im Tiefenbereich späterer Bearbeitung*
		2	mit **„B“** gekennzeichnete Bereiche gem. CS-0006
		3	restliche und unbearbeitete Bereiche

Wärmebehandlung/ *Heat treatment/Traitement thermique*		**Glühbericht Nr.** *Heat treatment-No.*	**Temperatur [°C]** *Temperature*	**Haltezeit [h]** *Holding time*	**Abkühlung** *Cooling down*
Härten/*Quenching hardening treatment*	☒	**12686**	**1050**	**6**	**Ventilator / fan**
Anlassen/*Tempering*	☒	**12691**	**620**	**8**	**Luft / air**
Spannungsarmglühen/*Stress relieving*	☒	**12755**	**600**	**8**	**Luft / air**

sonstige Wärmebehandlungen/*Other heat treatment steps: 675 °C / 8 h / Luftabkühlung/ cooling on air*

Schmelzanalyse : *Ladle analysis/Analyse de la Charge:* — **Erschmelzungsart : Induktionsofen** *Melting Practice/procédure :* induction furnace/induction four de fusion

Charge-Nr. *Heat-No. No de la Charge*	**Guß-Nr.** *Casting-No Coulee-No*		**% C**	**% Si**	**% Mn**	**% P**	**% S**	**% Cr**	**% Mo**	**% Ni**	**% Cu**	**% V**
Soll/*Required/Exigé:*		**min:**						12.00		3.50		
		max:	0.060	1.00	1.00	0.035	0.025	13.50	0.70	5.00	0.30	0.08
1020567	**50048505**		**0,049**	**0,51**	**0,74**	**0,023**	**0,003**	**12,48**	**0,51**	**4,05**	**0,12**	**0,04**

Mechanisch-technologische Prüfung bei Prüftemperatur/*Mechanique Testing at temperature/ Mécanique test*

Charge-Nr. *Heat-No./ No de la Charge*	**Proben-Nr.** *Test-No Eprouv-No.*		**Probenabm./Temp.** *Sample dimens./temp Dimens.d'eprouv/temp..*	**Rp0,2**	**Rm**	**A5**	**AV ISO-V Probe**	**Härte HB**	
			∅ / l_0 [mm] / °C	N/mm²	N/mm²	%	J	HB	
Soll/*Required/Exigé*		**min:**		550	760	15	27	260	
		max:			960			285	
1020567	**43422**		**10/50/20**	**817**	**948**	**19,7**	**100/96/96**	**275**	

Zerstörungsfreie Prüfung/*Nondestructive Testing/Examen non destructif:*

☒ **Magnetpulverprüfung** *Magnetic Particle Inspection Exam. au Magnaflux*
☒ **Farbeindringprüfung** *Liquid Penetrant Inspection Exam. au Ressuage*
☐ **Durchstrahlungsprüfung** *Radiographic Inspection Exam. au Radiographique*
☒ **US-Prüfung** *Ultrasonic Testing Exam. au Ultra son.*
☒ **Sichtprüfung** *Visual test contrôle visuel*

Ergebnis / *Result / Résultat:* **Es wurden keine Fehler festgestellt, die die Verwendbarkeit beeinträchtigen**
No faults were found, which would impair the usability/Il n´existe pas de défauls nuisibles à l´utilisation des piecès

sonstige Prüfungen/*Other Testings/Autres examens: Maßkontrolle gem. o.a. Zeichnung und Liefervorschrift – ohne Beanstandung.*

Kennzeichnung erfolgt durch: 371908000 (Sach-Nr.) / 1.4317 (Werkstoffbezeichnung) / S+B Zeichen / 1020567 (Chargen-Nr.) / 148579/136 (Modell-Nr.) / **48505** - auf innerer Lasche nur Chargen-Nr. + Teil-Nr.

Kunde/Abnahmegesellschaft *Customer/Inspection authority/Client/Organisme de réception*	***Datum***/*Date/Date* **09.05.2022**	**SCHMOLZ+BICKENBACH GUSS GmbH** Werk Krefeld • Hülser Straße 810 • 47803 Krefeld **Martina Lipphardt** **Abnahmebeauftragte/r** *Works Inspector/Le respondsable de l'usine:*

Zertifiziert entsprechend der Europäischen Richtlinie für Druckgeräte 2014/68/EU Anhang I, 4.3 durch die TÜV-Zertifizierungsstelle für Druckgeräte des TÜV Rheinland Industrie Service GmbH – Notifizierte Stelle 0035- mit der Zertifikatsnummer 01 202 617/Q-08 0100/02

Vorlage Drehkolben 20.04.2021.dotx

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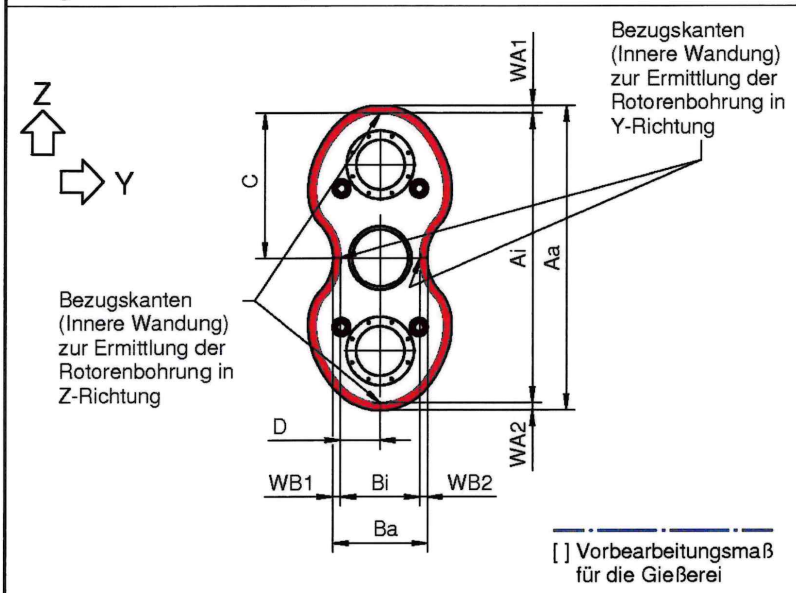
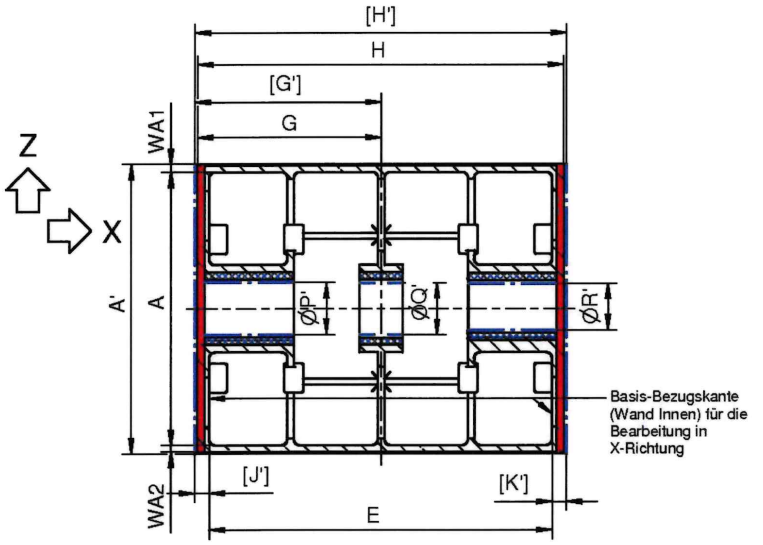
3230016573, 50048505
Nr. 92, Charge 1020567
Best.-Nr. 4500490975

2. Messprotokolle

2.1 Messprotokoll Drehkolben

Bezugsmaße für Vorbearbeitung und Ist-Maße





Prüfmaße (von Gießerei ausfüllen)

Ai	1411 - 1419	
WA1	50 - 52	
WA2	50 - 56	
Bi	328	
WB1	58 - 64	
WB2	56 - 64	
E	1433 - 1345	
H'	1551	
J'	53 - 60	
K'	53 - 58	
P'	254	
Q'	258	
R'	254	

Y-Z Ebene:
1. Maß Ai bestimmen und C= Ai/2 anreißen.
2. Maß Bi bestimmen und D=Bi/2 anreißen
=> Rotorbohrung ist definiert

3. Maße A,A',B,B',C,C',D,D'E,E', F, F' kontrollieren.

X-Z Ebene:
4. Maß E bestimmen und Mitte des Drehkolbens in X-Richtung festlegen = E/2
5. G und G' sowie H und H' anreißen

Naben:
6. Radius P', Q',R' um die erzeugte Wellenachse anreißen

Gdanietz
06.05.2022

					Datum	Name	
g							**Stahlguss Spezifikation**
f				Bearb.	25.05.2010	Borchers	**Drehkolben**
e				Gepr.	-	-	
d							
c				**Aerzener Maschinenfabrik GmbH 31855-Aerzen-Germany**			CS-00006 — Format: A4
b							
a	15745	07.04.2011	Borchers				Seite 4 von 5
Zust.	Änderung	Datum	Name	Ursprung:		Ers. Für:	Ers. Durch:

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SCHMOLZ + BICKENBACH

SCHMOLZ+BICKENBACH GUSS GmbH,
Werk Krefeld • Postfach 10 20 51 • 47720 Krefeld

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Abnahmeprüfzeugnis

Inspection Certificate/Certificat de reception
nach/*according/suivant* DIN EN 10204 – 3.1

Nr. /*No.* 6023/22 Lip

Bestellung/*Order-No./Commande-No.* 4500490975 — **vom**/*from* 20.10.2021

Auftrags-Nr./*Our Order-No./Notre No. de Commande* 3230016573 (50048506)

Menge/*Quantity/Quanite* 1 — **Kund-Ident-Nr.**/*Ident-No./No. d´identification* 371908000

Gegenstand/*Object/Objet* Drehkolben GQ22.23-2

Zeichnungs-Nr./*Drawing-No./Plan-No.* 4900005224/000/ Vers. 05

Modell-Nr./*Pattern-No./Modele-No.* 148579/136

Werkstoff/*Material/Matière*
1.4317 / GX4CrNi13-4
gemäß./ acc. to EN 10213 / EN 10283 & QP00294

Abnahmevorschrift/*Spezification/Cond.de reception*
Qualitätsvorschrift/ Quality Instruction; QP00294 Rev. 00; CS-00006
Wärmebehandlung 1.4317 + QT1 gem. EN 10283, in Anlehnung an QP00294 Rev. 00

Gütestufe: *Quality Level*	**Oberflächenrißprüfung – MT** - DIN EN 1369:1996 - an für die MT unzugänglichen Bereichen **Oberflächenrißprüfung – PT –** DIN EN 1371-1:1997	**SM1 / SP1**	mit **„A“** gekennzeichnete Flächen gem. CS-0006
		SM2 / SP2	mit **„B“** gekennzeichnete Flächen gem. CS-0006
		SM3 / SP3	unbearbeitete Flächen
Gütestufe: *Quality Level*	**Volumenprüfung - UT** - EN 12680-1	**1 #**	mit **„A“** gekennzeichnete Bereiche gem. CS-0006 *# - im Tiefenbereich späterer Bearbeitung*
		2	mit **„B“** gekennzeichnete Bereiche gem. CS-0006
		3	restliche und unbearbeitete Bereiche

Wärmebehandlung/ *Heat treatment/Traitement thermique*		**Glühbericht Nr.** *Heat treatment-No.*	**Temperatur [°C]** *Temperature*	**Haltezeit [h]** *Holding time*	**Abkühlung** *Cooling down*
Härten/*Quenching hardening treatment*	☒	**12683**	**1050**	**6**	**Ventilator / fan**
Anlassen/*Tempering*	☒	**12691**	**620**	**8**	**Luft / air**
Spannungsarmglühen/*Stress relieving*	☒	**12766**	**600**	**8**	**Luft / air**

sonstige Wärmebehandlungen/*Other heat treatment steps: 675 °C / 8 h / Luftabkühlung/ cooling on air*

Charge-Nr. *Heat-No. No de la Charge* — **Guß-Nr.** *Casting-No Coulee-No* — **Schmelzanalyse :** *Ladle analysis/Analyse de la Charge:* — **Erschmelzungsart : Induktionsofen** *Melting Practice/procédure :* induction furnace/induction four de fusion

		% C	% Si	% Mn	% P	% S	% Cr	% Mo	% Ni	% Cu	% V
Soll/*Required/Exigé:*	**min:**						12.00		3.50		
	max:	0.060	1.00	1.00	0.035	0.025	13.50	0.70	5.00	0.30	0.08
1020568	**50048506**	**0,052**	**0,54**	**0,77**	**0,024**	**0,004**	**12,53**	**0,51**	**4,00**	**0,13**	**0,04**

***M*echanisch-technologische Prüfung bei Prüftemperatur**/*Mechanique Testing at temperature/ Mécanique test*

Charge-Nr. *Heat-No./ No de la Charge*	**Proben-Nr.** *Test-No Eprouv-No.*	**Probenabm./Temp.** *Sample dimens./temp Dimens.d'eprouv/temp..*	**Rp0,2**	**Rm**	**A5**	**AV ISO-V Probe**	**Härte HB**	
		∅ / l_0 [mm] / °C	N/mm²	N/mm²	%	J	HB	
Soll/*Required/Exigé* **min:**			550	760	15	27	260	
max:				960			285	
1020568	**43429**	**10/50/20**	**771**	**926**	**21,2**	**120/108/112**	**265**	

Zerstörungsfreie Prüfung/*Nondestructive Testing/Examen non destructif:*

☒ **Magnetpulverprüfung** *Magnetic Particle Inspection Exam. au Magnaflux* — ☒ **Farbeindringprüfung** *Liquid Penetrant Inspection Exam. au Ressuage* — ☐ **Durchstrahlungsprüfung** *Radiographic Inspection Exam. au Radiographique* — ☒ **US-Prüfung** *Ultrasonic Testing Exam. au Ultra son.* — ☒ **Sichtprüfung** *Visual test contrôle visuel*

Ergebnis / *Result / Résultat:* **Es wurden keine Fehler festgestellt, die die Verwendbarkeit beeinträchtigen**
No faults were found, which would impair the usability/Il n´existe pas de défauls nuisibles à l´utilisation des piecès

sonstige Prüfungen/*Other Testings/Autres examens: Maßkontrolle gem. o.a. Zeichnung und Liefervorschrift – ohne Beanstandung.*

Kennzeichnung erfolgt durch: 371908000 (Sach-Nr.) / 1.4317 (Werkstoffbezeichnung) / S+B Zeichen /
1020568 (Chargen-Nr.) / 148579/136 (Modell-Nr.) / **48506** - auf innerer Lasche nur Chargen-Nr. + Teil-Nr.

Kunde/Abnahmegesellschaft *Customer/Inspection authority/Client/Organisme de réception*	***Datum***/*Date/Date* **10.05.2022**	**SCHMOLZ+BICKENBACH GUSS GmbH** Werk Krefeld • Hülser Straße 810 • 47803 Krefeld **Martina Lipinhardt** **Abnahmebeauftragte/r** *Works Inspector/Le respondsable de l'usine:*

Zertifiziert entsprechend der Europäischen Richtlinie für Druckgeräte 2014/68/EU Anhang I, 4.3 durch die TÜV-Zertifizierungsstelle für Druckgeräte des TÜV Rheinland Industrie Service GmbH – Notifizierte Stelle 0035- mit der Zertifikatsnummer 01 202 617/Q-08 0100/02

Vorlage Drehkolben 20.04.2021.dotx

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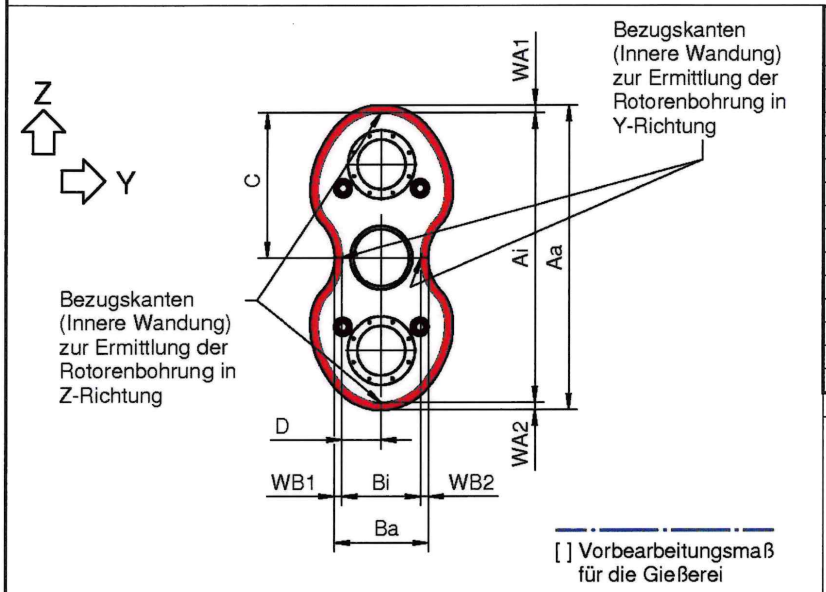
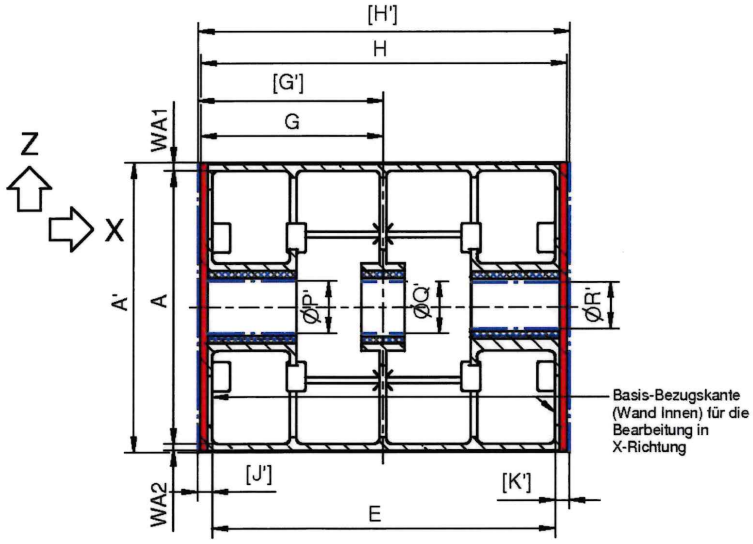
3230016573, 50048506
Nr. 94, Charge 1020568
Best.-Nr. 4500490975

2. Messprotokolle

2.1 Messprotokoll Drehkolben

Bezugsmaße für Vorbearbeitung und Ist-Maße





Prüfmaße (von Gießerei ausfüllen)		
Ai	1408 - 1418	
WA1	50 - 53	
WA2	51 - 58	
Bi	327	
WB1	53 - 63	
WB2	57 - 63	
E	1432	
H'	1550	
J'	58	
K'	58	
P'	255	
Q'	259	
R'	255	

Y-Z Ebene:
1. Maß Ai bestimmen und C= Ai/2 anreißen.
2. Maß Bi bestimmen und D=Bi/2 anreißen
=> Rotorbohrung ist definiert

3. Maße A,A',B,B',C,C',D,D'E,E', F, F' kontrollieren.

X-Z Ebene:
4. Maß E bestimmen und Mitte des Drehkolbens in X-Richtung festlegen = E/2
5. G und G' sowie H und H' anreißen

Naben:
6. Radius P', Q',R' um die erzeugte Wellenachse anreißen

Gdanietz
10.05.2022

					Datum	Name	**Stahlguss Spezifikation** **Drehkolben**	
g								
f				Bearb.	25.05.2010	Borchers		
e				Gepr.	-	-		
d								
c				**Aerzener Maschinenfabrik GmbH 31855-Aerzen-Germany**			CS-00006	Format: A4
b								
a	15745	07.04.2011	Borchers					Seite 4 von 5
Zust.	Änderung	Datum	Name	Ursprung:			Ers. Für:	Ers. Durch:

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Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to
Certificat prévu

DIN EN 10204 / 3.1

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No.
Référénce usine
K21610554/1/1

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Erzeugnis/Lieferbedingung Product/Terms of order Produit/Stipulations de la commande

Rundstahl, geschmiedet, fixlang ges□gt, verg□tet nach Norm (+QT), spannungsarmgegl□ht (+SR), Gl□htemperatur bei ca. 540 - 560□C, Grenztemperatur < 623□C, vorgedreht, Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560□C, limit temperature < 623□C, preturned
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Herstellerzeichen
Suppliers Mark
Marque d usine

Positions-Nr Item Poste	Anzahl Quantity Nombre	Abmessung - Dimension - Dimension [mm]	Schmelze-Nr. Heat No. Coulée No.	Probe-Nr. Test No. No. d essai
1	5	VDM: □ 280 -0/+10 x 3486 mm	30225	115 139

Schmelze-Nr. Heat No. Coulée No.	Chemische Zusammensetzung in % - Chemical Composition % - Composition chimique %										
	C	Si	Mn	P	S	Cr	Mo				
Min.	0,38		0,60			0,90	0,15				
Max.	0,45	0,40	0,90	0,035	0,0350	1,20	0,30				
30225	0,43	0,27	0,74	0,003	0,0010	1,12	0,23				

Probe-Nr. Test-No. No. d essai	Ergebnis der mechanischen Prüfungen - Result of mechanical tests - Resultats des essais mécaniques Zugversuch - Tensile test - Essai de traction						Kerbschlagarbeit - Impact test - Résilience					
	Probenabm. Dim. of test Dim.de l'épr [mm]	Streckgren Yield point Lim. d' elast [N/mm²]	Zugfestigkeit Tensile str. Résistance [N/mm²]	Dehnung Elongatio Allongme %	Einschnüru Red. of Are Striction %	Prüftemp.: Test-temp. Temp. d'e °C	Probenform Sample Eprouvette	Pr.-Richtu Test directi Sens d' es	Einzelwerte Indiv. results Valeurs indiv. J	J	J	Prüftemp. Test-temp. Temp. d'e °C
Soll-Required		500	750	14					30			
115	10x50	703	895	21.6	65.3	20	ISO-V	längs longitudinal	130	132	119	20
Soll-Required		500	750-900	14	55				35			
139	10x50	631	837	21.3	62.3	20	ISO-V	längs longitudinal	88	68	27	20

Chem. Zusammensetzung entspr. Zeugnis Vorlieferant.
Chemical composition according to the original supplier's certificate.
Composition chimique suivant certificat du fournisseur original.

Zeichen des Werksachverständigen
Inspectors Stamps
Sigle d' Inspect. usine

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Seite: 1 (2)

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Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to
Certificat prévu
DIN EN 10204 / 3.1

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No.
Référénce usine
K21610554/1/1

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Sonstige Angaben - Remarks - Remarques

US-gepr□ft nach EN 10228-3 100%, Qualit□tsklasse 3 / US-tested acc. to EN 10228-3 100%, quality class 3

Verformungsgrad / reduction ratio:: 8,37

Erschmelzungsart: Elektrostahl, Blockguss, vakuumentgast
Melting procedure: Electro steel, ingot casting, vacuum degassed

Mengenkontrakt Pos.10
Material: 584221000

Es wird hiermit bestätigt, daß die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.
Nous certifions que les produits indiqués ci dessus sont conformes à la commande.

Herr Stieglitz

Essen, 10.03.2022

Seite: 2 (2)

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von schaewen

Lieferwerk / supply site:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

von Schaewen GmbH · Postfach 10 35 62 · 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hückeswagen, 29.03.2021
Ihr Ansprechpartner / your contact:

Durchwahl:+49 0201/8110 -

Herr / Mr Yzerman	-431
Herr / Mr Kunz	-597
Fax	-439
Fax	-352

Umstempel-Bescheinigung / Remark Certification

Auftragsnummer / our order no.:	**K22610554/2/1**
Fertigungsauftrag / production no.:	396200
Bestellnummer / order no.:	4600001935 Pos. 20
Notizen / notes:	US-geprüft nach DIN EN 10228-3 100%, Qualitätsklasse 3 US-tested acc. to EN 10228-3 100%, quality class 3

Wir bestätigen / we confirm that the pieces delivered

5 Stück / piece(s)	Ø 280 - 0/+ 10 x 2864 mm
Werkstoff / material grade:	42CrMo4
Artikel Nr. / article no.:	Rundstahl, gesägt / roundbar, sawn

aus folgenden Abmessungen gefertigt wurden / were made of the following dimensions:

Abmessungen/dimension	Werkstoff/material grade	Schmelze/heat no.	Probe/test no.
5 Stk. aus /piece(s) from 280 RD x 2864 mm	42CrMo4	30122	2195

APZ DIN EN 10204/3.1, Zeugnis Nr. / certification no. K21610554/2/1 gemäß der Firma / of company
SSK von Schaewen Hückeswagen GmbH

9 - Herr Kunz 14 - Herr Pohlmann

Seite: 1 (2)

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von schaewen

Umstempel-Bescheinigung	Auftragsnummer	Druckdatum
Remark Certification	Order Number	date of printing
	K22610554/2/1	04/03/2022

Die Stempelung wurde vor dem Trennen ordnungsgemäß übertragen.
Zum Zeichen der ordnungsgemäßen Umstempelung wurden die Teile mit unserem Stempel versehen.
Die Umstempelung erfolgt mit der Zustimmung des TÜV Nord, Essen.
Unser Unternehmen ist nach EN ISO 9001 zertifiziert.

The marking was duly transferred before disjunction.
In order to prove the marking is copied according to the original the material was marked by our die. The marking was effected with the consent of TÜV Nord, Essen.
Our company is certified by ISO 9001.

von Schaewen GmbH

Kurz

Seite: 2 (2)

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HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500501467

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 03.12.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28
DE 31855 Aerzen

Zeichnungs-Nr.: drawing nr. 4900000677"7"

unsere Komm.-Nr.: work order nr. 10001570

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15572

	Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
	1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0062	04052206

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,66	2,19	0,22	0,027	0,005	0,056	0,036	0,003	0,028	0,028	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	376	244	23,3	137	13	13	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 19.05.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig /
This document has been created and is valid without signature

HegerGuss GmbH

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HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500490109

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 15.10.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28
DE 31855 Aerzen

Zeichnungs-Nr.: drawing nr. 4900000677"7"

unsere Komm.-Nr.: work order nr. 10001473

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15534

	Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
	1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0057	27042204

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,66	2,16	0,22	0,027	0,007	0,047	0,035	0,005	0,036	0,034	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	376	243	24,4	143	13	13	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 12.05.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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HegerGuss GmbH

Serial no. 411524

Fertigungsauftrag/ Order:	1307573	ESNR / Mat. No. Stage:	35232000
FBNR / Serialni.:	4775420		
Typ/Type:	GQb22.23	FENR / Workplace:	1321

Material Liste / Material-Reference List

Gem. QH00469

AERZEN

Gebläse / Blower

Bezeichnung / Description	Materialnummer / Material No.	Charge / Schmelze / Heat No. / Probe / Sample / Gießdatum / Casting date	No.	Rohteilnummer / No. Raw material
Zahnradpaar / Gear	140241000	05-2022 004		
Zylinder / Cylinder	171904000	1012355 0014	1.	571904000
Radkasten / Wheel cover	157178000	180322 30	2.	557178000
Gehäusedeckel-OT / Housing cover	157179000	833421	3.	557181000
Gehäusedeckel-UT / Housinf cover	157179000	829921 8333-21	4.	557180000
A-Kolben / Male piston	18271000	K 69336 W30 122 94	5.	371908000
N-Kolben / Female piston	18472000	K 69381 W258 28 112	6.	371908000
A-Welle / Drive shaft	18472100	30229 4500514297	7.	584221000
N-Welle / Driven shaft	18472000	30122 4600001935	8.	584222000
Seitenplatte AS / Sideplate	141094000	1012 35 400 60 2204 2022	9.	540299000
Seitenplatte RS / Sideplate	171905000	1012 35 400061 2904 2022	10.	
Gleitringdichtung / Mechanical seal	2000054906	166 50 95		
Gleitringdichtung / Mechanical seal	2000054906	166 50 96		
Gleitringdichtung / Mechanical seal	2000054906	166 50 97		
Gleitringdichtung / Mechanical seal	2000054906	166 50 98		

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HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: (order nr.) 4500490109

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: (date of order) 15.10.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28
DE 31855 Aerzen

Zeichnungs-Nr.: (drawing nr.) 4900005222"05"

unsere Komm.-Nr.: (work order nr.) 10001473

☐ **Werkszeugnis** (test report) nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** (inspection certificate) nach DIN 10204-3.1

Nr.: 15601

	Nr. (item)	Stückzahl (number)	Erzeugnis (product)	Modell-Nr (pattern nr.)	Werkstoff (material)	Stück-Nr. (part nr.)	Schmelze-Nr (melt nr.)
	1	1	Zylinder GQB22.23	4900005222"05"	EN-GJS-400-18-LT	1012355 0014	03052207

	lfd. Nr. (item)	Chemische Zusammensetzung (Schmelzanalyse) [%] (chemical composition (melting analysis))										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,64	2,13	0,2	0,029	0,005	0,053	0,03	0,004	0,03	0,03	

	lfd. Nr. (item)	Zugfestigkeit (tensile strength DIN EN ISO 6892-1) [MPa]	0,2-Grenze (0,2-limit) [MPa]	Dehnung (elongation Lo = 5 d) [%]	Härte (hardness DIN EN 10 003-1) [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel (average)	Erschmelzungsart (melting process)	Produktvorschrift (Product specification)
target min.		380	230	15		9	9	9	12		
act.	1	381	247	22,6	137	13	13	13	13	MF Induktionsofen (induction melting furnace)	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum (Date) 19.05.2022

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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HegerGuss GmbH

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olsberg
innovativ. seit 1577

Olsberg GmbH, Postfach 1362, 59932 Olsberg

Aerzener Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Olsberg GmbH
Hüttenstraße 38
59939 Olsberg

Telefon 0049 2962/805-0
Fax 0049 2962/805-181

Unsere Abteilung/
Our Department: **GQF**
Hausruf/ Tel. Ext.: **0049 2962/ 805-261**

Datum/ Date: **01.April.2022**

Abnahmeprüfzeugnis
Inspection Certificate
EN 10204 3.1
(DIN 50049 3.1B)

Nr./ No.
6410/ 34038

Zeichen des Herstellers
Mark of Manufacture: **oh**

Benennung / designation: **Radkasten**
Modell-Nr. / pattern-no: **140300-8 (557178000)**
Olsberg- Nr/Olsberg-part-no: **53/1026.1410**

Besteller / customer:
Aerzener Maschinenfabrik GmbH

Bestellungs-Nr./ Order No.: **4500509219**
vom/ of: **10.01.2022**

Auftrags-Nr./ Order No.: **2022/200623/1**

Werkstoff/ DIN/ Spezification:
EN-GJS-400-15U **DIN EN 1563**
GGG-40 **DIN 1693**

Erschmelzungsart/ Melting-furace: **Elektroofen/ Electric furace/**

Lieferbedingungen/ Terms of Delivery
lt. Vereinbarung / according to agreement

Erzeugnisform/ Product: **Rohguß / Raw Casting**

Anzahl/ Quantity	Gegenstand/ Description	Masse pro Teil/ Weight per part (kg)	Schmelzen-Nr. Cast-No Los-Nr./ Lot-No.	Chemische Zusammensetzung (Schmelzanalyse) Chemische Composition of Coast (in %) C	Si	Mn	P	S	Mg	
1	140300-8 (557178000)	1415	18.03.2022	3,579	2,057	0,153	0,059	0,014	0,046	

Zugfestigkeit/ Tensile strength [MPa]		Dehngrenze/ Proof Stress Rp0,2 [MPa]	Bruchdehnung/ Elongation A5 [%]	Härte/Hardness [HBW 5/750] DIN EN ISO 6506-1		Kerbschlagarbeit / Impact Value KV² in Joule bei -20° C DIN EN ISO 148-1			
Zugversuch nach /Tensile testing according DIN EN ISO 6892-1						1	2	3	x-quer
uWD50	451	301	14,1	uWD50	170				

Bemerkung/ remark: **aufgegossenes Gießdatum: 180322 30**

Lieferung gemäß/ delivery according	Vorschrift / rule	Index	vom/date
☐ QT01714		01	
☐ QP00200 Index 06 2017-04-07 Anmerkungen Olsberg		06	07.04.2017
☐ QH00510A Rev01 Vorschrift für den Beschichtungsaufbau		01	02.11.2021

Olsberg GmbH
i.V.
Digital unterschrieben von i.V. Burkhard Rüther
DN: cn=i.V. Burkhard Rüther, o=Olsberg GmbH, ou=QM Gusstechnik, email=burkhard.ruether@olsberg.com, c=DE
Datum: 2022.04.04 07:50:15 +02'00'
FH

Abnahmebeauftragter / manufacturer's authorized representative

Es wird bestätigt, daß die Lieferung geprüft wurde und den Vereinbarungen der Bestellannahme entspricht.

Hereby we confirm, that the delivery was checked and complies with the declarations of the purchase order.

incoming-inspection@aerzen.com
Fax-Nr.: +49 5154 819191 gefaxt: ☐ **Seite** *1* **von** *1*

10.1.F21 Rev. 9

Olsberg GmbH, 59939 Olsberg; Amtsgericht Arnsberg HRB 3730; Geschäftsführer Ulrich Herrmann und Stefan Osebold

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SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 17.12.21

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét..... :1 Gehäusedeckel Oberteil
Bestell-Nr./ Order No./ Commande No. ..... :4500488515
Modell-Nr./ Pattern No./ Modèle No..... :140301-8
Kom.-Nr./ Our Order No./ Notre commande No..... :21023734.20
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557181000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8334-21	3,64	2,30	0,14	0,042	0,008	0,047			1	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8334-21	302	438	24						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Sphäritisierung Spheroidal Spheroidal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

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SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 10.01.22

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét..... :2 Gehäusedeckel Unterteil
Bestell-Nr./ Order No./ Commande No. ..... :4500491086
Modell-Nr./ Pattern No./ Modèle No ..... :140302-8
Kom.-Nr./ Our Order No./ Notre commande No..... :21023890.10
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557180000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8333-21	3,74	2,31	0,16	0,046	0,009	0,050			2	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8333-21	305	438	24						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Sphäritisierung Spheroidal Spheroídal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

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Pleissner Guss GmbH

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1
inspection certificate acc. To DIN - EN 10204 - 3.1

Zeugnis-Nr.: certificate no.:	1021521/2022	Seite page	1/3
Kunde: customer:	2001718 Aerzener Maschinenfabrik GmbH	Kd.-Auftrag: customer commission:	3911009923 / 000010
Kd.-Bestell-Nr.: order no.: vom / of:	4500490962 / 10 20.10.2021	Fertigungsauftrag: production order:	390001021521
		Modell-Nr.: pattern no.:	171908-01
Material-Nr. material no.	39V0317190840	Kundenmaterialnr.: customer material no.:	371908000
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Kundenprojekt: customer project:	
Spez.: spec.:	QP00294 Rev.00/1 u. 2816 Rev.5	Zeichen des Lieferwerks: sign of the manufacturer:	P
Qualität: material:	GX4CrNi13-4+QT1 (1.4317)	Kenn-Nr.: code no.:	3/1
Stückzahl: number of pieces:	1	Stückgewicht: piece weight:	3.600,000 kg

Kenn-Nr.: code no.:	Charge: heat no.:	Proben-Nr.: sample no.:	Wärmebehandlungs-Charge: heat treatment no.:
3/1	69336	2MHH	01-08887-1, 05-57266-1, 05-57350-1, 06-06685-1, 01-08973-1

Chemische Analyse in % - chemical analysis in %

Erschmelzungsart - melting technology: VOD-Konverter - VOD converter

Charge: heat no:	C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu		
						12,00		3,50				
	0,060	1,00	1,00	0,035	0,025	13,50	0,700	5,00	0,080	0,300		
69336	0,051	0,52	0,71	0,020	0,004	12,74	0,568	4,42	0,033	0,079		

Bemerkung / remark:

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Pleissner Guss GmbH

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. To DIN - EN 10204 - 3.1

Zeugnis-Nr.: certificate no.:	1021521/2022	Seite page	2/3

Mechanische Eigenschaften - mechanical properties:

Zugversuch nach DIN EN ISO 6892-1:2020 B - tensile test according to DIN EN ISO 6892-1:2020 B

Charge: heat no:	Proben-Nr.: sample no.:	Dehngrenze yield point [Mpa]		Zugfestigkeit tensile strength [Mpa]	Dehnung elongation [%]	Einschnürung reduction of area [%]
		$Rp_{0,2}$	$Rp_{1,0}$	Rm	A	Z
Soll-Wert: requirements:		550		760	15,0	
				960		
69336	2MHH	799		951	16	56

Bemerkung / remark:

Kerbschlagbiegeversuch nach DIN EN ISO 148-1 - charpy impact test according to DIN EN ISO 148-1

Charge: heat no:	Proben-Nr.: sample no.:	Temperatur temperature [°C]	Hammerfinne striker Radius / radius [mm]	Kerbschlagarbeit impact energy [J]		
Soll-Wert: requirements:		20	2	27 50		
69336	2MHH	20	2	95	99	98

Bemerkung / remark:

Härteprüfung nach DIN EN ISO 6506-1 - hardness test according toDIN EN ISO 6506-1

Kenn-Nr.: code no.:	Härte hardness [HB]			Kenn-Nr.: code no.:	Härte hardness [HB]		
3/1	274	286	282				

Bemerkung / remark:

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Pleissner Guss GmbH

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. To DIN - EN 10204 - 3.1

Zeugnis-Nr.: certificate no.:	1021521/2022	Seite page	3/3

Wärmebehandlung - heat treatment:

WBH-Charge heat treatment no.	Wärmebehandlung-Art Heat treatment type	Temperatur temperature [°C]	Zeit time [h]	Medium medium
05-57266-1	Weichglühen / soft annealing	620	8,0	ruhende Luft/still air
01-08887-1	Härten / hardening	1050	5,0	bewegte Luft/moved air
06-06685-1	Anlassen / tempering	620	7,0	ruhende Luft/still air
05-57350-1	Spannungsarmglühen / pwht	620	6,0	ruhende Luft/still air
01-08973-1	Spannungsarmglühen / pwht	620	6,0	ruhende Luft/still air

Sonstige Prüfungen - other tests:

Magnetpulverprüfung: Magnetic particle testing:	
Farbeindringprüfung Penetrant Testing	gemäß DIN EN 1371-1, PS1-3 acc to DIN EN 1371-1, PS1-3
Ultraschallprüfung: ultrasonic testing:	gemäß EN 12680-1 -UV1-3- acc to EN 12680-1 -UV1-3-
Durchstrahlungsprüfung: Radiographic testing	
Sicht-Prüfung: Visual testing:	gemäß QP00294 §6.6.1 acc to QP00294 §6.6.1
Gefügebeurteilung: Microstructure analysis:	

Bemerkung / remark:

37412 Herzberg am Harz, 09.05.22

Dittrich

Abnahmebeauftragter:
competent representive:

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Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan **defect position plan**		Protokoll Nr.: report no.: **WD 222 / 2022**	Blatt: page: **1/8**
Kunde: customer:	**0002001718** **Aerzener Maschinenfabrik GmbH**	Material Nr.: material no.:	**39V0317190840**
Kd.-Bestell-Nr.: order no.:	**4500490962/10** **vom 20.10.2021**	Kd.-Auftrag: customer commission:	**3911009923/10**
Bezeichnung: item:	**Drehkolben GQ22.23-2** **Rotor GQ22.23-2**	Charge: heat no:	**69336**
Modell-Nr.: pattern no.:	**171908-01**	Kenn-Nr.: code no.:	**3/1**
Werkstoff: material:	**GX4CrNi13-4+QT1 (1.4317)**	Fertigungsauftrag: production order:	**390001021521**

Fehlerarten: type of defects:	Lineare Anzeigen: linear indications: x	Sand: sand: x	Blase: bubble: x	Lunker: shrinkage:

Fehlererkennung durch: detection of defects by:	DS: RT:	US: UT: x	FE: PT: x	MP: MT:
	Sichtkontrolle: visual control: x	Maßkontrolle: dimensional control:	Sonstiges: other:	

Fehlerfreiheit der ausgemuldeten Bereiche siehe MT/PT-Protokoll
correctness of the excavacations see MT/PT report

Fehlerlage siehe Fotos oder Skizzen defect position see photos or sketches	Wärmenachbehandlung: post weld heat treatment: siehe Schweißprotokoll see welding report

Prüfung der Schweissung: testing of weldment:	DS: RT:	US: UT: x	FE: PT: x	MP: MT:

Bemerkung:
remark: Die Bestätigung der Fehlerfreiheit der Schweissung, erfolgt mit dem Abnahmezeugnis.
the confirmation over the correctness of the weldments are attested by the certificate of casting.

Anforderungen / Rquirements:

Dokupflichtige Schweißstellen Documetation of Welds	**alle/all**
Einzureichende Schweißstellen Rwquires approval of welds	**alle/all**
Schweißverbot welding prohibited	**nein / no**

Kriterium Große Schweißstellen
Major Repair Creteria

Länge / Lenght (mm)	-
Tiefe / depth (mm)	-
Tiefe / depth (%)	-
Fläche / area (cm²)	-
Volumen / volume (%)	-

Bemerkung:
remark: Fett und Grau = Major Repair / Fat and gray = Major Repair

Schweißen nach / welding according: **PQR 274** **WPS 427**

Datum: 19.04.2022

Schweißaufsicht / welding supervisor

Sachverständiger / expert

Schweißfreigabe **Datum:** 19.04.22

Schweißaufsicht / welding supervisor

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Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.:	WD 222 / 2022	Blatt: page:	2/8
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521		

Nr.: weld No.:	Länge length mm	Breite width mm	Tiefe depth mm	 %	Originalwandstärke: origin wall thickness: mm	Rest-Wandstärke: remaining wall thinckness: mm	 %	Fläche area cm²	Volumen volume cm³	 %
1	50	20	6	20	30	24	80	10	6	
2	50	35	8	27	30	22	73	17,5	14	
3	35	30	6	20	30	24	80	10,5	6	
4	70	50	6	20	30	24	80	35	21	
5	55	40	6	20	30	24	80	22	13	
6	25	20	6	20	30	24	80	5	3	
7	190	45	30	100	30			85,5	257	
8	110	35	6	20	30	24	80	38,5	23	
9	170	45	30	100	30			76,5	230	
10	25	20	6	20	30	24	80	5	3	
11	60	30	10	33	30	20	67	18	18	
12	50	35	10	33	30	20	67	17,5	18	
13	25	20	6	20	30	24	80	5	3	
14	45	30	10	33	30	20	67	13,5	14	
15	100	65	8	27	30	22	73	65	52	
16	35	30	12	40	30	18	60	10,5	13	
17	100	80	8	27	30	22	73	80	64	
18	40	30	6	20	30	24	80	12	7	
19	65	35	8	27	30	22	73	22,75	18	
20	40	30	12	40	30	18	60	12	14	
21	50	30	12	13	90	78	87	15	18	
22	100	70	8	27	30	22	73	70	56	
23	100	30	8	27	30	22	73	30	24	
24	60	30	6	20	30	24	80	18	11	
25	60	30	8	27	30	22	73	18	14	
26	25	20	6	20	30	24	80	5	3	
27	40	25	6	20	30	24	80	10	6	
28	65	45	6	20	30	24	80	29,25	18	
29	140	45	30	100	30			63	189	
30	60	45	6	20	30	24	80	27	16	
31	35	30	6	20	30	24	80	10,5	6	
32	50	35	8	27	30	22	73	17,5	14	
33	210	40	30	100	30			84	252	
34	45	30	8	27	30	22	73	13,5	11	
35	65	50	6	7	90	84	93	32,5	20	
36	110	35	12	40	30	18	60	38,5	46	

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Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.:	WD 222 / 2022	Blatt: page:	3/8
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521		

Nr.: weld No.:	Länge length mm	Breite width mm	Tiefe depth mm	 %	Originalwandstärke: origin wall thickness: mm	Rest-Wandstärke: remaining wall thinckness: mm	 %	Fläche area cm²	Volumen volume cm³	 %
37	130	80	6	20	30	24	80	104	62	
38	80	55	6	20	30	24	80	44	26	
39	110	40	20	67	30	10	33	44	88	
40	165	50	30	100	30			82,5	248	
41	145	40	20	67	30	10	33	58	116	
42	75	70	22	24	90	68	76	52,5	116	
43	410	130	6	7	90	84	93	533	320	
44	35	30	6	7	90	84	93	10,5	6	
45	80	30	6	20	30	24	80	24	14	
46	70	60	6	7	90	84	93	42	25	
47	60	30	8	27	30	22	73	18	14	
48	35	30	8	27	30	22	73	10,5	8	
49	100	40	15	50	30	15	50	40	60	
50	150	45	30	100	30			67,5	203	
51	130	30	15	50	30	15	50	39	59	
52	50	50	4	13	30	26	87	25	10	

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Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.: WD 222 / 2022	Blatt: page: 4/8
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840
Kd.-Bestell-Nr.: order no.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521

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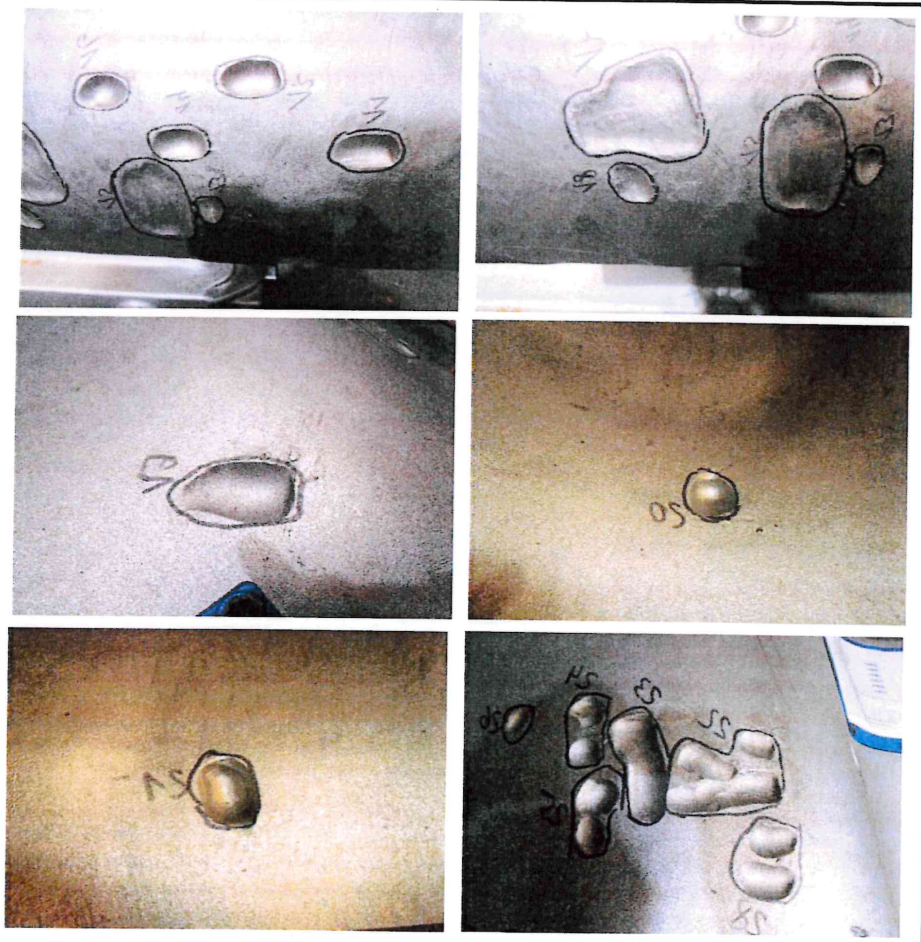
Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.:	WD 222 / 2022	Blatt: page:	5/8
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521		



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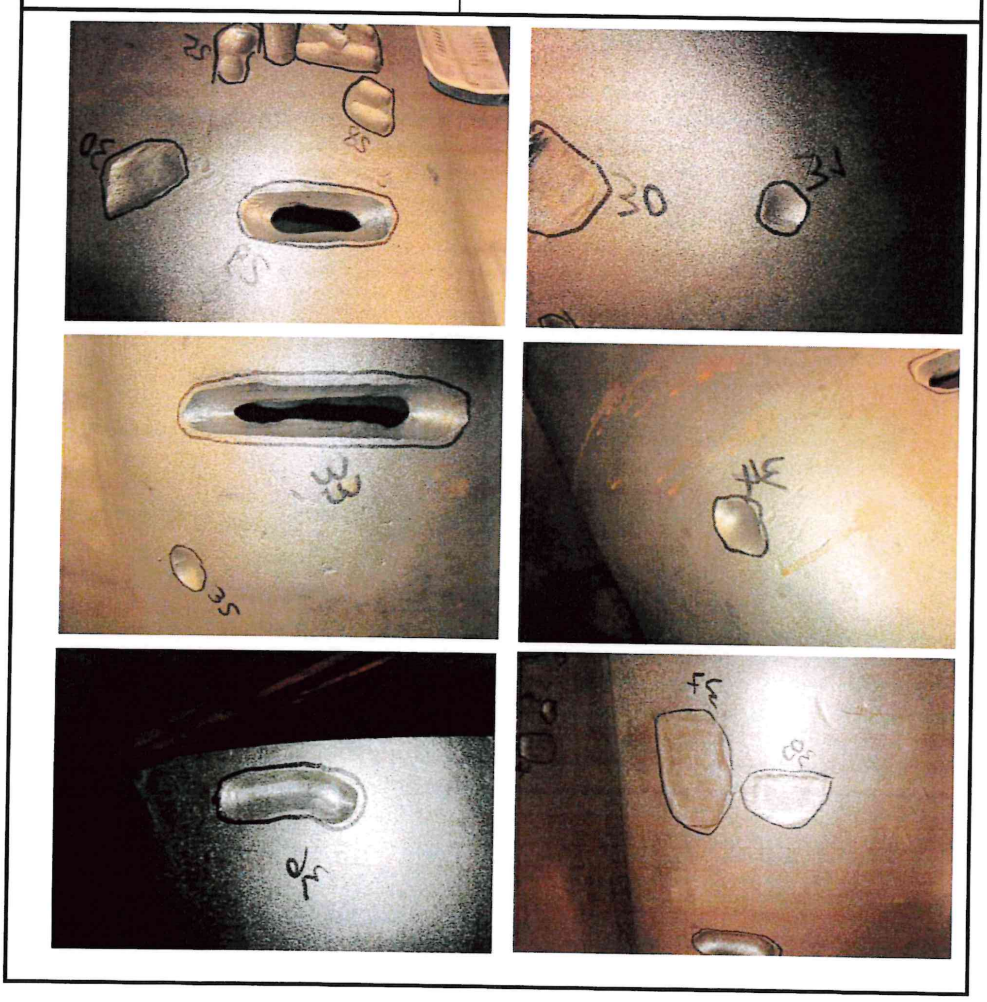
Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.: WD 222 / 2022	Blatt: page: 6/8
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840
Kd.-Bestell-Nr.: order no.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521



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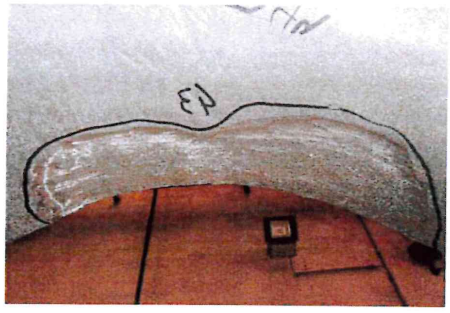
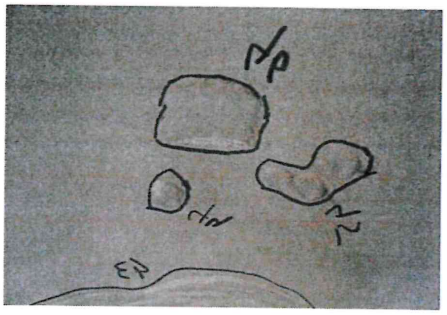
Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.: WD 222 / 2022	Blatt: page: 7/8
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840
Kd.-Bestell-Nr.: order no.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521

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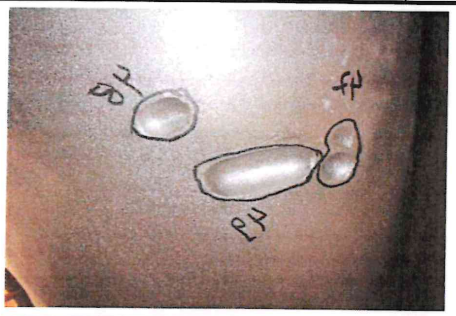
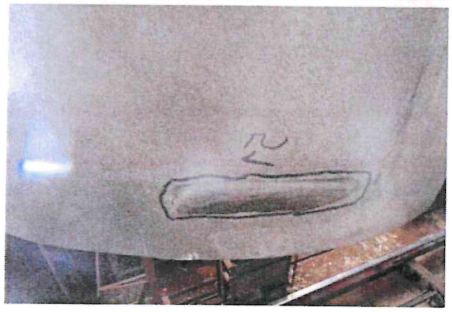
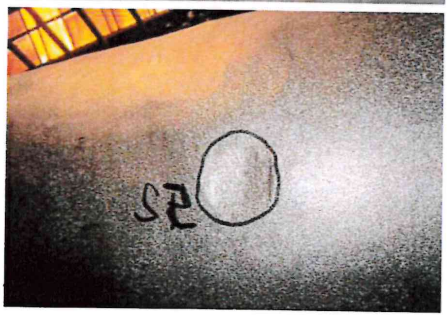
Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.: WD 222 / 2022	Blatt: page: 8/8
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840
Kd.-Bestell-Nr.: order no.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521







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Pleissner Guss Gießerei
GMH GRUPPE

Schweißprotokoll **welding report**		Protokoll Nr.: report no.: **WD 222 / 2022**	Blatt: page: **1/1**
Kunde: customer:	**0002001718** **Aerzener Maschinenfabrik GmbH**	Material Nr.: material no.:	**39V0317190840**
Kd.-Bestell-Nr.: order no.:	**4500490962/10** **vom 20.10.2021**	Kd.-Auftrag: customer commission:	**3911009923/10**
Bezeichnung: item:	**Drehkolben GQ22.23-2** **Rotor GQ22.23-2**	Charge: heat no:	**69336**
Modell-Nr.: pattern no.:	**171908-01**	Kenn-Nr.: code no.:	**3/1**
Werkstoff: material:	**GX4CrNi13-4+QT1 (1.4317)**	Fertigungsauftrag: production order:	**390001021521**

Schweißverfahrens-prüfung: welding procedure record no.:	**PQR 274**	Spezifikation: specification:	**WPS 427**
Schweißverfahren: welding procedure:	**MAG / GMAW/ 138**	Zusatzwerkstoff : filler metal : Charge / heat no.:	**Böhler FOXcore CrNi 13/4**
Vorwärmung: preheat temperature:	**RT**	Zwischenlagentemp.: interpass temperature	**max. 150°C**
Nachwärmung: postheat temperature:	**580°C - 600°C 1h/2. min. 4h**	Abkühlung: cooling:	**Air**

Schweißstelle: weld: 1 - 23		Schweißstelle: weld:	
Schweißer: welder: Rotekke	Stempel: stamp S28	Schweißer welder:	Stempel: stamp
Schweißstelle: weld: 24 - 52		Schweißstelle: weld:	
Schweißer: welder: Heinecke	Stempel: stamp S12	Schweißer welder:	Stempel: stamp

Gesamtvolumen / total volume [cm³]:	**1375**	Gesamtfläche / total sureface [cm²]	**1195**
Masse Schweißgut / mass weld [kg]:	**10,82**		
Anteil Schweißgut / stake weld [%]:			

Bemerkung:
remark:

Datum: 21.04.2022

Schweißaufsicht
welding supervisor

Sachverständiger
expert

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Pleissner Guss Gießerei
GMH GRUPPE

FE-Protokoll / PT-Report		Protokoll Nr.: report no.:	WD 222 / 2022	Blatt: page:	1/1
Kunde: customar:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order-No.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521		

Angaben zur Prüftechnik / examination technique

Prüfung nach: testing to:	DIN EN 1371-1 acc. To QP00294 §6.6.3 and 2816 (CS-00006) §1.1	Eindringzeit: penetration time:	60 min
Beurteilung nach: assessment by:	Inspectionarea 1- quality class 1, no linear indications allowed	Entwicklerzeit: developer time:	60 min
Prüfumfang: inspection:	Ausgemuldete Bereiche / excavated areas	Oberflächenzustand: surface condition:	geschliffen und gestrahlt / ground and shotblasted

Angaben zum Prüfsystem / examination system

Vor-, Endreiniger (Hersteller/Typ/Chargen-Nr.): preliminary, final cleaning (manufacturer / type / batch no.)	Wasser - water	
Eindringmittel (Hersteller/Typ/Chargen-Nr.): penetrant (manufacturer / type / batch no.):	MR 67	67/1081G
Zwischenreinigung (Hersteller/Typ/Chargen-Nr.): between cleaning (manufacturer / type / batch no.)	Wasser - water	
Entwickler (Hersteller/Typ/Chargen-Nr.): developer (manufacturer / type / batch no.):	MR 70	70/1311G

Angaben zu den Kontrollen/indications concerning checks

Kontrollkörper für die Empfindlichkeit Kontrolle (Norm/Typ/Nr.): inspection body for the sensitivity control (standard / type / no.)	Kontrollkörper nach DIN EN ISO 3452-3 control body acc. to DIN EN ISO 3452-3
Ergebniss am Kontrollkörper (Anzahl und Größe der Anzeige): result on the control body (number and size of the display):	5
Inspektion Bedingung (Luxmeter/Wert der Beleuchtungsstärke): inspection condition (Luxmeter / value of illuminance)	1000 Lux
ggf. sonstige Prüfparameter (z.B. Wasserdruck, Temp. usw.) other test parameters if necessary (e.g. water pressure, temp etc..)	

Prüfergebnis/test result

Prüfergebnis result of examination	Es wird bestätigt, das die Ergebnisse der angegebenen Spez. entsprechen / we confirm that the results are in conformity with the indicated specification.

Datum: 14.04.2022

Prüfer / inspector

Prüfaufsicht / special supervisor

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Pleissner Guss Gießerei
GMH GRUPPE

FE-Protokoll / PT-Report		Protokoll Nr.: report no.:	PT 198/2022	Blatt: page:	1/1
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order-no.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521		

Angaben zur Prüftechnik / examination technique

Prüfung nach: testing to:	DIN EN 1371-1; acc to QP00294 §6.6.3 and 2816(CS-0006) §1.1	Eindringzeit: penetration time:	60 min
Beurteilung nach: assessment by:	Flächen A: SP1; Flächen B: SP2; Restflächen & unbearb. Fl.: SP3	Entwicklerzeit: developer time:	60 min
Prüfumfang: inspection:	100%	Oberflächenzustand: surface condition:	geschliffen und/oder gestrahlt / ground and/or shotblasted

Angaben zum Prüfsystem / examination system

Vor-, Endreiniger (Hersteller/Typ/Chargen-Nr.): preliminary, final cleaning (manufacturer / type / batch no.)	Wasser - water	
Eindringmittel (Hersteller/Typ/Chargen-Nr.): penetrant (manufacturer / type / batch no.):	MR 67	67/1076G
Zwischenreinigung (Hersteller/Typ/Chargen-Nr.): between cleaning (manufacturer / type / batch no.)	Wasser - water	
Entwickler (Hersteller/Typ/Chargen-Nr.): developer (manufacturer / type / batch no.):	MR 70	70/1314G

Angaben zu den Kontrollen/indications concerning checks

Kontrollkörper für die Empfindlichkeit Kontrolle (Norm/Typ/Nr.): inspection body for the sensitivity control (standard / type / no.)	Kontrollkörper nach DIN EN ISO 3452-3 control body acc. to DIN EN ISO 3452-3	
Ergebniss am Kontrollkörper (Anzahl und Größe der Anzeige): result on the control body (number and size of the display):	5	
Inspektion Bedingung (Luxmeter/Wert der Beleuchtungsstärke): inspection condition (Luxmeter / value of illuminance)	1250 Lux mit Taschenlampe	
ggf. sonstige Prüfparameter (z.B. Wasserdruck, Temp. usw.) other test parameters if necessary (e.g. water pressure, temp etc..)	Temperatur Bauteil : 18 Grad Temperatur Prüfhalle : 18 Grad	Testo 925 Inventar-Nr.5016

Prüfergebnis/test result

Prüfergebnis result of examination	Es wird bestätigt, dass die Ergebnisse der angegebenen Spez. entsprechen (ohne registrierpflichtige Anzeigen). / We confirm that the results are in conformity with the indicated specification (without indications to be documented).

Datum: date:	06.05.2022	Prüfdatum: Test date:	05.05.2022
	Michaelis Level II Prüfer / inspector		Wehmeyer Level II Prüfaufsicht / special supervisor

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Pleissner Guss Gießerei
GMH GRUPPE

US-Protokoll / UT-Report		Protokoll Nr.: report no.:	UT 190/2022	Blatt: page:	1/1
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521		

Angaben zum Prüfsystem / examination system

Gerät: apparatus:	GE USN 58L (01MLBN)	Kopplung: couplant:	Kleister / paste
Prüfköpfe: assessment by:	B2S MSEB4-0°S TS 60°- 4	Prüfbereich: examined area:	100, 250, 500mm
Justierung: calibration:	Am Prüfstück in Verbindung mit dem AVG Datenblatt,WPK Gußkante 80% BSH + 6dB / on the test piece in connection with the AVG data sheet,angle beam probe casting edge 80% screen hight + 6dB		

Angaben zur Prüfung / Information about the test

Prüfvorschrift: test procedure:	gem. QP00294 §6.6.5 und CS-00006 §1.1 ; DIN EN 12680-1 Fläche A -UV1- ; Fläche B -UV2- ; Fläche C -UV3-
Registrierschwelle: reference line:	Gemäß DIN EN 12680-1 / according to DIN EN 12680-1 Fläche A -UV1- ; Fläche B -UV2- ; Fläche C -UV3-
Prüfumfang: volume of operation:	100% soweit prüftechnisch möglich / as far as technically possible
Prüfflächenzustand: surface condition:	geschliffen und/oder gestrahlt / ground and/or shotblasted
WBH - Zustand: heat treatment state:	nach letzter Warmbehandlung / after last heat treatment

Prüfergebnis / test result

Prüfergebnis: result of examination	Es wird bestätigt, dass die Ergebnisse der angegebenen Spez. entsprechen (ohne registrierpflichtige Anzeigen). / We confirm that the results are in conformity with the indicated specification (without indications to be documented).
Bemerkung: remark:	

Datum: date:	06.05.2022	Prüfdatum: Test date:	05.05.2022
	Bierbaum Level 2 Prüfer / inspector		Wehmeyer Level 3 Prüfaufsicht / special supervisor

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Pleissner Guss Gießerei
GMH GRUPPE

Maßprotokoll Dimensional report	Protokoll Nr.: report no.: DT 112/2022	Blatt: page: 1/2
Erstmuster / initial sample	X	Serie / serial casting

Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840
Kd.-Bestell-Nr.: order-no.:	4500490962/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009923/10
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69336
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	3/1
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021521

Zeichnungs-Nr.:
drawing-no.: 4900005224 Rev.5

	Rohguss raw casting	X	Vorbearbeitet pre machined		Fertigbearbeitet final machined

Ref. Nr. ref. No.	Zg. Koord. drawing coord.	Blatt sheet	Sollmaß lt. Zeichnung required dimension [mm]	Istmaß actual dimension [mm]	Bewertung estimation e OK	ne NOK	Rauhigkeit roughness Soll req.	Ist act.	Bemerkung remark
1	F-2		1493 +2xBz	1514-1532	x				
2	D-3		460	460	x				
3	G-3		460	460	x				
4	B-6		676,39 +2xBz	685-689	x				
5	F-5		415,1 +2xBz	425-435	x				
6	M-9		100 ±5	98-101	x				
7	M-10		100 ±5	98-100	x				
8	M-10		Ø440 ±7	438-440	x				
9	D-13		20 ±3	18-20	x				
10	E-11		Ø315 -Bz	255	x				
11	E-12		Ø265 -Bz	255	x				
12	E-12		Ø255	255	x				
13	E-14		Ø290 -Bz	255	x				
14	E-14		Ø440 ±7	438-440	x				
15	G-13		300 +6=306 ±6	306-307	x				
16	G-15		345 ±6	340-341	x				
17	G-16		249 ±5,5	250-252	x				
18	F-15		Ø261	261	x				
19	E-15		Ø269 -Bz	261	x				
20	E-16		100 ±5	96-98	x				
21	E-17		Ø261	261	x				
22	F-17		Ø269 -Bz	261	x				
23	E-17		Ø315 ±6	311-312	x				
24	F-17		345 ±6	344-345	x				
25	F-18		300+6=306 ±6	305-307	x				

BZ = Bearbeitungszugabe / the machining allowance

Ergebnis:
result:

Datum:
date: 06.05.2022

Prüfdatum:
Test date: 06.05.2022

Leonhardt
Prüfer / inspector

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Pleissner Guss Gießerei
GMH GRUPPE

Maßprotokoll
Dimensional report

Protokoll Nr.: / report no.: DT 112/2022

Blatt: / page: 2 / 2

Ref. Nr. ref. No.	Zg. Koord. drawing coord.	Blatt sheet	Sollmaß lt. Zeichnung required dimension [mm]	Istmaß actual dimension [mm]	Bewertung estimation		Rauhigkeit roughness		Bemerkung remark
					e OK	ne NOK	Soll req.	Ist act.	
26	C-17		50 ±4	54	x				
27	C-18		170 ±5,5	166	x				
28	D-17		Ø140 ±5	138	x				
29	D-18		Ø140 ±5	138	x				
30	F-20		Ø255	255	x				
31	F-20		Ø270 -Bz	255	x				
32	F-21		Ø315 -Bz	255	x				
33	H-18		285 ±6	284	x				
34	H-17		188 ±5,5	187-188	x				
35	G-17		375 ±6	373	x				
36	G-16		219 ±5,5	218-220	x				
37	H-15		15 ±4	19	x				
38	G-14		375 ±6	373-374	x				
39	H-14		188 ±5,5	186	x				
40	H-13		285 ±6	287	x				
41	G-13		40 ±5	42-44 (bis 52)		x			(Formschräge)
42	H-12		Ø260 ±6	256	x				
43	H-11		Ø330 -Bz	256	x				
44	J-15		1550	1550	x				

Datum: / date: 06.05.2022

Prüfdatum: / Test date: 06.05.2022

Leonhardt
Prüfer / inspector

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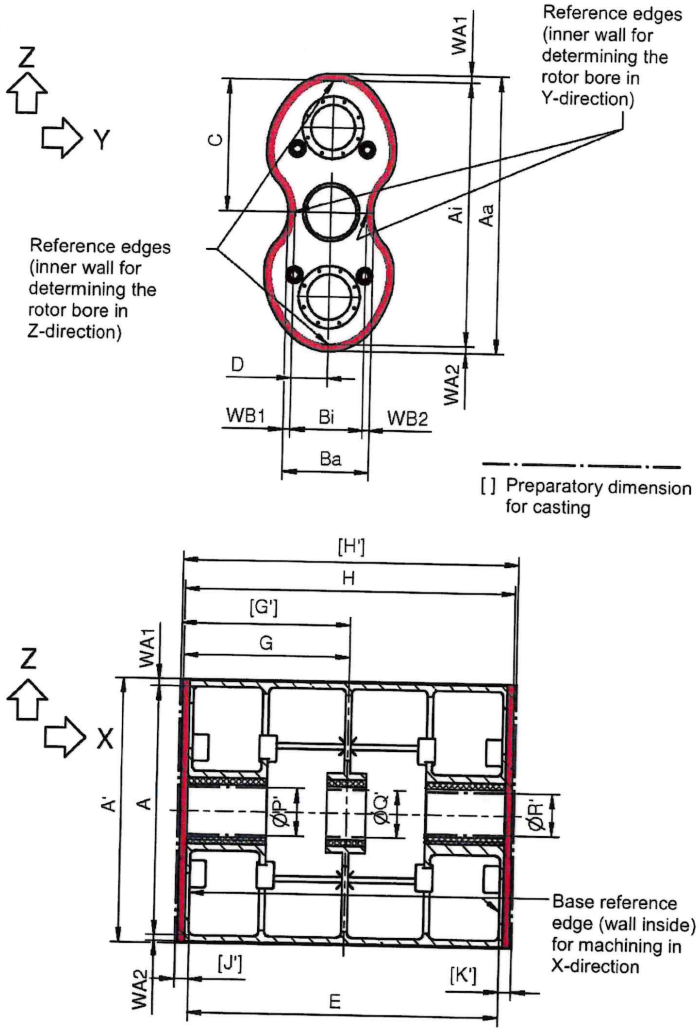
Measuring Reports

3.3 Measuring Report Rotary Piston

Reference dimensions for pre-machining and actual dimensions

P3/1



Testing dimensions (to be completed by foundry)		
Ai	1431-1434	
WA1	39-47	
WA2	39-48	
Bi	309-314	
WB1	56-59	
WB2	57-60	
E	1456-1457	
H'	1550	
J'	46-48	
K'	46-48	
P'	255	
Q'	261	
R'	255	

Y-Z level:

1. Define dim. Ai and mark C= Ai/2 anreißen.
2. Define dim. Bi and mark D=Bi/2
=> Rotor hole is defined

3. Check dimensions A,A',B,B',C,C',D,D'E,E', F, F'

X-Z Level:

4. Determine dimension E and set centre of the rotary piston in X-direction = E/2
5. Mark G and G' and H and H'

Hubs:

6. Mark radius P', Q',R' around the generated shaft axis

2816 | ZTD | 06

Zust.	Änderung	Datum	Name		Datum	Name
07						
06	5...23395	07.02.2020	Hergesell	Bearb.	07.02.2020	Hergesell
05	5...16700	26.03.2019	Vasel	Gepr.	07.02.2020	Palermo
04	5...14834	02.08.2018	Vasel			
03	5...13468	30.01.2018	Vasel			
02	5...11563	28.04.2017	Passauer			
a	15745	07.04.2011	Borchers			

AERZEN

Ursprung: CS-00006

Stahlguss Spezifikation
Drehkolben

2816

Format: A4

Seite 9 von 10

Ers. Für:

Ers. Durch:

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Duderstädler Straße 17
D-37412 Herzberg am Harz
Telefon (0 55 21) 83 -0
Telefax (0 55 21) 83 - 203

www.pleissner-guss.de

Pleissner Guss GmbH

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.: certificate no.:	1021523/2022	Seite: Page:	1 / 3
Kunde: customer:	2001718 Aerzener Maschinenfabrik GmbH	Kundenauftrag: customer commission:	3911009924 / 000010
Kd.-Bestell-Nr.: order no.:	4500490964 / 10	Fertigungsauftrag: production order:	390001021523
vom/of:	20.10.2021	Modell-Nr.: pattern no.:	171908-01
Materialnummer: material no.:	39V0317190840	Kundenmaterialnr.: customer material no.:	371908000
Bezeichnung: Item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Kundenprojekt: customer project:	
Spez.: spec.:	QP00294 Rev.00/1 u. 2816 Rev.5	Zeichen des Lieferwerks: sign of the manufacturer:	P
Qualität: material:	GX4CrNi13-4+QT1 (1.4317)	Kenn-Nr.: code no.:	5/1
Stückzahl: number of pieces:	1	Stückgewicht: piece weight:	3.600,000 kg

Kenn-Nr.: code no.:	Charge: heat no.:	Proben-Nr.: sample no.:	Wärmebehandlungs-Charge: heat treatment no.:
5/1	69381	2MM7	01-08985-1,02-16398-1,06-06718-1

Chemische Analyse in % - Chemical analysis in %

Erschmelzungsart - melting technology: VOD-Konverter - VOD converter

Charge:	C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu
heat no.:						12,00		3,50		
	0,060	1,00	1,00	0,035	0,025	13,50	0,700	5,00	0,080	0,300
69381	**0,053**	**0,51**	**0,73**	**0,022**	**0,004**	**12,95**	**0,419**	**4,34**	**0,062**	**0,174**

Bemerkung / remark:

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Pleissner Guss GmbH

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

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Zeugnis-Nr.: / certificate no.: 1021523/2022

Seite: / Page: 2 / 3

Mechanische Eigenschaften - mechanical properties

Zugversuch nach DIN EN ISO 6892-1:2020 B - tensile test according to DIN EN ISO 6892-1:2020 B

Charge: heat no.:	Proben-Nr.: sample no.:	Dehngrenze yield point [MPa]		Zugfestigkeit tensile strength [MPa]	Dehnung elongation [%]	Einschnürung reduction of area [%]
		$Rp_{0,2}$	$Rp_{1,0}$	R_m	A	Z
Soll-Wert: requirements:	min.	550		760	15,0	
	max.			960		
69381	2MM7	735		905	18	58

Bemerkung / remark:

Kerbschlagbiegeversuch nach DIN EN ISO 148-1 - charpy impact test according to DIN EN ISO 148-1

Charge: heat no.:	Proben-Nr.: sample no.:	Temperatur temperature [°C]	Hammerfinne striker Radius / radius [mm]	Kerbschlagarbeit impact energy [J]		
Soll-Wert: requirements:		20 20	2 2	27 50		
69381	2MM7	20	2	95	91	103

Bemerkung / remark:

Härteprüfung nach DIN EN ISO 6506-1 - Hardness test according to DIN EN ISO 6506-1

Kenn-Nr.: code no.:	Härte hardness [HB]			Kenn-Nr.: code no.:	Härte hardness [HB]		
Soll-Wert: requirements:				Soll-Wert: requirements:			
5/1	268	262	271				

Bemerkung / remark:

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Pleissner Guss GmbH

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.:
certificate no.: **1021523/2022**

Seite:
Page: **3 / 3**

Wärmebehandlung - heat treatment

WBH-Charge heat treatment no.	Wärmebehandlung-Art heat treatment type	Temperatur temperature [°C]	Zeit time [h]	Medium medium
06-06718-1	Härten / hardening	1050	5,0	bewegte Luft/moved air
01-08985-1	Spannungsarmglühen / pwht	620	6,0	ruhende Luft/still air
02-16398-1	Anlassen / tempering	620	7,0	ruhende Luft/still air

Bemerkung / remark:

Sonstige Prüfungen - Other tests

Magnetpulverprüfung: magnetic particle testing:	
Farbeindringprüfung: penetrant testing:	gemäß DIN EN 1371-1, PS1-3 acc. to DIN EN 1371-1, PS1-3
Ultraschallprüfung: ultrasonic testing:	gemäß EN 12680-1 -UV1-3- acc. to EN 12680-1 -UV1-3-
Durchstrahlungsprüfung: Radiographic testing:	
Sichtprüfung: Visual testing:	gemäß QP00294 §6.6.1 acc. to QP00294 §6.6.1
Gefügebeurteilung: Microstructure analysis:	

Bemerkung / remark:

37412 Herzberg am Harz, 17.05.2022

Abnahmebeauftragter:
competent representative:

Dittrich

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Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan **defect position plan**		Protokoll Nr.: report no.: **WD 243 / 2022**	Blatt: page: **1/6**
Kunde: customer:	**0002001718** **Aerzener Maschinenfabrik GmbH**	Material Nr.: material no.:	**39V0317190840**
Kd.-Bestell-Nr.: order no.:	**4500490964/10** **vom 20.10.2021**	Kd.-Auftrag: customer commission:	**3911009924/10**
Bezeichnung: item:	**Drehkolben GQ22.23-2** **Rotor GQ22.23-2**	Charge: heat no:	**69381**
Modell-Nr.: pattern no.:	**171908-01**	Kenn-Nr.: code no.:	**5/1**
Werkstoff: material:	**GX4CrNi13-4+QT1 (1.4317)**	Fertigungsauftrag: production order:	**390001021523**

Fehlerarten: type of defects:	Lineare Anzeigen: linear indications: x	Sand: sand: x	Blase: bubble: x	Lunker: shrinkage:

Fehlererkennung durch: detection of defects by:	DS: RT:	US: UT: x	FE: PT: x	MP: MT:
	Sichtkontrolle: visual control: x	Maßkontrolle: dimensional control:		Sonstiges: other:

Fehlerfreiheit der ausgemuldeten Bereiche siehe MT/PT-Protokoll
correctness of the excavacations see MT/PT report

Fehlerlage siehe Fotos oder Skizzen defect position see photos or sketches	Wärmenachbehandlung: siehe Schweißprotokoll post weld heat treatment: see welding report

Prüfung der Schweissung: testing of weldment:	DS: RT:	US: UT: x	FE: PT: x	MP: MT:

Bemerkung: Die Bestätigung der Fehlerfreiheit der Schweissung, erfolgt mit dem Abnahmezeugnis.
remark: the confirmation over the correctness of the weldments are attested by the certificate of casting.

Anforderungen / Rquirements:

Dokupflichtige Schweißstellen Documetation of Welds	**alle/all**
Einzureichende Schweißstellen Rwquires approval of welds	**nein / no**
Schweißverbot welding prohibited	**nein / no**

Kriterium Große Schweißstellen
Major Repair Creteria

Länge / Lenght (mm)	-
Tiefe / depth (mm)	-
Tiefe / depth (%)	40
Fläche / area (cm²)	-
Volumen / volume (%)	-

Bemerkung: Fett und Grau = Major Repair / Fat and gray = Major Repair
remark:

Schweißen nach / welding according: **PQR 39** WPS **GX 40**

Datum: 27.04.2022

Schweißaufsicht / welding supervisor

Sachverständiger / expert

Schweißfreigabe **Datum:** 22.04.2022

Schweißaufsicht / welding supervisor

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Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.: WD 243 / 2022	Blatt: page: 2/6
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840
Kd.-Bestell-Nr.: order no.:	4500490964/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009924/10
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69381
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	5/1
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021523

Nr.: weld No.:	Länge length mm	Breite width mm	Tiefe depth mm	 %	Originalwandstärke: origin wall thickness: mm	Rest-Wandstärke: remaining wall thinckness: mm	 %	Fläche area cm²	Volumen volume cm³	 %
1	90	35	6	3	200	194	97	31,5	19	
2	35	30	8	29	28	20	71	10,5	8	
3	240	40	28	**100**	28			96	269	
4	90	60	6	21	28	22	79	54	32	
5	220	40	28	**100**	28			88	246	
6	50	35	8	29	28	20	71	17,5	14	
7	70	30	12	6	200	188	94	21	25	
8	110	110	12	**43**	28	16	57	121	145	
9	90	60	20	25	80	60	75	54	108	
10	70	50	12	15	80	68	85	35	42	
11	220	40	28	**100**	28			88	246	
12	240	40	28	**100**	28			96	269	
13	160	35	10	36	28	18	64	56	56	
14	50	30	8	29	28	20	71	15	12	
15	70	40	10	36	28	18	64	28	28	
16	220	40	28	**100**	28			88	246	
17	25	25	8	29	28	20	71	6,25	5	
18	45	25	8	29	28	20	71	11,25	9	
19	35	25	6	21	28	22	79	8,75	5	
20	220	40	28	**100**	28			88	246	
21	40	25	8	29	28	20	71	10	8	
22	25	25	6	21	28	22	79	6,25	4	
23	50	30	8	29	28	20	71	15	12	
24	60	50	6	21	28	22	79	30	18	
25	220	40	28	**100**	28			88	246	
26	100	90	6	21	28	22	79	90	54	
27	50	25	6	21	28	22	79	12,5	8	
28	220	40	28	**100**	28			88	246	
29	180	150	6	21	28	22	79	270	162	
30	330	35	8	29	28	20	71	115,5	92	
31	80	60	8	29	28	20	71	48	38	
32	80	50	8	29	28	20	71	40	32	

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Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.:	WD 243 / 2022	Blatt: page:	3/6
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500490964/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009924/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69381		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	5/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021523		

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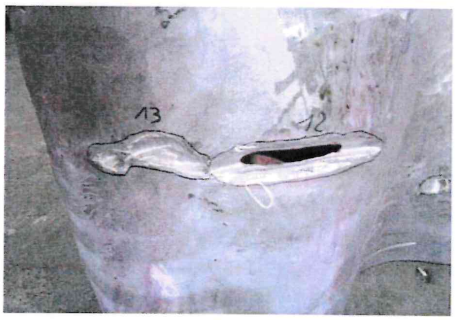
Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.:	WD 243 / 2022	Blatt: page:	4/6
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500490964/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009924/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69381		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	5/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021523		



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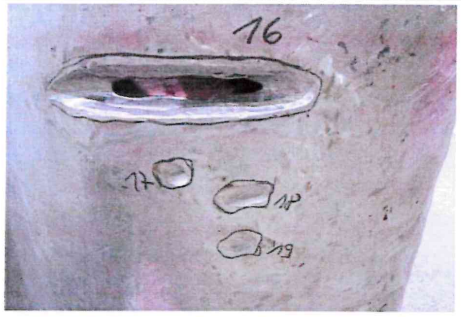
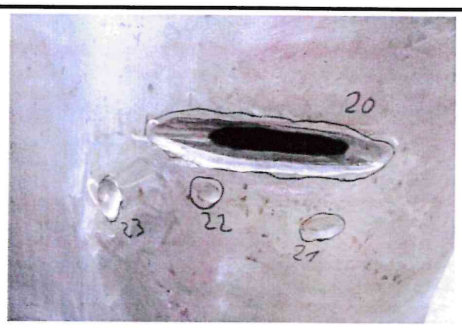
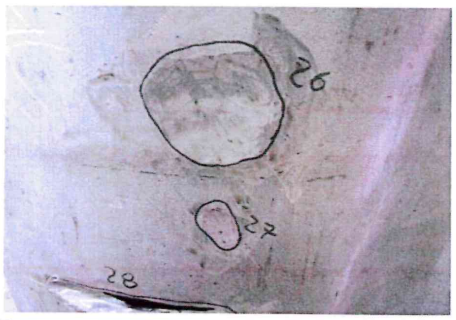
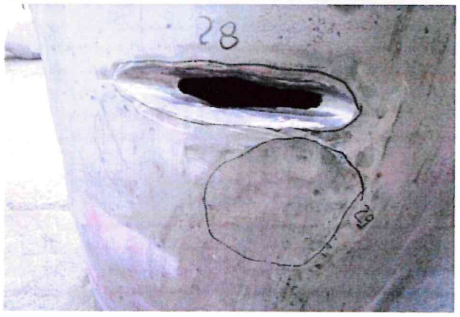
Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.:	WD 243 / 2022	Blatt: page:	5/6
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500490964/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009924/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69381		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	5/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021523		









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Pleissner Guss Gießerei
GMH GRUPPE

Fehlerlageplan defect position plan		Protokoll Nr.: report no.:	WD 243 / 2022	Blatt: page:	6/6
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500490964/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009924/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69381		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	5/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021523		

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Pleissner Guss Gießerei
GMH GRUPPE

FE-Protokoll / PT-Report		Protokoll Nr.: report no.:	WD 243 / 2022	Blatt: page:	1/1
Kunde: customar:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order-No.:	4500490964/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009924/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69381		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	5/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021523		

Angaben zur Prüftechnik / examination technique

Prüfung nach: testing to:	DIN EN 1371-1 acc.TO QP00294 §6.6.3 and 2816 (CS-00006) §1.1	Eindringzeit: penetration time:	60 min
Beurteilung nach: assessment by:	Inspectionarea 1-quality class 1, no linear indications allowed	Entwicklerzeit: developer time:	60 min
Prüfumfang: inspection:	Ausgemuldete Bereiche / excavated areas	Oberflächenzustand: surface condition:	geschliffen und gestrahlt / ground and shotblasted

Angaben zum Prüfsystem / examination system

Vor-, Endreiniger (Hersteller/Typ/Chargen-Nr.): preliminary, final cleaning (manufacturer / type / batch no.)	Wasser - water	
Eindringmittel (Hersteller/Typ/Chargen-Nr.): penetrant (manufacturer / type / batch no.):	MR 67	67/1081G
Zwischenreinigung (Hersteller/Typ/Chargen-Nr.): between cleaning (manufacturer / type / batch no.)	Wasser - water	
Entwickler (Hersteller/Typ/Chargen-Nr.): developer (manufacturer / type / batch no.):	MR 70	70/1311G

Angaben zu den Kontrollen/indications concerning checks

Kontrollkörper für die Empfindlichkeit Kontrolle (Norm/Typ/Nr.): inspection body for the sensitivity control (standard / type / no.)	Kontrollkörper nach DIN EN ISO 3452-3 control body acc. to DIN EN ISO 3452-3
Ergebniss am Kontrollkörper (Anzahl und Größe der Anzeige): result on the control body (number and size of the display):	5
Inspektion Bedingung (Luxmeter/Wert der Beleuchtungsstärke): inspection condition (Luxmeter / value of illuminance)	1000 Lux
ggf. sonstige Prüfparameter (z.B. Wasserdruck, Temp. usw.) other test parameters if necessary (e.g. water pressure, temp etc..)	

Prüfergebnis/test result

Prüfergebnis result of examination	Es wird bestätigt, das die Ergebnisse der angegebenen Spez. entsprechen / we confirm that the results are in conformity with the indicated specification.

Datum: 27.04.2022

Prüfer / inspector

Prüfaufsicht / special supervisor

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Pleissner Guss Gießerei
GMH GRUPPE

Schweißprotokoll **welding report**		Protokoll Nr.: report no.:	**WD 243 / 2022** Blatt: page: **1/1**
Kunde: customer:	**0002001718** **Aerzener Maschinenfabrik GmbH**	Material Nr.: material no.:	**39V0317190840**
Kd.-Bestell-Nr.: order no.:	**4500490964/10** **vom 20.10.2021**	Kd.-Auftrag: customer commission:	**3911009924/10**
Bezeichnung: item:	**Drehkolben GQ22.23-2** **Rotor GQ22.23-2**	Charge: heat no:	**69381**
Modell-Nr.: pattern no.:	**171908-01**	Kenn-Nr.: code no.:	**5/1**
Werkstoff: material:	**GX4CrNi13-4+QT1 (1.4317)**	Fertigungsauftrag: production order:	**390001021523**

Schweißverfahrens-prüfung: welding procedure record no.:	**PQR 39**	Spezifikation: specification:	**GX 40**
Schweißverfahren: welding procedure:	**E-Hand / SMAW/ 111**	Zusatzwerkstoff : filler metal : Charge / heat no.:	**Thyssen Thermanit 13/04**
Vorwärmung: preheat temperature:	**150°C**	Zwischenlagentemp.: interpass temperature	**max. 198°C**
Nachwärmung: postheat temperature:	**Doppelanlassung 680°C + 600°C, 1h/1" min.1h**	Abkühlung: cooling:	**ruhende Luft**

Schweißstelle: weld: 1 - 17 Schweißer: welder: Heinecke	Stempel: stamp S12	Schweißstelle: weld: Schweißer welder:	Stempel: stamp
Schweißstelle: weld: 18 - 32 Schweißer: welder: Rakelle	Stempel: stamp S28	Schweißstelle: weld: Schweißer welder:	Stempel: stamp

Gesamtvolumen / total volume [cm³]:	**2953**	Gesamtfläche / total sureface [cm²]	**1827**
Masse Schweißgut / mass weld [kg]:	**23,24**		
Anteil Schweißgut / stake weld [%]:			

Bemerkung:
remark:

Datum: 28.04.2022

Schweißaufsicht
welding supervisor

Sachverständiger
expert

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Pleissner Guss Gießerei
GMH GRUPPE

FE-Protokoll / PT-Report		Protokoll Nr.: report no.:	PT 325/2022	Blatt: page:	1/1
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order-no.:	4500490964/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009924/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69381		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	5/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021523		

Angaben zur Prüftechnik / examination technique

Prüfung nach: testing to:	DIN EN 1371-1; acc to QP00294 §6.6.3 and 2816(CS-0006) §1.1	Eindringzeit: penetration time:	60 min
Beurteilung nach: assessment by:	Flächen A: SP1; Flächen B: SP2; Restflächen & unbearb. Fl.: SP3	Entwicklerzeit: developer time:	60 min
Prüfumfang: inspection:	100%	Oberflächenzustand: surface condition:	geschliffen und/oder gestrahlt / ground and/or shotblasted

Angaben zum Prüfsystem / examination system

Vor-, Endreiniger (Hersteller/Typ/Chargen-Nr.): preliminary, final cleaning (manufacturer / type / batch no.)	Wasser - water	
Eindringmittel (Hersteller/Typ/Chargen-Nr.): penetrant (manufacturer / type / batch no.):	MR 67	67/1076G
Zwischenreinigung (Hersteller/Typ/Chargen-Nr.): between cleaning (manufacturer / type / batch no.)	Wasser - water	
Entwickler (Hersteller/Typ/Chargen-Nr.): developer (manufacturer / type / batch no.):	MR 70	70/1314G

Angaben zu den Kontrollen/indications concerning checks

Kontrollkörper für die Empfindlichkeit Kontrolle (Norm/Typ/Nr.): inspection body for the sensitivity control (standard / type / no.)	Kontrollkörper nach DIN EN ISO 3452-3 control body acc. to DIN EN ISO 3452-3	
Ergebniss am Kontrollkörper (Anzahl und Größe der Anzeige): result on the control body (number and size of the display):	5	
Inspektion Bedingung (Luxmeter/Wert der Beleuchtungsstärke): inspection condition (Luxmeter / value of illuminance)	1320 Lux mit Taschenlampe	
ggf. sonstige Prüfparameter (z.B. Wasserdruck, Temp. usw.) other test parameters if necessary (e.g. water pressure, temp etc..)	Temperatur Bauteil : 19 Grad Temperatur Prüfhalle : 20 Grad	Testo 925 Inventar-Nr.5016

Prüfergebnis/test result

Prüfergebnis result of examination	Es wird bestätigt, dass die Ergebnisse der angegebenen Spez. entsprechen (ohne registrierpflichtige Anzeigen). / We confirm that the results are in conformity with the indicated specification (without indications to be documented).

Datum: date:	16.05.2022	Prüfdatum: Test date:	13.05.2022
	Michaelis Level II Prüfer / inspector		Wehmeyer Level II Prüfaufsicht / special supervisor

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Pleissner Guss Gießerei
GMH GRUPPE

US-Protokoll / UT-Report		Protokoll Nr.: report no.:	UT 200/2022	Blatt: page:	1/1
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840		
Kd.-Bestell-Nr.: order no.:	4500490964/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009924/10		
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69381		
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	5/1		
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021523		

Angaben zum Prüfsystem / examination system

Gerät: apparatus:	Krautkrämer USN 58L (0162N5)	Kopplung: couplant:	Kleister / paste
Prüfköpfe: assessment by:	B2S MSEB4-0°S TS 60°- 4	Prüfbereich: examined area:	100, 250, 500mm
Justierung: calibration:	Am Prüfstück in Verbindung mit dem AVG Datenblatt,WPK Gußkante 80% BSH + 6dB / on the test piece in connection with the AVG data sheet,angle beam probe casting edge 80% screen hight + 6dB		

Angaben zur Prüfung / Information about the test

Prüfvorschrift: test procedure:	gem. QP00294 §6.6.5 und CS-00006 §1.1 ; DIN EN 12680-1 Fläche A -UV1- ; Fläche B -UV2- ; Fläche C -UV3-
Registrierschwelle: reference line:	Gemäß DIN EN 12680-1 / according to DIN EN 12680-1 Fläche A -UV1- ; Fläche B -UV2- ; Fläche C -UV3-
Prüfumfang: volume of operation:	100% soweit prüftechnisch möglich / as far as technically possible
Prüfflächenzustand: surface condition:	geschliffen und/oder gestrahlt / ground and/or shotblasted
WBH - Zustand: heat treatment state:	nach letzter Warmbehandlung / after last heat treatment

Prüfergebnis / test result

Prüfergebnis: result of examination	Es wird bestätigt, dass die Ergebnisse der angegebenen Spez. entsprechen (ohne registrierpflichtige Anzeigen). / We confirm that the results are in conformity with the indicated specification (without indications to be documented).
Bemerkung: remark:	

Datum: date:	16.05.2022	Prüfdatum: Test date:	16.05.2022
	Bierbaum Level 2 Prüfer / inspector		Wehmeyer Level 3 Prüfaufsicht / special supervisor

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Pleissner Guss Gießerei
GMH GRUPPE

Maßprotokoll Dimensional report		Protokoll Nr.: report no.: DT 121/2022	Blatt: page: 1/2
	Erstmuster / initial sample	X	Serie / serial casting
Kunde: customer:	0002001718 Aerzener Maschinenfabrik GmbH	Material Nr.: material no.:	39V0317190840
Kd.-Bestell-Nr.: order-no.:	4500490964/10 vom 20.10.2021	Kd.-Auftrag: customer commission:	3911009924/10
Bezeichnung: item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Charge: heat no:	69381
Modell-Nr.: pattern no.:	171908-01	Kenn-Nr.: code no.:	5/1
Werkstoff: material:	GX4CrNi13-4+QT1 (1.4317)	Fertigungsauftrag: production order:	390001021523
Zeichnungs-Nr.: drawing-no.:	4900005224 Rev.05		

	Rohguss raw casting	X	Vorbearbeitet pre machined		Fertigbearbeitet final machined

Ref. Nr. ref. No.	Zg. Koord. drawing coord.	Blatt sheet	Sollmaß lt. Zeichnung required dimension [mm]	Istmaß actual dimension [mm]	Bewertung estimation e OK	ne NOK	Rauhigkeit roughness Soll req.	Ist act.	Bemerkung remark
1	F-2		1493 +2xBz	1511-1532	x				
2	D-3		460	460	x				
3	G-3		460	460	x				
4	B-6		676,39 +2xBz	686-689	x				
5	F-5		415,1 +2xBz	425-435	x				
6	M-9		100 ±5	98-101	x				
7	M-10		100 ±5	98-100	x				
8	M-10		Ø440 ±7	437-440	x				
9	D-13		20 ±3	18-20	x				
10	E-11		Ø315 -Bz	255	x				
11	E-12		Ø265 -Bz	255	x				
12	E-12		Ø255	255	x				
13	E-14		Ø290 -Bz	255	x				
14	E-14		Ø440 ±7	438-440	x				
15	G-13		300 +6=306 ±6	307-309	x				
16	G-15		345 ±6	340-341	x				
17	G-16		249 ±5,5	250-252	x				
18	F-15		Ø261	261	x				
19	E-15		Ø269 -Bz	261	x				
20	E-16		100 ±5	96-98	x				
21	E-17		Ø261	261	x				
22	F-17		Ø269 -Bz	261	x				
23	E-17		Ø315 ±6	311-312	x				
24	F-17		345 ±6	344-346	x				
25	F-18		300+6=306 ±6	305-307	x				

BZ = Bearbeitungszugabe / the machining allowance

Ergebnis:
result:

Datum:
date: 16.05.2022

Prüfdatum:
Test date: 16.05.2022

Leonhardt
Prüfer / inspector

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Pleissner Guss Gießerei
GMH GRUPPE

Maßprotokoll
Dimensional report

Protokoll Nr.: / report no.: DT 121/2022 Blatt: / page: 2 / 2

Ref. Nr. ref. No.	Zg. Koord. drawing coord.	Blatt sheet	Sollmaß lt. Zeichnung required dimension [mm]	Istmaß actual dimension [mm]	Bewertung estimation e OK	ne NOK	Rauhigkeit roughness Soll req.	Ist act.	Bemerkung remark
26	C-17		50 ±4	54	x				
27	C-18		170 ±5,5	166-167	x				
28	D-17		Ø140 ±5	138	x				
29	D-18		Ø140 ±5	138	x				
30	F-20		Ø255	255	x				
31	F-20		Ø270 -Bz	255	x				
32	F-21		Ø315 -Bz	255	x				
33	H-18		285 ±6	284	x				
34	H-17		188 ±5,5	187-188	x				
35	G-17		375 ±6	373	x				
36	G-16		219 ±5,5	218-220	x				
37	H-15		15 ±4	19	x				
38	G-14		375 ±6	373-374	x				
39	H-14		188 ±5,5	186	x				
40	H-13		285 ±6	287	x				
41	G-13		40 ±5	42-44 (bis 52)		x			(Formschräge)
42	H-12		Ø260 ±6	256	x				
43	H-11		Ø330 -Bz	256	x				
44	J-15		1550	1550	x				

Datum: / date: 16.05.2022

Prüfdatum: / Test date: 16.05.2022

Leonhardt
Prüfer / inspector

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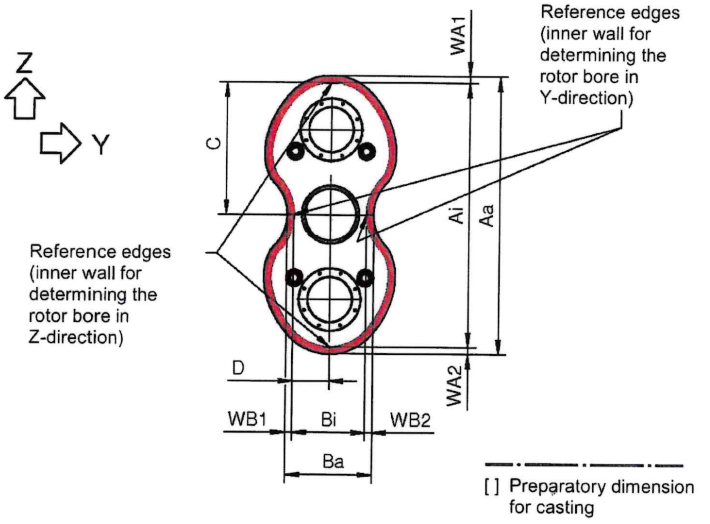
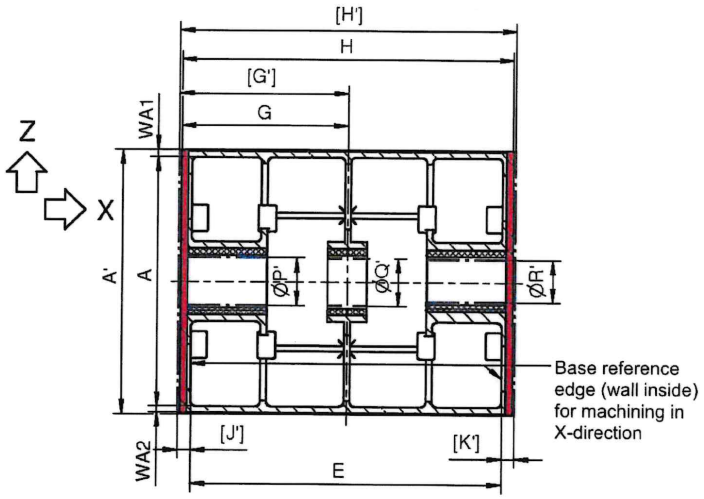
Measuring Reports

3.3 Measuring Report Rotary Piston

Reference dimensions for pre-machining and actual dimensions

5/1





Testing dimensions (to be completed by foundry)	
Ai	1431-1436
WA1	40-45
WA2	31-45
Bi	309-310
WB1	58-62
WB2	58-62
E	1455-1456
H'	1550
J'	44-47
K'	44-47
P'	255
Q'	261
R'	255

Y-Z level:

1. Define dim. Ai and mark C= Ai/2 anreißen.
2. Define dim. Bi and mark D=Bi/2
=> Rotor hole is defined

3. Check dimensions A,A',B,B',C,C',D,D'E,E', F, F'

X-Z Level:

4. Determine dimension E and set centre of the rotary piston in X-direction = E/2
5. Mark G and G' and H and H'

Hubs:

6. Mark radius P', Q',R' around the generated shaft axis

2816 | ZTD | 06

07					Datum	Name	**Stahlguss Spezifikation** **Drehkolben**
06	5…23395	07.02.2020	Hergesell	Bearb.	07.02.2020	Hergesell	
05	5…16700	26.03.2019	Vasel	Gepr.	07.02.2020	Palermo	
04	5…14834	02.08.2018	Vasel				
03	5…13468	30.01.2018	Vasel	AERZEN			2816 — Format: A4
02	5…11563	28.04.2017	Passauer				Seite 9 von 10
a	15745	07.04.2011	Borchers				
Zust.	Änderung	Datum	Name	Ursprung: CS-00006		Ers. Für:	Ers. Durch:

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Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No.
Reférénce usine: K21610554/1/1

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Erzeugnis/Lieferbedingung Product/Terms of order Produit/Stipulations de la commande

Rundstahl, geschmiedet, fixlang ges□gt, verg□tet nach Norm (+QT), spannungsarmgegl□ht (+SR), Gl□htemperatur bei ca. 540 - 560□C, Grenztemperatur < 623□C, vorgedreht, Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560□C, limit temperature < 623□C, preturned
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Herstellerzeichen
Suppliers Mark
Marque d usine

Positions-Nr Item Poste	Anzahl Quantity Nombre	Abmessung - Dimension - Dimension [mm]	Schmelze-Nr. Heat No. Coulée No.	Probe-Nr. Test No. No. d essai
1	5	VDM: □ 280 -0/+10 x 3486 mm	30225	115 139

Schmelze-Nr. Heat No. Coulée No.	Chemische Zusammensetzung in % - Chemical Composition % - Composition chimique %										
	C	Si	Mn	P	S	Cr	Mo				
Min.	0,38		0,60			0,90	0,15				
Max.	0,45	0,40	0,90	0,035	0,0350	1,20	0,30				
30225	0,43	0,27	0,74	0,003	0,0010	1,12	0,23				

Probe-Nr. Test-No. No. d essai	Ergebnis der mechanischen Prüfungen - Result of mechanical tests - Resultats des essais mécaniques Zugversuch - Tensile test - Essai de traction						Kerbschlagarbeit - Impact test - Résilience					
	Probenabm. Dim. of test Dim.de l'épr [mm]	Streckgren Yield point Lim. d' elast [N/mm²]	Zugfestigkeit Tensile str. Résistance [N/mm²]	Dehnung Elongatio Allongme %	Einschnüru Red. of Are Striction %	Prüftemp.: Test-temp. Temp. d'e °C	Probenform Sample Eprouvette	Pr.-Richtu Test directi Sens d' es	Einzelwerte Indiv. results Valeurs indiv. J	J	J	Prüftemp. Test-temp. Temp. d'e °C
Soll-Required		500	750	14					30			
115	10x50	703	895	21.6	65.3	20	ISO-V	längs longitudinal	130	132	119	20
Soll-Required		500	750-900	14	55				35			
139	10x50	631	837	21.3	62.3	20	ISO-V	längs longitudinal	88	68	27	20

Chem. Zusammensetzung entspr. Zeugnis Vorlieferant.
Chemical composition according to the original supplier's certificate.
Composition chimique suivant certificat du fournisseur original.

Zeichen des Werksachverständigen
Inspectors Stamps
Sigle d' Inspect. usine

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Seite: 1 (2)

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Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
ameca von Schaewen GmbH
Strickerstr. 31
45329 Essen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No. K21610554/1/1
Référénce usine

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Sonstige Angaben - Remarks - Remarques

US-gepr□ft nach EN 10228-3 100%, Qualit□tsklasse 3 / US-tested acc. to EN 10228-3 100%, quality class 3

Verformungsgrad / reduction ratio:: 8,37

Erschmelzungsart: Elektrostahl, Blockguss, vakuumentgast
Melting procedure: Electro steel, ingot casting, vacuum degassed

Mengenkontrakt Pos.10
Material: 584221000

Es wird hiermit bestätigt, daß die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.
Nous certifions que les produits indiqués ci dessus sont conformes à la commande.

Herr Stieglitz

Essen, 10.03.2022

Seite: 2 (2)

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von schaewen

Lierferwerk / supply site:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

von Schaewen GmbH · Postfach 10 35 62 · 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hückeswagen, 29.03.2021
Ihr Ansprechpartner / your contact:

Durchwahl:+49 0201/8110 -

Herr / Mr Yzerman	-431
Herr / Mr Kunz	-597
Fax	-439
Fax	-352

Umstempel-Bescheinigung / Remark Certification

Auftragsnummer / our order no.:	**K22610554/2/2**
Fertigungsauftrag / production no.:	408536; 408537
Bestellnummer / order no.:	4600001935 Pos. 20
Notizen / notes:	US-geprüft nach DIN EN 10228-3 100%, Qualitätsklasse 3 US-tested acc. to EN 10228-3 100%, quality class 3

Wir bestätigen / we confirm that the pieces delivered

2 Stück / piece(s)	Ø 280 - 0/+ 10 x 2864 mm
Werkstoff / material grade:	42CrMo4
Artikel Nr. / article no.:	Rundstahl, gesägt / roundbar, sawn

aus folgenden Abmessungen gefertigt wurden / were made of the following dimensions:

Abmessungen/dimension	Werkstoff/material grade	Schmelze/heat no.	Probe/test no.
1 Stk. aus /piece(s) from 280 RD x 2864 mm	42CrMo4	30122	2195
1Stk. Aus / piece(s) from 280 RD x 2864 mm	42CrMo4	258299	2286

APZ DIN EN 10204/3.1, Zeugnis Nr. / certification no. K21610554/2/1 gemäß der Firma / of company
SSK von Schaewen Hückeswagen GmbH

9 - Herr Kunz 14 - Herr Pohlmann

Seite: 1 (2)

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von schaewen

Umstempel-Bescheinigung	**Auftragsnummer**	**Druckdatum**
Remark Certification	**Order Number**	**date of printing**
	K22610554/2/2	**04/03/2022**

Die Stempelung wurde vor dem Trennen ordnungsgemäß übertragen.
Zum Zeichen der ordnungsgemäßen Umstempelung wurden die Teile mit unserem Stempel versehen.
Die Umstempelung erfolgt mit der Zustimmung des TÜV Nord, Essen.
Unser Unternehmen ist nach EN ISO 9001 zertifiziert.

The marking was duly transferred before disjunction.
In order to prove the marking is copied according to the original the material was
marked by our die. The marking was effected with the consent of TÜV Nord, Essen.
Our company is certified by ISO 9001.

von Schaewen GmbH

Kunz

Seite: 2 (2)

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HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500490108

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 15.10.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28
DE 31855 Aerzen

Zeichnungs-Nr.: drawing nr. 4900000677"7"

unsere Komm.-Nr.: work order nr. 10001471

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15486

Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0060	22042203

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,64	2,14	0,22	0,026	0,005	0,049	0,06	0,004	0,031	0,03	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	377	240	22,7	140	13	14	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 06.05.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig /
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HegerGuss GmbH

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HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500490109

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 15.10.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28
DE 31855 Aerzen

Zeichnungs-Nr.: drawing nr. 4900000677"7"

unsere Komm.-Nr.: work order nr. 10001473

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15535

Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0061	29042201

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,67	2,13	0,21	0,026	0,007	0,038	0,036	0,003	0,029	0,03	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	372	239	25,7	137	13	13	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 12.05.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
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This document has been created and is valid without signature

HegerGuss GmbH

Cooling gas stage
Serial no.n 4115956

Fertigungsauftrag/ Order:	1307574	ESNR / Mat. No. Stage:	35232000
FBNR / Serialni.:	4115956		
Typ/Type:	GQb 22.23	FENR / Workplace:	1321

Material Liste / Material-Reference List

Gem. QH00469

AERZEN
Gebläse / Blower

Bezeichnung / Description	Materialnummer / Material No.	Charge / Schmelze / Heat No. / Probe / Sample / Gießdatum / Casting date	Rohteilnummer / No. Raw material
Zahnradpaar / Gear	140241000	01.2022 002 BL31	
Zylinder / Cylinder	171904000	1012355 0010 07042022	
Radkasten / Wheel cover	157178000	13 130921	
Gehäusedeckel-OT / Housing cover	157179000	833321	
Gehäusedeckel-UT / Housinf cover		833421	
A-Kolben / Male piston	184271000	69363	
N-Kolben / Female piston	184220000	751720 Satz 2081	
A-Welle / Drive shaft		4600001935/20258288	
N-Welle / Driven shaft		4600001935 30122 IIQ	
Seitenplatte AS / Sideplate	141094000	10123540058 20042022 IIQ	
Seitenplatte RS / Sideplate	171905000	10123540058 13042022 IIQ	
Gleitringdichtung / Mechanical seal	2000054906	1666662	
Gleitringdichtung / Mechanical seal	200054906	1666663	
Gleitringdichtung / Mechanical seal	2000054906	1666664	
Gleitringdichtung / Mechanical seal	2000054906	1666665	

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500490106

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 15.10.2021

Aerzener Maschinenfabrik GmbH
--
Reherweg 28
DE 31855 Aerzen

Zeichnungs-Nr.: drawing nr. 4900005222"05"

unsere Komm.-Nr.: work order nr. 10001466

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15449

	Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
	1	1	Zylinder GQB22.23	4900005222"05"	EN-GJS-400-18-LT	1012355 0010	07042204

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,65	2,2	0,21	0,026	0,003	0,053	0,025	0,002	0,027	0,029	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		380	230	15		9	9	9	12		
act.	1	380	248	23,1	135	13	14	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 22.04.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig /
This document has been created and is valid without signature

HegerGuss GmbH

– 2. –

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innovativ. seit 1577

Olsberg GmbH, Postfach 1362, 59932 Olsberg

Aerzener Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Olsberg GmbH
Hüttenstraße 38
59939 Olsberg

Telefon 0049 2962/805-0
Fax 0049 2962/805-181

Unsere Abteilung/
Our Department: **GQF**
Hausruf/ Tel. Ext.: **0049 2962/ 805-261**

Datum/ Date: **11.Oktober.2021**

Abnahmeprüfzeugnis
Inspection Certificate
EN 10204 3.1
(DIN 50049 3.1B)

Nr./ No.
6262/ 33613

Zeichen des Herstellers
Mark of Manufacture: **oh**

Benennung / designation: **Radkasten**
Modell-Nr. / pattern-no: **140300-8 (557178000)**
Olsberg- Nr/Olsberg-part-no: **53/1026.1410**

Besteller / customer:
Aerzener Maschinenfabrik GmbH

Bestellungs-Nr./ Order No.: **4500470499**
vom/ of: **09.06.2021**

Auftrags-Nr./ Order No.: **2021/211078/1**

Werkstoff/ DIN/ Spezification:
EN-GJS-400-15U DIN EN 1563
GGG-40 DIN 1693

Erschmelzungsart/ Melting-furace: **Elektroofen/ Electric furace/**

Lieferbedingungen/ Terms of Delivery
lt. Vereinbarung / according to agreement

Erzeugnisform/ Product: **Rohguß / Raw Casting**

Anzahl/ Quantity	Gegenstand/ Description	Masse pro Teil/ Weight per part (kg)	Schmelzen-Nr. Cast-No Los-Nr./ Lot-No.	Chemische Zusammensetzung (Schmelzanalyse) Chemische Composition of Coast (in %) C	Si	Mn	P	S	Mg
1	140300-8 (557178000)	1415	13.09.2021	3,710	1,741	0,156	0,016	0,007	0,048

Zugfestigkeit/ Tensile strength [MPa]	Dehngrenze/ Proof Stress Rp0,2 [MPa]	Bruchdehnung/ Elongation A5 [%]	Härte/Hardness [HBW 5/750] DIN EN ISO 6506-1		Kerbschlagarbeit / Impact Value KV² in Joule bei -20° C DIN EN ISO 148-1			
Zugversuch nach /Tensile testing according DIN EN ISO 6892-1					1	2	3	x-quer
uWD50	418	256	18,0	uWD50	148			

Bemerkung/ remark: **aufgegossenes Giessdatum: 130921 13**

Lieferung gemäß/ delivery according	Vorschrift / rule	Index	vom/date
☐ QT01714		01	
☐ QP00200 - Vorschrift für die Lieferung von Gussrohteilen		03	26.07.2016
☐ QH-00510 Grundierung in Friazink-SikaCor Zinc von Sika		05	21.12.2016

Olsberg GmbH
i.V.
Digital unterschrieben von i.V. Burkhard Rüther
DN: cn=i.V. Burkhard Rüther, o=Olsberg GmbH, ou=QM Gusstechnik, email=burkhard.ruether@olsberg.com, c=DE
Datum: 2021.10.12 13:43:36 +02'00'
FH

Abnahmebeauftragter / manufacturer's authorized representative

Es wird bestätigt, daß die Lieferung geprüft wurde und den Vereinbarungen der Bestellannahme entspricht.

Hereby we confirm, that the delivery was checked and complies with the declarations of the purchase order.

incoming-inspection@aerzen.com
Fax-Nr.: +49 5154 819191 gefaxt: ☐ **Seite** *1* **von** *1*

10.1.F21 Rev. 9

Olsberg GmbH, 59939 Olsberg; Amtsgericht Arnsberg HRB 3730; Geschäftsführer Ulrich Herrmann und Stefan Osebold

- 3. -

SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 10.01.22

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét..... :2 Gehäusedeckel Oberteil
Bestell-Nr./ Order No./ Commande No. ..... :4500491110
Modell-Nr./ Pattern No./ Modèle No ..... :140301-8
Kom.-Nr./ Our Order No./ Notre commande No..... :21023891.10
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557181000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8334-21	3,64	2,30	0,14	0,042	0,008	0,047			2	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8334-21	302	438	24						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Sphäritisierung Spheroidal Spheroidal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

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SCHONLAU
DIE EISENGIESSEREI

SCHONLAU WERKE/59590 Geseke/Ernst-von-Bayern-Straße 22

Aerzener
Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Bearbeiter: Hr. Killing
Telefon: 02942-505 42

Geseke, den 17.12.21

Abnahmeprüfzeugnis 3.1
EN 10204 3.1 / Inspection certificate 3.1 / Certificate de réception 3.1

Gegenstand/ Subject/ Sujét..... :2 Gehäusedeckel Unterteil
Bestell-Nr./ Order No./ Commande No. ..... :4500491085
Modell-Nr./ Pattern No./ Modèle No..... :140302-8
Kom.-Nr./ Our Order No./ Notre commande No..... :21023892.10
Kunden-Art-Nr./Customer-Ref-No./Client-No..... :557180000

Werkstoff Quality Matière	Norm Standard Norme EN	Lieferzustand Condition of Delivery État de livraison	Streckgrenze Yield stress Limit d' Écoulement N/mm²	Zugfestigkeit Tensile strenght Résistance à la traction N/mm²	Bruchdehnung Elongation Allongement après rupture A5 %	Kerbschlagarbeit Impact Value Résilience ISO-V / - 20°C
GJS 400-15	1563		250	400	15	

Schmelzanalyse/ Chem.Composition of Cast / Composition chemique de la fonte analysé

Charge Cast-No. Coulée No	% C	% Si	% Mn	% P	% S	% Mg	% Cu	% Cr	Stück Piece Piece	Gießdatum Cast-Date Date de found
8333-21	3,74	2,31	0,16	0,046	0,009	0,050			2	

Mechanische Werte / Mechanical value / Valeur mécanique

Probe Test Éprouvette	Streckgrenze Yield stress Limit d' écoulement	Zugfestigkeit Tensile strenght Résistance à la traction	Bruchdehnung Elongation Allongement après rupture A5	Kerbschlagarbeit Impact Value Résilience					
Nr./No	N/ mm²	N/ mm²	%	Probenform Type	Prüftemp. Test. temp. Temp d'.essai	J	J	J	xq J
8333-21	305	438	24						

Gefügeuntersuchung (nach DIN EN ISO 945) / **Structural examination / Examen structurel**

Härteprüfung / Hardness / Essai de dureté

Sphäritisierung Spheroidal Spheroídal	Ferrit Ferrit Ferrite	Perlit Pearlite Perlite	Zementit Cementite Cémentite	Anordnung Arrangement	Form Figure Forme	Größe Size Grandeur	Nr. No. No.	HB

Christian Rohde
Abnahmebeauftragter / Worksinspector

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Duderstadter Straße 17
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www.pleissner-guss.de

Pleissner Guss GmbH

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.: certificate no.:	1021522/2022	Seite: Page:	1 / 3
Kunde: customer:	2001718 Aerzener Maschinenfabrik GmbH	Kundenauftrag: customer commission:	3911009923 / 000011
Kd.-Bestell-Nr.: order no.:	4500490962 / 10	Fertigungsauftrag: production order:	390001021522
vom/of:	20.10.2021	Modell-Nr.: pattern no.:	171908-01
Materialnummer: material no.:	39V0317190840	Kundenmaterialnr.: customer material no.:	371908000
Bezeichnung: Item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Kundenprojekt: customer project:	
Spez.: spec.:	QP00294 Rev.00/1 u. 2816 Rev.5	Zeichen des Lieferwerks: sign of the manufacturer:	P
Qualität: material:	GX4CrNi13-4+QT1 (1.4317)	Kenn-Nr.: code no.:	4/1
Stückzahl: number of pieces:	1	Stückgewicht: piece weight:	3.600,000 kg

Kenn-Nr.: code no.:	Charge: heat no.:	Proben-Nr.: sample no.:	Wärmebehandlungs-Charge: heat treatment no.:
4/1	69363	2MIW	03-08409-1,03-08527-1,03-08530-1,06-06708-2

Chemische Analyse in % - Chemical analysis in %

Erschmelzungsart - melting technology: VOD-Konverter - VOD converter

Charge:	C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu		
heat no.:						12,00		3,50				
	0,060	1,00	1,00	0,035	0,025	13,50	0,700	5,00	0,080	0,300		
69363	**0,060**	**0,55**	**0,67**	**0,019**	**0,013**	**12,83**	**0,452**	**4,25**	**0,038**	**0,093**		

Bemerkung / remark:

- 5. -

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Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.: / certificate no.: **1021522/2022** Seite: / Page: **2 / 3**

Mechanische Eigenschaften - mechanical properties

Zugversuch nach DIN EN ISO 6892-1:2020 B - tensile test according to DIN EN ISO 6892-1:2020 B

Charge: heat no.:	Proben-Nr.: sample no.:	Dehngrenze yield point [MPa]		Zugfestigkeit tensile strength [MPa]	Dehnung elongation [%]	Einschnürung reduction of area [%]
		$Rp_{0,2}$	$Rp_{1,0}$	R_m	A	Z
Soll-Wert: requirements: min.		550		760	15,0	
max.				960		
69363	**2MIW**	**797**		**936**	**17**	**60**

Bemerkung / remark:

Kerbschlagbiegeversuch nach DIN EN ISO 148-1 - charpy impact test according to DIN EN ISO 148-1

Charge: heat no.:	Proben-Nr.: sample no.:	Temperatur temperature [°C]	Hammerfinne striker Radius / radius [mm]	Kerbschlagarbeit impact energy [J]		
Soll-Wert: requirements:		20 20	2 2	27 50		
69363	**2MIW**	**20**	**2**	**91**	**103**	**108**

Bemerkung / remark:

Härteprüfung nach DIN EN ISO 6506-1 - Hardness test according to DIN EN ISO 6506-1

Kenn-Nr.: code no.:	Härte hardness [HB]			Kenn-Nr.: code no.:	Härte hardness [HB]		
Soll-Wert: requirements:				Soll-Wert: requirements:			
4/1	**287**	**284**	**283**				

Bemerkung / remark:

– 5. –

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Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.:
certificate no.: **1021522/2022**

Seite:
Page: **3 / 3**

Wärmebehandlung - heat treatment

WBH-Charge heat treatment no.	Wärmebehandlung-Art heat treatment type	Temperatur temperature [°C]	Zeit time [h]	Medium medium
03-08409-1	Härten / hardening	1050	5,0	bewegte Luft/moved air
03-08527-1	Spannungsarmglühen / pwht	620	7,0	ruhende Luft/still air
03-08530-1	Spannungsarmglühen / pwht	620	6,0	ruhende Luft/still air
06-06708-2	Anlassen / tempering	620	7,0	ruhende Luft/still air

Bemerkung / remark:

Sonstige Prüfungen - Other tests

Magnetpulverprüfung: magnetic particle testing:	
Farbeindringprüfung: penetrant testing:	gemäß DIN EN 1371-1, PS1-3 acc. to DIN EN 1371-1, PS1-3
Ultraschallprüfung: ultrasonic testing:	gemäß EN 12680-1 -UV1-3- acc. to EN 12680-1 -UV1-3-
Durchstrahlungsprüfung: Radiographic testing:	
Sichtprüfung: Visual testing:	gemäß QP00294 §6.6.1 acc. to QP00294 §6.6.1
Gefügebeurteilung: Microstructure analysis:	

Bemerkung / remark:

37412 Herzberg am Harz, 31.05.2022

Dittrich

Abnahmebeauftragter:
competent representative:

– 6. –

Duderstädter Straße 17
D-37412 Herzberg am Harz
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Pleissner Guss GmbH

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.: certificate no.:	1021525/2022	Seite: Page:	1 / 3
Kunde: customer:	2001718 Aerzener Maschinenfabrik GmbH	Kundenauftrag: customer commission:	3911009924 / 000011
Kd.-Bestell-Nr.: order no.:	4500490964 / 10	Fertigungsauftrag: production order:	390001021525
vom/of:	20.10.2021	Modell-Nr.: pattern no.:	171908-01
Materialnummer: material no.:	39V0317190840	Kundenmaterialnr.: customer material no.:	371908000
Bezeichnung: Item:	Drehkolben GQ22.23-2 Rotor GQ22.23-2	Kundenprojekt: customer project:	
Spez.: spec.:	QP00294 Rev.00/1 u. 2816 Rev.5	Zeichen des Lieferwerks: sign of the manufacturer:	P
Qualität: material:	GX4CrNi13-4+QT1 (1.4317)	Kenn-Nr.: code no.:	6/1
Stückzahl: number of pieces:	1	Stückgewicht: piece weight:	3.600,000 kg

Kenn-Nr.: code no.:	Charge: heat no.:	Proben-Nr.: sample no.:	Wärmebehandlungs-Charge: heat treatment no.:
6/1	69389	2MPD	01-08914-1,01-09000-1,01-09004-1,02-16411-2

Chemische Analyse in % - Chemical analysis in %

Erschmelzungsart - melting technology: VOD-Konverter - VOD converter

Charge:	C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu		
heat no.:						12,00		3,50				
	0,060	1,00	1,00	0,035	0,025	13,50	0,700	5,00	0,080	0,300		
69389	**0,054**	**0,52**	**0,70**	**0,020**	**0,004**	**12,75**	**0,429**	**4,26**	**0,042**	**0,136**		

Bemerkung / remark:

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Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.: / certificate no.: **1021525/2022** Seite: / Page: **2 / 3**

Mechanische Eigenschaften - mechanical properties

Zugversuch nach DIN EN ISO 6892-1:2020 B - tensile test according to DIN EN ISO 6892-1:2020 B

Charge: heat no.:	Proben-Nr.: sample no.:	Dehngrenze yield point [MPa]		Zugfestigkeit tensile strength [MPa]	Dehnung elongation [%]	Einschnürung reduction of area [%]
		$Rp_{0,2}$	$Rp_{1,0}$	R_m	A	Z
Soll-Wert: requirements: min.		550		760	15,0	
max.				960		
69389	**2MPD**	**643**		**867**	**18**	**60**

Bemerkung / remark:

Kerbschlagbiegeversuch nach DIN EN ISO 148-1 - charpy impact test according to DIN EN ISO 148-1

Charge: heat no.:	Proben-Nr.: sample no.:	Temperatur temperature [°C]	Hammerfinne striker Radius / radius [mm]	Kerbschlagarbeit impact energy [J]		
Soll-Wert: requirements:		20 20	2 2	27 50		
69389	**2MPD**	**20**	**2**	**110**	**111**	**108**

Bemerkung / remark:

Härteprüfung nach DIN EN ISO 6506-1 - Hardness test according to DIN EN ISO 6506-1

Kenn-Nr.: code no.:	Härte hardness [HB]			Kenn-Nr.: code no.:	Härte hardness [HB]		
Soll-Wert: requirements:				Soll-Wert: requirements:			
6/1	**263**	**267**	**273**				

Bemerkung / remark:

— 6. —

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Pleissner Guss GmbH

Abnahmeprüfzeugnis nach DIN - EN 10204 - 3.1

inspection certificate acc. to DIN - EN 10204 - 3.1

Zeugnis-Nr.:
certificate no.: **1021525/2022**

Seite:
Page: 3 / 3

Wärmebehandlung - heat treatment

WBH-Charge heat treatment no.	Wärmebehandlung-Art heat treatment type	Temperatur temperature [°C]	Zeit time [h]	Medium medium
01-08914-1	Härten / hardening	1050	5,0	bewegte Luft/moved air
01-09000-1	Spannungsarmglühen / pwht	620	6,0	ruhende Luft/still air
01-09004-1	Spannungsarmglühen / pwht	620	6,0	ruhende Luft/still air
02-16411-2	Anlassen / tempering	620	7,0	ruhende Luft/still air

Bemerkung / remark:

Sonstige Prüfungen - Other tests

Magnetpulverprüfung: magnetic particle testing:	
Farbeindringprüfung: penetrant testing:	gemäß DIN EN 1371-1, PS1-3 acc. to DIN EN 1371-1, PS1-3
Ultraschallprüfung: ultrasonic testing:	gemäß EN 12680-1 -UV1-3- acc. to EN 12680-1 -UV1-3-
Durchstrahlungsprüfung: Radiographic testing:	
Sichtprüfung: Visual testing:	gemäß QP00294 §6.6.1 acc. to QP00294 §6.6.1
Gefügebeurteilung: Microstructure analysis:	

Bemerkung / remark:

37412 Herzberg am Harz, 08.06.2022

Dittrich

Abnahmebeauftragter:
competent representative:

- 7 -

Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
SSK von Schaewen
Hückeswagen GmbH
Stahlschmidtsbrücke 20
42499 Hückeswagen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No. K21610554/1/4
Référénce usine

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Erzeugnis/Lieferbedingung Product/Terms of order Produit/Stipulations de la commande

Rundstahl, geschmiedet, fixlang gesägt, vergütet nach Norm (+QT), spannungsarmgeglüht (+SR), Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C, vorgedreht,
Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560°C, limit temperature < 623°C, preturned
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Herstellerzeichen
Suppliers Mark
Marque d usine

Positions-Nr Item Poste	Anzahl Quantity Nombre	Abmessung - Dimension - Dimension [mm]	Schmelze-Nr. Heat No. Coulée No.	Probe-Nr. Test No. No. d essai	Härteprüfung Hardness test Contrôle de dureté HB
1	1	VDM: Ø 280 -0/+10 x 3486 mm	258288	112	276
1	3	VDM: Ø 280 -0/+10 x 3486 mm	30225	139	276
1	1	VDM: Ø 280 -0/+10 x 3486 mm	30225	139	276

Schmelze-Nr. Heat No. Coulée No.	Chemische Zusammensetzung in % - Chemical Composition % - Composition chimique %										
	C	Si	Mn	P	S	Cr	Mo				
Min.	0,38		0,60			0,90	0,15				
Max.	0,45	0,40	0,90	0,035	0,0350	1,20	0,30				
258288	0,42	0,26	0,69	0,010	0,0070	1,11	0,26				
30225	0,43	0,27	0,74	0,003	0,0010	1,12	0,23				

Probe-Nr. Test-No. No. d essai	Ergebnis der mechanischen Prüfungen - Result of mechanical tests - Resultats des essais mécaniques											
	Zugversuch - Tensile test - Essai de traction						Kerbschlagarbeit - Impact test - Résilience					
	Probenabm. Dim. of test Dim.de l'épr [mm]	Streckgren Yield point Lim. d' elast [N/mm²]	Zugfestigkeit Tensile str. Résistance [N/mm²]	Dehnung Elongatio Allongme %	Einschnüru Red. of Are Striction %	Prüftemp.: Test-temp. Temp. d'e °C	Probenform Sample Eprouvette	Pr.-Richtu Test directi Sens d' es	Einzelwerte Indiv. results Valeurs indiv. J	J	J	Prüftemp. Test-temp. Temp. d'e °C
Soll-Required		500	750-900	14	55				35			
112	10x50	646	844	21.1	60.8	20	ISO-V	längs longitudinal	114	102	48	20
Soll-Required		500	750-900	14	55				35			
139	10x50	631	837	21.3	62.3	20	ISO-V	längs longitudinal	88	68	27	20

Chem. Zusammensetzung entspr. Zeugnis Vorlieferant.
Chemical composition according to the original supplier's certificate.
Composition chimique suivant certificat du fournisseur original.

Zeichen des Werksachverständigen
Inspectors Stamps
Sigle d' Inspect. usine

Seite: 1 (2)

- 7 -

Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
SSK von Schaewen
Hückeswagen GmbH
Stahlschmidtsbrücke 20
42499 Hückeswagen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No. K21610554/1/4
Référénce usine

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Sonstige Angaben - Remarks - Remarques

US-geprüft nach EN 10228-3 100%, Qualitätsklasse 3 / US-tested acc. to EN 10228-3 100%, quality class 3

T.R. 14

Verformungsgrad / reduction ratio: 8,4

Erschmelzungsart: Elektrostahl, Blockguss, vakuumentgast
Melting procedure: Electro steel, ingot casting, vacuum degassed

Mengenkontrakt Pos. 10
Material: 584221000

Bestellung 4500526128
5 Stk

Es wird hiermit bestätigt, daß die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.
Nous certifions que les produits indiqués ci dessus sont conformes à la commande.

Herr Pohlmann

Hückeswagen, 06.04.2022

Seite: 2 (2)

- 7. -

von schaewen

Lierferwerk / supply site:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

von Schaewen GmbH · Postfach 10 35 62 · 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hückeswagen, 06.04.2022
Ihr Ansprechpartner / your contact:

Durchwahl:+49 0201/8110 -

Herr / Mr Yzerman	-431
Herr / Mr Kunz	-597
Fax	-439
Fax	-352

Umstempel-Bescheinigung / Remark Certification

Auftragsnummer / our order no.:	**K22610554/1/4**
Fertigungsauftrag / production no.:	396199; 413119; 413120
Bestellnummer / order no.:	4600001935 Pos. 10
Notizen / notes:	US-geprüft nach DIN EN 10228-3 100%, Qualitätsklasse 3 US-tested acc. to EN 10228-3 100%, quality class 3

Wir bestätigen / we confirm that the pieces delivered

5 Stück / piece(s)	Ø 280 - 0/+ 10 x 3486 mm
Werkstoff / material grade:	42CrMo4
Artikel Nr. / article no.:	Rundstahl, gesägt / roundbar, sawn

aus folgenden Abmessungen gefertigt wurden / were made of the following dimensions:

Abmessungen/dimension	Werkstoff/material grade	Schmelze/heat no.	Probe/test no.
3 Stk. aus /piece(s) from 280 RD x 3486 mm	42CrMo4	30225	139
1Stk. Aus / piece(s) from 280 RD x 3486 mm	42CrMo4	30225	139
1Stk. Aus / piece(s) from 280 RD x 3486 mm	42CrMo4	258288	112

APZ DIN EN 10204/3.1, Zeugnis Nr. / certification no. K21610554/1/4 gemäß der Firma / of company
SSK von Schaewen Hückeswagen GmbH

9 - Herr Kunz 14 - Herr Pohlmann

Seite: 1 (2)

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von schaewen

Umstempel-Bescheinigung	Auftragsnummer	Druckdatum
Remark Certification	Order Number	date of printing
	K22610554/1/4	06/04/2022

Die Stempelung wurde vor dem Trennen ordnungsgemäß übertragen.
Zum Zeichen der ordnungsgemäßen Umstempelung wurden die Teile mit unserem Stempel versehen.
Die Umstempelung erfolgt mit der Zustimmung des TÜV Nord, Essen.
Unser Unternehmen ist nach EN ISO 9001 zertifiziert.

The marking was duly transferred before disjunction.
In order to prove the marking is copied according to the original the material was
marked by our die. The marking was effected with the consent of TÜV Nord, Essen.
Our company is certified by ISO 9001.

von Schaewen GmbH

Kurz - DM

Seite: 2 (2)

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von schaewen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hersteller / Producer:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

Hückeswagen, 06.04.2022

Ihr Ansprechpartner / Your contact:
Durchwahl / Phone: 0201/8110 -

Herr Stieglitz - 395
Telefax - 352

US - Prüfzeugnis / US - testcertificate

Bestellnmmer / Customer Order No.:	Beleg-Nr.: 4600001935 -Mengenkontrakt-		
Auftragsnummer / Works Order No.:	K21610554/1/4		
Prüfort, Datum / Test location in time:	Hückeswagen, 08.03.2022		
Prüfgerät / Testing set:	USM 36		
Prüfung gemäß / Testing acc.:	EN 10228-3 100%, Qualitätsklasse 3 / EN 10228-3 100%, quality class 3		
Koppelmedium / Coupling medium:	Öl / oil		
Prüfbereich / Test scope:	0 - 325 mm		
Prüfkopf / Test head:	B2S		
Prüfer / Examiner:	Herr Stieglitz	DIN EN ISO 9712 Stufe/Level:	3
Prüfaufsicht / Test supervisors:	Herr Stieglitz	DIN EN ISO 9712 Stufe/Level:	3

Rundstahl, geschmiedet, fixlang gesägt, vergütet nach Norm (+QT), spannungsarmgeglüht (+SR), Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C, vorgedreht
Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560°C, limit temperature < 623°C, preturned

Werkstoff / Material: 42CRMO4

Schmelze-Nr. Heat No.	Anzahl Qty.	Abmessung Dimension	Bezugsecho Reference Echo
30225	3	VDM: Ø 280 -0/+10 x 3486 mm	55 dB; ohne Beanstandung / without objection
30225	1	VDM: Ø 280 -0/+10 x 3486 mm	59 dB; ohne Beanstandung / without objection
258288	1	VDM: Ø 280 -0/+10 x 3486 mm	59 dB; ohne Beanstandung / without objection

sonstige Angaben / Remarks:
Mengenkontrakt Pos. 10
Material: 584221000

Bestellung 4500526128
5 Stk.

Seite / Page: 1 (2)

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von schaewen

US - Prüfzeugnis / US - testcertificate

Auftragsnummer /
Works Order No.
K21610554/1/4

Hückeswagen
06.04.2022

von Schaewen GmbH

Seite / Page: 2 (2)

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von schaewen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hersteller / Producer:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

Hückeswagen, 06.04.2022

Ihr Ansprechpartner / Your contact:
Durchwahl / Phone: 0201/8110 -

Herr Pohlmann -552
Fax -534

Warmbehandlungsbescheinigung
Certification of heat treatment

Bescheinigung gemäß DIN EN 10204/3.1
Certification acc. to DIN EN 10204/3.1

Bestellnummer / Customer Order No.:	Beleg-Nr.: 4600001935 -Mengenkontrakt-
Auftragsnummer / Works Order No.:	K21610554/1/4
Fertigungsauftrag / FA No.:	396199, 413119, 413120
Schmelze Nr. / Heat No.:	30225, 258288
Werkstoff / Material:	42CRMO4
Abmessung / Dimension:	VDM: Ø 280 -0/+10 x 3486 mm
Anzahl / Quantity:	4; 1
Zeichnung / Drawing No.:	

Rundstahl, geschmiedet, fixlang gesägt, vergütet nach Norm (+QT), spannungsarmgeglüht (+SR), Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C, vorgedreht,
Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560°C, limit temperature < 623°C, preturned

Schmelze Nr. / Heat No.: 30225

Wärmebehandlung Heat treatment	Temperatur Temperature	Haltezeit Holding time	Abkühlmedium Cooling medium
Härten / hardening	860 °C	6 h	Polymer / Polymer
Anlassen / termpering	600 °C	12 h	Luft / Air
Entspannen / thermal stress relief	550 °C	6 h	Ofen / Furnace

Schmelze Nr. / Heat No.: 30225

Wärmebehandlung Heat treatment	Temperatur Temperature	Haltezeit Holding time	Abkühlmedium Cooling medium
Härten / hardening	860 °C	6 h	Polymer / Polymer
Anlassen / termpering	600 °C	12 h	Luft / Air
Entspannen / thermal stress relief	550 °C	6 h	Ofen / Furnace

Schmelze Nr. / Heat No.: 258288

Wärmebehandlung Heat treatment	Temperatur Temperature	Haltezeit Holding time	Abkühlmedium Cooling medium
Härten / hardening	860 °C	6 h	Polymer / Polymer
Anlassen / termpering	600 °C	12 h	Luft / Air
Entspannen / thermal stress relief	550 °C	6 h	Ofen / Furnace

Seite / Page: 1 (2)

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von schaewen

Warmbehandlungsbescheinigung
Certification of heat treatment

Auftragsnummer / Works Order No.: K21610554
Datum / Date 06.04.2022

Sonstige Angaben - Remarks
Mengenkontrakt Pos. 10
Material: 584221000

Bestellung 4500526128
5 Stk.

SSK von Schaewen Hückeswagen GmbH

Herr Pohlmann

Es wird hiermit bestätigt, dass die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.

Seite / Page: 2 (2)

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Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
SSK von Schaewen
Hückeswagen GmbH
Stahlschmidtsbrücke 20
42499 Hückeswagen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No. K21610554/2/4
Référénce usine

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Erzeugnis/Lieferbedingung Product/Terms of order Produit/Stipulations de la commande

Rundstahl, geschmiedet, fixlang gesaegt, verguetet nach Norm (+QT), spannungsarmgeglueht (+SR), Gluehtemperatur bei ca. 540 - 560 C, Grenztemperatur < 623 C, vorgedreht
Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560 C, limit temperature < 623 C, preturned
Werkstoff / material grade: 42CrMo4/DIN EN 10250

Herstellerzeichen
Suppliers Mark
Marque d usine

Positions-Nr Item Poste	Anzahl Quantity Nombre	Abmessung - Dimension - Dimension [mm]	Schmelze-Nr. Heat No. Coulée No.	Probe-Nr. Test No. No. d essai	Härteprüfung Hardness test Contrôle de dureté HB
2	1	VDM: Ø 280 -0/+10 x 2864 mm	258288	112	276
2	3	VDM: Ø 280 -0/+10 x 2864 mm	30122	92	246
2	1	VDM: Ø 280 -0/+10 x 2864 mm	30122	92	246

Schmelze-Nr. Heat No. Coulée No.	Chemische Zusammensetzung in % - Chemical Composition % - Composition chimique %										
	C	Si	Mn	P	S	Cr	Mo				
Min.	0,38		0,60			0,90	0,15				
Max.	0,45	0,40	0,90	0,035	0,0350	1,20	0,30				
258288	0,42	0,26	0,69	0,010	0,0070	1,11	0,26				
30122	0,43	0,29	0,74	0,004	0,0010	1,14	0,22				
30122	0,43	0,29	0,74	0,004	0,0010	1,14	0,22				

Probe-Nr. Test-No. No. d essai	Ergebnis der mechanischen Prüfungen - Result of mechanical tests - Resultats des essais mécaniques											
	Zugversuch - Tensile test - Essai de traction						Kerbschlagarbeit - Impact test - Résilience					
	Probenabm. Dim. of test Dim.de l'épr [mm]	Streckgren Yield point Lim. d' elast [N/mm²]	Zugfestigkeit Tensile str. Résistance [N/mm²]	Dehnung Elongatio Allongme %	Einschnüru Red. of Are Striction %	Prüftemp.: Test-temp. Temp. d'e °C	Probenform Sample Eprouvette	Pr.-Richtu Test directi Sens d' es	Einzelwerte Indiv. results Valeurs indiv. J	J	J	Prüftemp. Test-temp. Temp. d'e °C
Soll-Required		500	750-900	14	55				35			
112	10x50	646	844	21.1	60.8	20	ISO-V	längs longitudinal	114	102	48	20
Soll-Required		500	750-900	14	55				35			
92	10x50	631	834	21.2	65.1	20	ISO-V	längs longitudinal	73	83	51	20

Chem. Zusammensetzung entspr. Zeugnis Vorlieferant.
Chemical composition according to the original supplier's certificate.
Composition chimique suivant certificat du fournisseur original.

Zeichen des Werksachverständigen
Inspectors Stamps
Sigle d' Inspect. usine

Seite: 1 (2)

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Abnahme-Prüfzeugnis / test certificate

Bescheinigung gemäß
Certificate acc. to DIN EN 10204 / 3.1
Certificat prévu

von schaewen

Hersteller - Producer - Fabricant
SSK von Schaewen
Hückeswagen GmbH
Stahlschmidtsbrücke 20
42499 Hückeswagen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Werksauftrag-Nr.
Works Order No. K21610554/2/4
Referénce usine

Kunden-Bestell-Nr.
Customers Order No.
No. de commande client
Beleg-Nr.: 4600001935 -Mengenkontrakt-

Sonstige Angaben - Remarks - Remarques

US-geprüft nach EN 10228-3 100%, Qualitätsklasse 3 / US-tested acc. to EN 10228-3 100%, quality class 3

T.R. 14

Verformungsgrad / reduction ratio: 6,4

Erschmelzungsart: Elektrostahl, Blockguss, vakuumentgast
Melting procedure: Electro steel, ingot casting, vacuum degassed

Mengenkontrakt Pos. 20
Material: 584222000

Bestelllung 4500525871
5 Stk

Es wird hiermit bestätigt, daß die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.
Nous certifions que les produits indiqués ci dessus sont conformes à la commande.

Herr Pohlmann

Hückeswagen, 06.04.2022

Seite: 2 (2)

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von schaewen

Lierferwerk / supply site:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

von Schaewen GmbH · Postfach 10 35 62 · 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hückeswagen, 06.04.2022
Ihr Ansprechpartner / your contact:

Durchwahl:+49 0201/8110 -

Herr / Mr Yzerman	-431
Herr / Mr Kunz	-597
Fax	-439
Fax	-352

Umstempel-Bescheinigung / Remark Certification

Auftragsnummer / our order no.:	**K22610554/2/4**
Fertigungsauftrag / production no.:	396203; 411178; 413128
Bestellnummer / order no.:	4600001935 Pos. 20
Notizen / notes:	US-geprüft nach DIN EN 10228-3 100%, Qualitätsklasse 3 US-tested acc. to EN 10228-3 100%, quality class 3

Wir bestätigen / we confirm that the pieces delivered

5 Stück / piece(s)	Ø 280 - 0/+ 10 x 3486 mm
Werkstoff / material grade:	42CrMo4
Artikel Nr. / article no.:	Rundstahl, gesägt / roundbar, sawn

aus folgenden Abmessungen gefertigt wurden / were made of the following dimensions:

Abmessungen/dimension	Werkstoff/material grade	Schmelze/heat no.	Probe/test no.
1 Stk. aus /piece(s) from 280 RD x 3486 mm	42CrMo4	258288	112
3Stk. Aus / piece(s) from 280 RD x 3486 mm	42CrMo4	30122	92
1Stk. Aus / piece(s) from 280 RD x 3486 mm	42CrMo4	30122	92

APZ DIN EN 10204/3.1, Zeugnis Nr. / certification no. K21610554/2/4 gemäß der Firma / of company
SSK von Schaewen Hückeswagen GmbH

9 - Herr Kunz 14 - Herr Pohlmann

Seite: 1 (2)

– 8. –

von schaewen

Umstempel-Bescheinigung	Auftragsnummer	Druckdatum
Remark Certification	Order Number	date of printing
	K22610554/2/4	06/04/2022

Die Stempelung wurde vor dem Trennen ordnungsgemäß übertragen.
Zum Zeichen der ordnungsgemäßen Umstempelung wurden die Teile mit unserem Stempel versehen.
Die Umstempelung erfolgt mit der Zustimmung des TÜV Nord, Essen.
Unser Unternehmen ist nach EN ISO 9001 zertifiziert.

The marking was duly transferred before disjunction.
In order to prove the marking is copied according to the original the material was marked by our die. The marking was effected with the consent of TÜV Nord, Essen.
Our company is certified by ISO 9001.

von Schaewen GmbH

Kurz

Seite: 2 (2)

– 8. –

von schaewen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hersteller / Producer:
ameca von Schaewen GmbH
Strickerstr. 31 · 45329 Essen

Essen, 06.04.2022

Ihr Ansprechpartner / Your contact:
Durchwahl / Phone: 0201/8110 -

Herr Stieglitz	- 395
Herr Franz	- 329
Telefax	- 352

US - Prüfzeugnis / US - testcertificate

Bestellnmmer / Customer Order No.:	Beleg-Nr.: 4600001935 -Mengenkontrakt-		
Auftragsnummer / Works Order No.:	K21610554/2/4		
Prüfort, Datum / Test location in time:	Essen, 03.03.2022		
Prüfgerät / Testing set:	USM 36		
Prüfung gemäß / Testing acc.:	EN 10228-3 100%, Qualitätsklasse 3 / EN 10228-3 100%, quality class 3		
Koppelmedium / Coupling medium:	Öl / oil		
Prüfbereich / Test scope:	0 - 325 mm		
Prüfkopf / Test head:	B2S		
Prüfer / Examiner:	Herr Franz	DIN EN ISO 9712 Stufe/Level:	2
Prüfaufsicht / Test supervisors:	Herr Stieglitz	DIN EN ISO 9712 Stufe/Level:	3

Rundstahl, geschmiedet, fixlang gesägt, vergütet nach Norm (+QT), spannungsarmgeglüht (+SR), Glühtemperatur bei ca. 540 - 560°C, Grenztemperatur < 623°C, vorgedreht
Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560°C, limit temperature < 623°C, preturned

Werkstoff / Material: 42CRMO4

Schmelze-Nr. Heat No.	Anzahl Qty.	Abmessung Dimension	Bezugsecho Reference Echo
258288	1	VDM: Ø 280 -0/+10 x 2864 mm	59 dB; ohne Beanstandung / without objection
30122	3	VDM: Ø 280 -0/+10 x 2864 mm	52 dB; ohne Beanstandung / without objection
30122	1	VDM: Ø 280 -0/+10 x 2864 mm	52 dB; ohne Beanstandung / without objection

Mengenkontrakt Pos. 20
Material: 584222000

Bestelllung 4500525871
sonstige Angaben / Remarks: 5 Stk.

Seite / Page: 1 (2)

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von schaewen

US - Prüfzeugnis / US - testcertificate

Auftragsnummer /
Works Order No.
K21610554/2/4

Essen
06.04.2022

von Schaewen GmbH

Herr Stieglitz

Seite / Page: 2 (2)

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von schaewen

Hersteller / Producer:
SSK von Schaewen Hückeswagen GmbH
Stahlschmidtsbrücke 20 · 42499 Hückeswagen

von Schaewen GmbH • Postfach 10 35 62 • 45035 Essen

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen

Hückeswagen, 06.04.2022

Ihr Ansprechpartner / Your contact:
Durchwahl / Phone: 0201/8110 -

Herr Pohlmann -552
Fax -534

Warmbehandlungsbescheinigung
Certification of heat treatment

Bescheinigung gemäß DIN EN 10204/3.1
Certification acc. to DIN EN 10204/3.1

Bestellnummer / Customer Order No.:	Beleg-Nr.: 4600001935 -Mengenkontrakt-
Auftragsnummer / Works Order No.:	K21610554/2/4
Fertigungsauftrag / FA No.:	396203, 411178, 413128
Schmelze Nr. / Heat No.:	258288, 30122
Werkstoff / Material:	42CRMO4
Abmessung / Dimension:	VDM: Ø 280 -0/+10 x 2864 mm
Anzahl / Quantity:	1; 4
Zeichnung / Drawing No.:	

Rundstahl, geschmiedet, fixlang gesaegt, verguetet nach Norm (+QT), spannungsarmgeglueht (+SR), Gluehtemperatur bei ca. 540 - 560 C, Grenztemperatur < 623 C, vorgedreht
Roundbar, forged, sawn, fixed length, quenched and tempered acc. to standard (+QT), stress relieved (+SR), annealing temperature at approx 540 - 560 C, limit temperature < 623 C, preturned

Schmelze Nr. / Heat No.: 258288

Wärmebehandlung Heat treatment	Temperatur Temperature	Haltezeit Holding time	Abkühlmedium Cooling medium
Härten / hardening	860 °C	6 h	Polymer / Polymer
Anlassen / termpering	600 °C	12 h	Luft / Air
Entspannen / thermal stress relief	550 °C	6 h	Ofen / Furnace

Schmelze Nr. / Heat No.: 30122

Wärmebehandlung Heat treatment	Temperatur Temperature	Haltezeit Holding time	Abkühlmedium Cooling medium
Härten / hardening	860 °C	6 h	Polymer / Polymer
Anlassen / termpering	600 °C	12 h	Luft / Air
Entspannen / thermal stress relief	550 °C	6 h	Ofen / Furnace

Schmelze Nr. / Heat No.: 30122

Wärmebehandlung Heat treatment	Temperatur Temperature	Haltezeit Holding time	Abkühlmedium Cooling medium
Härten / hardening	860 °C	6 h	Polymer / Polymer
Anlassen / termpering	600 °C	12 h	Luft / Air
Entspannen / thermal stress relief	550 °C	6 h	Ofen / Furnace

Seite / Page: 1 (2)

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von schaewen

Warmbehandlungsbescheinigung
Certification of heat treatment

Auftragsnummer / Works Order No.: K21610554
Datum / Date 06.04.2022

Sonstige Angaben - Remarks
Mengenkontrakt Pos. 20
Material: 584222000

Bestelllung 4500525871
5 Stk.

SSK von Schaewen Hückeswagen GmbH

Herr Pohlmann

Es wird hiermit bestätigt, dass die Lieferung den Vereinbarungen bei der Bestellung entspricht.
We certify that the above mentioned material is in accordance with terms of order.

Seite / Page: 2 (2)

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HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500490108

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 15.10.2021

Aerzener Maschinenfabrik GmbH
--

Zeichnungs-Nr.: drawing nr. 4900000677"7"

Reherweg 28

unsere Komm.-Nr.: work order nr. 10001471

DE 31855 Aerzen

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15471

Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0059	20042205

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,63	2,16	0,2	0,018	0,005	0,048	0,025	0,003	0,026	0,04	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	377	246	23,3	140	13	13	13	13	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 06.05.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig /
This document has been created and is valid without signature

HegerGuss GmbH

— 10. —

HEGERGUSS

HegerGuss GmbH - Donnersbergstraße 48 - 67677 Enkenbach-Alsenborn - Telefon (0 63 03) 80 30 - Fax (0 63 03) 803-211 - e-mail: info@heger-gruppe.de

Bestell-Nr.: order nr. 4500490107

HegerGuss GmbH - Postfach 1262 - 67673 Enkenbach-Alsenborn

Bestelltag: date of order 15.10.2021

Aerzener Maschinenfabrik GmbH
--

Zeichnungs-Nr.: drawing nr. 4900000677"7"

Reherweg 28

unsere Komm.-Nr.: work order nr. 10001467

DE 31855 Aerzen

☐ **Werkszeugnis** test report nach DIN 10204-2.2

☒ **Abnahmeprüfzeugnis** inspection certificate nach DIN 10204-3.1

Nr.: 15457

Nr. item	Stückzahl number	Erzeugnis product	Modell-Nr pattern nr.	Werkstoff material	Stück-Nr. part nr.	Schmelze-Nr melt nr.
1	1	Räderseitenplatte GQ22.23-2	4900000677"7"	EN-GJS-400-18-LT	1012354 0058	13042207

	lfd. Nr. item	Chemische Zusammensetzung (Schmelzanalyse) [%] chemical composition (melting analysis)										
		C	Si	Mn	P	S	Mg	Cu	Mo	Cr	Ni	
act.	1	3,65	2,12	0,22	0,025	0,006	0,045	0,039	0,003	0,026	0,025	

	lfd. Nr. item	Zugfestigkeit tensile strength DIN EN ISO 6892-1 [MPa]	0,2-Grenze 0,2-limit [MPa]	Dehnung elongation Lo = 5 d [%]	Härte hardness DIN EN 10 003-1 [HB]	Kerbschlagarbeit impact value -20°C [J] 1.	2.	3.	Mittel average	Erschmelzungsart melting process	Produktvorschrift Product specification
target min.		360	220	12		7	7	7	10		
act.	1	370	233	25,2	135	14	13	14	14	MF Induktionsofen induction melting furnace	DIN EN 1563

Zusätzliche Angaben:
additional details

Besichtigung der Oberflächenbeschaffenheit und Maßkontrolle: o.B.
visual surface condition and dimension control: without objection

Es wird bestätigt, daß das Erzeugnis den Vereinbarungen der Bestellung entspricht.
We hereby certify, that the product complies with the arrangements of order.

Datum 28.04.2022
Date

Der Abnahmebeauftragte/Inspection Manager
Stefan Rudloff / Leitung Qualität/ Senior Quality Manager
Dieses Dokument wurde maschinell erstellt und ist ohne Unterschrift gültig /
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HegerGuss GmbH

B.1.5.2 Test documentation

Stage 1

Serial no.4112784

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

nach DIN EN 10204
acc. to DIN EN 10204

AERZEN
Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen - GERMANY
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Fax: ++49(0) 51 54 / 81 9191
E-Mail: info@aerzen.com
Internet: www.aerzener.com

Rev.: 13-070618

Typ / type	Fabriknummer / serial no.	Serialnummer/ serial no. unit	KANR / purchase order no.
GQB22.23	4112784		4000369/10

Besteller / committer	Volumen pro Umdrehung q_t volume per rotation q_t	Getriebeübersetzung i gear transmission i	p_1 / v_i
AERZEN Deutschland GmbH & Co. KG	3000,000 dm³/Umdr.	0,407	

Bestelldaten order data	ITEM-Nr.: ITEM-No.:	Betriebsfall case
Aerzen D 284697		A

Ansaugvolumen V intake volume flow V	Ansaugdruck p_1 intake pressure p_1	Enddruck p_2 discharge pressure p_2	Druckunterschied p_1 - p_2 pressure difference p_1 - p_2	Fördermedium conveying medium	Ansaugtemperatur t_1 intake temperature t_1
1619,28 m³/min	1,065 bar(abs.)	2,159 bar(abs.)	1094 mbar	CO2,H2,H2O,CH4	58 °C

Endtemperatur t_2 discharge temperature t_2	Leistungbed. an der Verdichterkupplung P_{Ku} powerconsumption on the coupling P_{Ku}	Antriebsdrehzahl n_{Mot} driving speed n_{Mot}	Hauptkolbendrehzahl n_{HK} main rotor speed n_{HK}	Dichte im Ansaugzustand ρ_1 density at intake conditions ρ_1	Durchflussrichtung direction of flow
75 °C	3604,00 kW	1485 1/min	612 1/min	0,717 kg/m³	N. LINKS

Messwerte measuring values — Index V = Versuch = test — **Auswertung** evaluation

φ_0	t_0	p_0
44 %	25 °C	999 mbar

$p_{M1,V}$	bar	- 0,027		$p_{1,V}$	mbar	972					
$p_{M2,V}$	bar	0,682		$p_{2,V}$	mbar	1681					
Blende orifice				$p_{2,V}$ - $p_{1,V}$	mbar	709					
DIN EN ISO 5167-1	mm Ø	410		$r_{1,V}$	kg/m³	1,146					
$\Delta p,v$	mbar	39,2		$T_{1,V}$	K	294					
$t_{0,V}$	°C	29		$V_{1,V}$	m³/min	390,68					
$t_{1,V}$	°C	21		$V_{t,V}$	m³/min	546,00					
$t_{2,V}$	°C	71		$n_{HK,V}$	1/min	182					
$n_{M,V}$	1/min	447		$P_{Ku,V}$	kW	664,47					
F_V	kg/kp N	14864,00			η_M						
$P_{M,V}$	kW			$V_{vert,V}$	m³/min	155,32					
$t_{OL,V}$	°C	33		$\eta_{vol,V}$		0,72					
$p_{OL,V}$	bar	3,0									

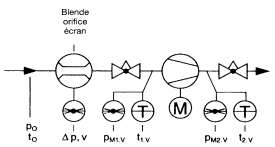
Messwerte umgerechnet auf Bestelldaten in Anlehnung an die ISO 1217
Measuring values converted into order data based acc. to ISO 1217

Index um = umgerechnet auf Bestelldaten = converted into order data

$\eta_{vol,um}$	$V_{vert,um}$	$V_{t,um}$	$V_{1,um}$	$V_{1,um}$	$P_{Ku,um}$	$P_{Ku,um}$
0,87	243,92 m³/min	1.836,00 m³/min	1592,08 m³/min	-1,68 %	3447,68 kW	-4,34 %

Maximale Erprobungsdaten
Maximum test data

p_1	0,011 bar	$t_{1\,max}$	50 °C	$n_{HK\,max}$	183 1/min
p_{2e}	0,580 bar	$t_{2\,max}$	114 °C		



Abnahmestempel / acceptance stamp

Datum date	Name name
20.06.2022	Rzepka

Prüfstand Nr.: test bench no.: 03

Bemerkungen / remarks

Stempel für Druckprobe
Stamp for pressure test

F 000 D 000

Fb 371

AERZEN

Werkszeugnis 2.2
anlehnend an EN 10204, jedoch für Maschinen und Teile

Works Certificate 2.2
as per EN 10204, but for machines and parts

Compressed air, gas
and vacuum solutions

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen
Germany

info@aerzen.com
www.aerzen.com
Telefon: +49 5154 81-0
Telefax: +49 5154 81-9191

Auftraggeber: Committer:	AERZEN Deutschland GmbH & Co. KG
Bestellzeichen: Order no:	Aerzen D 284697
Auftragsnummer: Our order no:	4000369 / 10
Lieferant und Hersteller: Supplier and manufacturer:	**Aerzener Maschinenfabrik GmbH Reherweg 28, D-31855 Aerzen**
Fabriknr. / Serial Nr. Agg: Serial no stage/Serial no unit:	4112784 4114849
Beschreibung der Ware: Description of the goods:	Gebläse / blower GQB22.23

Wir bescheinigen hiermit, dass das für vorgenannte Ware verwendete Material den Vorschriften der Stückliste entspricht und nach Zeichnung einwandfrei bearbeitet wurde. Alle qualitätsbestimmenden Prüfungen wurden mit kalibrierten Messmitteln im Toleranzrahmen der ISO 1217, der DIN ISO 21940 und der VDI-Richtlinien 2618 durchgeführt. Die Restunwucht der Drehkolben mit Wellen übersteigt nicht die zulässigen Werte der Auswucht-Gütestufe 2,5 nach DIN ISO 21940. Die unten aufgeführten Werkstoffe erfüllen bzgl. ihrer chemischen Zusammensetzung und ihrer physikalischen Eigenschaften die Anforderungen der jeweiligen Werkstoffnormen DIN EN 1561, DIN EN 10083-2, DIN EN 10084 und DIN CEN/TS 13388.

We herewith certify that the materials used for the above mentioned order correspond to the specification of the bill of materials and were fabricated perfectly as per drawing. All quality-determining inspections were carried out with gauged measuring devices within the tolerance of ISO 1217, DIN ISO 21940 and VDI Guidelines 2618. The residual balance error of the rotary pistons with shafts does not exceed the admissible values of the balance quality rating 2,5 shafts acc.to DIN ISO 21940. The materials mentioned below comply with the requirements of the material standards DIN EN 1561, DIN EN 10083-2, DIN EN 10084 and DIN CEN/TS 13388 concerning their chemical composition and their physical properties.

AERZEN

Werkszeugnis 2.2

anlehnend an EN 10204, jedoch für Maschinen und Teile

Works Certificate 2.2

as per EN 10204, but for machines and parts

Compressed air, gas
and vacuum solutions

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen
Germany

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Telefon: +49 5154 81-0
Telefax: +49 5154 81-9191

Zylinder / Cylinder	5.3103
Räderseitenplatte / Wheel-side plate	5.3103
Räderseitenplatte / Wheel-side plate	5.3103
Radkasten / Wheel case	EN JS 1030
Gehäusedeckel-Unterteil / Housing cover lower part	EN JS 1030
Gehäusedeckel-Oberteil / Housing cover upper part	EN JS 1030
Drehkolben / Rotary piston	1.4317
Antriebswelle / Drive shaft	1.7225
Verschlussdeckel / VERS	1.4057
Verschlussdeckel / VERS	1.4057
Drehkolben / Rotary piston	1.4317
Nebenwelle / Secondary shaft	1.7225
Steuerräder / Timing gears	1.7131+QT (550HV) / 1.7131+QT
Deckel / Cover	1.4059

Aerzener Maschinenfabrik GmbH
Qualitätswesen und Prüffeld

Datum: 12.09.2022
Date:

i.A. Dreyer

Seite 2 / 2

AERZEN

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

anlehnend an EN 10204, jedoch für Maschinen und Teile
as per EN 10204, but for maschines und parts

Compressed air, gas
and vacuum solutions

Aerzener Maschinenfabrik GmbH
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Telefon: +49 5154 81-0
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Auftraggeber: Committer:	AERZEN Deutschland GmbH & Co. KG
Bestellzeichen: Order no:	Aerzen D 284697
Auftragsnummer: Our order no:	4000369 / 10
Lieferant und Hersteller: Supplier and manufacturer:	**Aerzener Maschinenfabrik GmbH Reherweg 28, D-31855 Aerzen**
Fabriknr. / Serial Nr. Agg: Serial no stage/Serial no unit:	4112784 4114849
Beschreibung der Ware: Description of the goods:	Gebläse / blower GQB22.23

Die montierten Gehäuseteile wurden einer Festigkeitsprüfung mit Öl / Wasser bei 5,000 bar Überdruck unterzogen. Der vorgegebene Prüfdruck wurde für die Dauer von 5 Minuten gehalten.

The mounted housing parts were subject to a pressure test with oil / water of 5,000 bar overpressure. The stipulated test pressure was maintained for 5 minutes.

Eine Dichtheitsprüfung mit 0,500 bar Überdruck wurde durchgeführt. Durchlässigkeiten wurden nicht festgestellt.

A leakage test with 0,500 bar overpressure has been effected. Permeabilities have not been discovered.

Aerzener Maschinenfabrik GmbH
Qualitätswesen und Prüffeld

Datum: 15.08.2022
Date:

i.A. Rzepka

Serial no. 4113138

AERZEN

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

anlehnend an EN 10204, jedoch für Maschinen und Teile
as per EN 10204, but for maschines und parts

Compressed air, gas
and vacuum solutions

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Telefax: +49 5154 81-9191

Auftraggeber: Committer:	AERZEN Deutschland GmbH & Co. KG
Bestellzeichen: Order no:	Aerzen D 284697
Auftragsnummer: Our order no:	4000369 / 20
Lieferant und Hersteller: Supplier and manufacturer:	**Aerzener Maschinenfabrik GmbH** **Reherweg 28, D-31855 Aerzen**
Fabriknr. / Serial Nr. Agg: Serial no stage/Serial no unit:	4113138 4113138
Beschreibung der Ware: Description of the goods:	Gebläse / blower GQB22.23

Die montierten Gehäuseteile wurden einer Festigkeitsprüfung mit Öl / Wasser bei 5,000 bar Überdruck unterzogen. Der vorgegebene Prüfdruck wurde für die Dauer von 5 Minuten gehalten.

The mounted housing parts were subject to a pressure test with oil / water of 5,000 bar overpressure. The stipulated test pressure was maintained for 5 minutes.

Eine Dichtheitsprüfung mit 0,500 bar Überdruck wurde durchgeführt. Durchlässigkeiten wurden nicht festgestellt.

A leakage test with 0,500 bar overpressure has been effected. Permeabilities have not been discovered.

Aerzener Maschinenfabrik GmbH
Qualitätswesen und Prüffeld

Datum: 13.06.2022
Date:

i.A. Dreyer

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

nach DIN EN 10204
acc. to DIN EN 10204

Aerzener Maschinenfabrik GmbH
Reherweg 28
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E-Mail: info@aerzen.com
Internet: www.aerzener.com

Rev.: 13-070618

Typ / type	Fabriknummer / serial no.	Serialnummer/ serial no. unit	KANR / purchase order no.
GQB22.23	4113138	4113138	4000369/20

Besteller / committer	Volumen pro Umdrehung q_t volume per rotation q_t	Getriebeübersetzung i gear transmission i	p_1 / v_i
AERZEN Deutschland GmbH & Co. KG	3000,000 dm³/Umdr.	0,407	

Bestelldaten order data	**ITEM-Nr.:** ITEM-No.:	Betriebsfall case
Aerzen D 284697		A

Ansaugvolumen V intake volume flow V	Ansaugdruck p_1 intake pressure p_1	Enddruck p_2 discharge pressure p_2	Druckunterschied p_1 - p_2 pressure difference p_1 - p_2	Fördermedium conveying medium	Ansaugtemperatur t_1 intake temperature t_1
1619,28 m³/min	1,065 bar(abs.)	2,159 bar(abs.)	1094 mbar	CO2,H2,H2O,CH4	58 °C

Endtemperatur t_2 discharge temperature t_2	Leistungbed. an der Verdichterkupplung P_{Ku} powerconsumption on the coupling P_{Ku}	Antriebsdrehzahl n_{Mot} driving speed n_{Mot}	Hauptkolbendrehzahl n_{HK} main rotor speed n_{HK}	Dichte im Ansaugzustand ρ_1 density at intake conditions ρ_1	Durchflussrichtung direction of flow
75 °C	3604,00 kW	1485 1/min	612 1/min	0,717 kg/m³	N. LINKS

Messwerte measuring values — Index V = Versuch / = test — **Auswertung** evaluation

φ_0	t_0	ρ_0
44 %	24 °C	997 mbar

$p_{M1,V}$	bar	- 0,029		$p_{1,V}$	mbar	968					
$p_{M2,V}$	bar	0,631		$p_{2,V}$	mbar	1628					
Blende orifice				$p_{2,V}$ - $p_{1,V}$	mbar	660					
DIN EN ISO 5167-1	mm Ø	410		$r_{1,V}$	kg/m³	1,137					
$\Delta p,v$	mbar	39,5		$T_{1,V}$	K	295					
$t_{0,V}$	°C	30		$V_{1,V}$	m³/min	394,22					
$t_{1,V}$	°C	22		$V_{t,V}$	m³/min	549,00					
$t_{2,V}$	°C	46		$n_{HK,V}$	1/min	183					
$n_{M,V}$	1/min	450		$P_{Ku,V}$	kW	632,39					
F_V	kg/kp N	14052,00			η_M						
$P_{M,V}$	kW			$V_{verl.V}$	m³/min	154,78					
$t_{Ol,V}$	°C	34		$\eta_{vol.V}$		0,72					
$p_{Ol,V}$	bar	3,0									

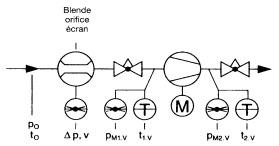
Messwerte umgerechnet auf Bestelldaten in Anlehnung an die ISO 1217
Measuring values converted into order data based acc. to ISO 1217

Index um = umgerechnet auf Bestelldaten / = converted into order data

$\eta_{vol.um}$	$V_{verl.um}$	$V_{t\,um}$	$V_{1\,um}$	$V_{1\,um}$	$P_{Ku.Um}$	$P_{Ku.um}$
0,86	250,94 m³/min	1.836,00 m³/min	1585,06 m³/min	-2,11 %	3505,57 kW	-2,73 %

Maximale Erprobungsdaten
Maximum test data

p_1	0,008 bar	$t_{1\,max}$	50 °C	$n_{HK\,max}$	183 1/min
p_{2e}	0,625 bar	$t_{2\,max}$	115 °C		



Abnahmestempel / acceptance stamp

Datum / date: 09.06.2022
Name / name: Dreyer

Prüfstand Nr.: / test bench no.: 03

Bemerkungen / remarks

Stempel für Druckprobe / Stamp for pressure test: F 000 D 000

Fb 371

AERZEN

Werkszeugnis 2.2
anlehnend an EN 10204, jedoch für Maschinen und Teile

Works Certificate 2.2
as per EN 10204, but for machines and parts

Compressed air, gas
and vacuum solutions

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Telefax: +49 5154 81-9191

Auftraggeber: Committer:	AERZEN Deutschland GmbH & Co. KG
Bestellzeichen: Order no:	Aerzen D 284697
Auftragsnummer: Our order no:	4000369 / 20
Lieferant und Hersteller: Supplier and manufacturer:	**Aerzener Maschinenfabrik GmbH Reherweg 28, D-31855 Aerzen**
Fabriknr. / Serial Nr. Agg: Serial no stage/Serial no unit:	4113138 4113138
Beschreibung der Ware: Description of the goods:	Gebläse / blower GQB22.23

Wir bescheinigen hiermit, dass das für vorgenannte Ware verwendete Material den Vorschriften der Stückliste entspricht und nach Zeichnung einwandfrei bearbeitet wurde. Alle qualitätsbestimmenden Prüfungen wurden mit kalibrierten Messmitteln im Toleranzrahmen der ISO 1217, der DIN ISO 21940 und der VDI-Richtlinien 2618 durchgeführt. Die Restunwucht der Drehkolben mit Wellen übersteigt nicht die zulässigen Werte der Auswucht-Gütestufe 2,5 nach DIN ISO 21940. Die unten aufgeführten Werkstoffe erfüllen bzgl. ihrer chemischen Zusammensetzung und ihrer physikalischen Eigenschaften die Anforderungen der jeweiligen Werkstoffnormen DIN EN 1561, DIN EN 10083-2, DIN EN 10084 und DIN CEN/TS 13388.

We herewith certify that the materials used for the above mentioned order correspond to the specification of the bill of materials and were fabricated perfectly as per drawing. All quality-determining inspections were carried out with gauged measuring devices within the tolerance of ISO 1217, DIN ISO 21940 and VDI Guidelines 2618. The residual balance error of the rotary pistons with shafts does not exceed the admissible values of the balance quality rating 2,5 shafts acc.to DIN ISO 21940. The materials mentioned below comply with the requirements of the material standards DIN EN 1561, DIN EN 10083-2, DIN EN 10084 and DIN CEN/TS 13388 concerning their chemical composition and their physical properties.

Werkszeugnis 2.2
anlehnend an EN 10204, jedoch für Maschinen und Teile

Works Certificate 2.2
as per EN 10204, but for machines and parts

Compressed air, gas
and vacuum solutions

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen
Germany

info@aerzen.com
www.aerzen.com
Telefon: +49 5154 81-0
Telefax: +49 5154 81-9191

Zylinder / Cylinder	5.3103
Räderseitenplatte / Wheel-side plate	5.3103
Räderseitenplatte / Wheel-side plate	5.3103
Radkasten / Wheel case	EN JS 1030
Gehäusedeckel-Unterteil / Housing cover lower part	EN JS 1030
Gehäusedeckel-Oberteil / Housing cover upper part	EN JS 1030
Drehkolben / Rotary piston	1.4317
Antriebswelle / Drive shaft	1.7225
Verschlussdeckel / VERS	1.4057
Verschlussdeckel / VERS	1.4057
Drehkolben / Rotary piston	1.4317
Nebenwelle / Secondary shaft	1.7225
Steuerräder / Timing gears	1.7131+QT (550HV) / 1.7131+QT
Deckel / Cover	1.4059

Aerzener Maschinenfabrik GmbH
Qualitätswesen und Prüffeld

Datum: 13.06.2022
Date:

i.A. Dreyer

Seite 2 / 2

Serial no. 4113561

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

nach DIN EN 10204
acc. to DIN EN 10204

AERZEN

Aerzener
Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen - GERMANY
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Internet: www.aerzener.com

Rev.: 13-070618

Typ / type	Fabriknummer / serial no.	Serialnummer/ serial no. unit	KANR / purchase order no.
GQB22.23	4113561	4113561	4000369/30

Besteller / committer	Volumen pro Umdrehung q_t volume per rotation q_t	Getriebeübersetzung i gear transmission i	p_1 / v_1
AERZEN Deutschland GmbH & Co. KG	3000,000 dm³/Umdr.	0,407	

Bestelldaten order data	ITEM-Nr.: ITEM-No.:	Betriebsfall case
Aerzen D 284697		A

Ansaugvolumen V intake volume flow V	Ansaugdruck p_1 intake pressure p_1	Enddruck p_2 discharge pressure p_2	Druckunterschied p_1 - p_2 pressure difference p_1 - p_2	Fördermedium conveying medium	Ansaugtemperatur t_1 intake temperature t_1
1619,28 m³/min	1,065 bar(abs.)	2,159 bar(abs.)	1094 mbar	CO2,H2,H2O,CH4	58 °C

Endtemperatur t_2 discharge temperature t_2	Leistungbed. an der Verdichterkupplung P_{Ku} powerconsumption on the coupling P_{Ku}	Antriebsdrehzahl n_{Mot} driving speed n_{Mot}	Hauptkolbendrehzahl n_{HK} main rotor speed n_{HK}	Dichte im Ansaugzustand ρ_1 density at intake conditions ρ_1	Durchflussrichtung direction of flow
75 °C	3604,00 kW	1485 1/min	612 1/min	0,717 kg/m³	N. LINKS

Messwerte measuring values — Index V = Versuch = test — **Auswertung** evaluation

φ_0	t_0	p_0
53 %	27 °C	1002 mbar

$p_{M1,V}$	bar	- 0,026		$p_{1,V}$	mbar	976					
$p_{M2,V}$	bar	0,685		$p_{2,V}$	mbar	1687					
Blende orifice				$p_{2,V}$ - $p_{1,V}$	mbar	711					
DIN EN ISO 5167-1	mm Ø	410		$r_{1,V}$	kg/m³	1,133					
$\Delta p_{,V}$	mbar	38		$T_{1,V}$	K	298					
$t_{0,V}$	°C	30		$V_{1,V}$	m³/min	389,00					
$t_{1,V}$	°C	25		$V_{t,V}$	m³/min	549,00					
$t_{2,V}$	°C	65		$n_{HK,V}$	1/min	183					
$n_{M,V}$	1/min	450		$P_{Ku,V}$	kW	679,55					
F_V	kg/kp N	15100,00			η_M						
$P_{M,V}$	kW			$V_{vert,V}$	m³/min	160,00					
$t_{Ol,V}$	°C	32		$\eta_{vol,V}$		0,71					
$p_{Ol,V}$	bar	2,8									

Messwerte umgerechnet auf Bestelldaten in Anlehnung an die ISO 1217
Measuring values converted into order data based acc. to ISO 1217

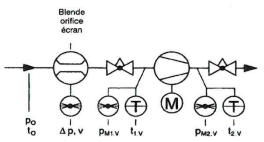
Index um = umgerechnet auf Bestelldaten = converted into order data

$\eta_{vol,um}$	$V_{vert,um}$	$V_{t,um}$	$V_{1,um}$	$V_{1,um}$	$P_{Ku,um}$	$P_{Ku,um}$
0,86	249,49 m³/min	1.836,00 m³/min	1586,51 m³/min	-2,02 %	3496,79 kW	-2,97 %

Maximale Erprobungsdaten
Maximum test data

p_1 bar	$t_{1\,max}$ °C	$n_{HK\,max}$
p_{2e} bar	$t_{2\,max}$ °C	1/min

Datum / date: 27.06.2022
Name / name: Rzepka



Abnahmestempel / acceptance stamp

Prüfstand Nr.: / test bench no.: 03

Bemerkungen / remarks
27.06.2022
Megtad Eltérés nélkül

Stempel für Druckprobe
Stamp for pressure test

F 000 D 000

Fb 371

AERZEN

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Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

anlehnend an EN 10204, jedoch für Maschinen und Teile
as per EN 10204, but for maschines und parts

Compressed air, gas
and vacuum solutions

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Reherweg 28
31855 Aerzen
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Telefax: +49 5154 81-9191

Auftraggeber: Committer:	AERZEN Deutschland GmbH & Co. KG
Bestellzeichen: Order no:	Aerzen D 284697
Auftragsnummer: Our order no:	4000369 / 30
Lieferant und Hersteller: Supplier and manufacturer:	**Aerzener Maschinenfabrik GmbH Reherweg 28, D-31855 Aerzen**
Fabriknr. / Serial Nr. Agg: Serial no stage/Serial no unit:	4113561 4115208
Beschreibung der Ware: Description of the goods:	Gebläse / blower GQB22.23

Die montierten Gehäuseteile wurden einer Festigkeitsprüfung mit Öl / Wasser bei 5,000 bar Überdruck unterzogen. Der vorgegebene Prüfdruck wurde für die Dauer von 5 Minuten gehalten.

The mounted housing parts were subject to a pressure test with oil / water of 5,000 bar overpressure. The stipulated test pressure was maintained for 5 minutes.

Eine Dichtheitsprüfung mit 0,500 bar Überdruck wurde durchgeführt. Durchlässigkeiten wurden nicht festgestellt.

A leakage test with 0,500 bar overpressure has been effected. Permeabilities have not been discovered.

Aerzener Maschinenfabrik GmbH
Qualitätswesen und Prüffeld

Datum: 15.08.2022
Date:

i.A. Rzepka

Stage 2

Serial no. 4115273

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

nach DIN EN 10204
acc. to DIN EN 10204

AERZEN

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Rev.: 13-070618

Typ / type	Fabriknummer / serial no.	Serialnummer/ serial no. unit	KANR / purchase order no.
GQ22.23	4115273	4115273	4000369/40

Besteller / committer	Volumen pro Umdrehung q_t volume per rotation q_t	Getriebeübersetzung i gear transmission i	p_1 / v_i
AERZEN Deutschland GmbH & Co. KG	3000,000 dm³/Umdr.	0,407	

Bestelldaten order data	ITEM-Nr.: ITEM-No.:	Betriebsfall case
Aerzen D 284697		A

Ansaugvolumen V intake volume flow V	Ansaugdruck p_1 intake pressure p_1	Enddruck p_2 discharge pressure p_2	Druckunterschied p_1 - p_2 pressure difference p_1 - p_2	Fördermedium conveying medium	Ansaugtemperatur t_1 intake temperature t_1
1359,16 m³/min	2,129 bar(abs.)	3,310 bar(abs.)	1181 mbar	CO2,H2,H2O,CH4	75 °C

Endtemperatur t_2 discharge temperature t_2	Leistungbed. an der Verdichterkupplung P_{Ku} powerconsumption on the coupling P_{Ku}	Antriebsdrehzahl n_{Mot} driving speed n_{Mot}	Hauptkolbendrehzahl n_{HK} main rotor speed n_{HK}	Dichte im Ansaugzustand ρ_1 density at intake conditions ρ_1	Durchflussrichtung direction of flow
89 °C	3159,00 kW	1485 1/min	506 1/min	1,360 kg/m³	N. LINKS

Messwerte measuring values — Index V = Versuch = test — **Auswertung** evaluation

φ_0	t_0	p_0
45 %	25 °C	1007 mbar

$p_{M1,V}$	bar	- 0,025		$p_{1,V}$	mbar	982					
$p_{M2,V}$	bar	0,730		$p_{2,V}$	mbar	1737					
Blende orifice				$p_{2,V}$ - $p_{1,V}$	mbar	755					
DIN EN ISO 5167-1	mm Ø	410		$r_{1,V}$	kg/m³	1,161					
$\Delta p,V$	mbar	37		$T_{1,V}$	K	293					
$t_{0,V}$	°C	30		$V_{1,V}$	m³/min	375,53					
$t_{1,V}$	°C	20		$V_{t,V}$	m³/min	549,00					
$t_{2,V}$	°C	78		$n_{HK,V}$	1/min	183					
$n_{M,V}$	1/min	450		$P_{Ku,V}$	kW	733,55					
F_V	kg/kp N	16300,00			η_M						
$P_{M,V}$	kW			$V_{verl,V}$	m³/min	173,47					
$t_{Ol,V}$	°C	36		$\eta_{vol,V}$		0,68					
$p_{Ol,V}$	bar	3,0									

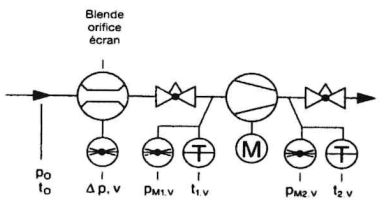
Messwerte umgerechnet auf Bestelldaten in Anlehnung an die ISO 1217
Measuring values converted into order data based acc. to ISO 1217

Index um = umgerechnet auf Bestelldaten = converted into order data

$\eta_{vol,um}$	$V_{verl,um}$	$V_{t,um}$	$V_{1,um}$	$V_{1,um}$	$P_{Ku,um}$	$P_{Ku,um}$
0,87	200,46 m³/min	1.518,00 m³/min	1317,54 m³/min	-3,06 %	3172,72 kW	0,43 %

Maximale Erprobungsdaten
Maximum test data

p_1 bar	$t_{1\,max}$ °C	$n_{HK\,max}$
p_{2e} bar	$t_{2\,max}$ °C	1/min



Abnahmestempel / acceptance stamp

Datum / date: 27.07.2022

Name / name: Rzepka

Prüfstand Nr.: / test bench no.: 03

Bemerkungen / remarks

Stempel für Druckprobe / Stamp for pressure test

F 000 D 000

Megdad Esfandyaripour

27.07.2022

Fb 371

AERZEN

Werkszeugnis 2.2
anlehnend an EN 10204, jedoch für Maschinen und Teile

Works Certificate 2.2
as per EN 10204, but for machines and parts

Compressed air, gas
and vacuum solutions

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Auftraggeber: Committer:	AERZEN Deutschland GmbH & Co. KG
Bestellzeichen: Order no:	Aerzen D 284697
Auftragsnummer: Our order no:	4000369 / 40
Lieferant und Hersteller: Supplier and manufacturer:	**Aerzener Maschinenfabrik GmbH Reherweg 28, D-31855 Aerzen**
Fabriknr. / Serial Nr. Agg: Serial no stage/Serial no unit:	4115273 4116781
Beschreibung der Ware: Description of the goods:	Gebläse / blower GQB22.23

Die montierten Gehäuseteile wurden einer Festigkeitsprüfung mit Öl / Wasser bei 5,000 bar Überdruck unterzogen. Der vorgegebene Prüfdruck wurde für die Dauer von 5 Minuten gehalten.

The mounted housing parts were subject to a pressure test with oil / water of 5,000 bar overpressure. The stipulated test pressure was maintained for 5 minutes.

Eine Dichtheitsprüfung mit 0,500 bar Überdruck wurde durchgeführt. Durchlässigkeiten wurden nicht festgestellt.

A leakage test with 0,500 bar overpressure has been effected. Permeabilities have not been discovered.

Aerzener Maschinenfabrik GmbH
Qualitätswesen und Prüffeld

Datum: 12.09.2022
Date:

i.A. Dreyer

AERZEN

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

anlehnend an EN 10204, jedoch für Maschinen und Teile
as per EN 10204, but for maschines und parts

Compressed air, gas
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Auftraggeber: Committer:	AERZEN Deutschland GmbH & Co. KG
Bestellzeichen: Order no:	Aerzen D 284697
Auftragsnummer: Our order no:	4000369 / 40
Lieferant und Hersteller: Supplier and manufacturer:	**Aerzener Maschinenfabrik GmbH** **Reherweg 28, D-31855 Aerzen**
Fabriknr. / Serial Nr. Agg: Serial no stage/Serial no unit:	4115273 4116781
Beschreibung der Ware: Description of the goods:	Gebläse / blower GQB22.23

Die montierten Gehäuseteile wurden einer Festigkeitsprüfung mit Öl / Wasser bei 5,000 bar Überdruck unterzogen. Der vorgegebene Prüfdruck wurde für die Dauer von 5 Minuten gehalten.

The mounted housing parts were subject to a pressure test with oil / water of 5,000 bar overpressure. The stipulated test pressure was maintained for 5 minutes.

Eine Dichtheitsprüfung mit 0,500 bar Überdruck wurde durchgeführt. Durchlässigkeiten wurden nicht festgestellt.

A leakage test with 0,500 bar overpressure has been effected. Permeabilities have not been discovered.

Aerzener Maschinenfabrik GmbH
Qualitätswesen und Prüffeld

Datum: 15.08.2022
Date:

i.A. Rzepka

Serial no. 4115420

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

nach DIN EN 10204
acc. to DIN EN 10204

AERZEN

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Internet: www.aerzener.com

Rev.: 13-070618

Typ / type	Fabriknummer / serial no.	Serialnummer/ serial no. unit	KANR / purchase order no.
GQB22.23	4115420	4115420	4000369/50

Besteller / committer	Volumen pro Umdrehung q_t volume per rotation q_t	Getriebeübersetzung i gear transmission i	p_1 / v_1
AERZEN Deutschland GmbH & Co. KG	3000,000 dm³/Umdr.	0,407	

Bestelldaten order data	ITEM-Nr.: ITEM-No.:	Betriebsfall case
Aerzen D 284697		A

Ansaugvolumen V intake volume flow V	Ansaugdruck p_1 intake pressure p_1	Enddruck p_2 discharge pressure p_2	Druckunterschied $p_1 - p_2$ pressure difference $p_1 - p_2$	Fördermedium conveying medium	Ansaugtemperatur t_1 intake temperature t_1
1359,16 m³/min	2,129 bar(abs.)	3,310 bar(abs.)	1181 mbar	CO2,H2,H2O,CH4	75 °C

Endtemperatur t_2 discharge temperature t_2	Leistungbed. an der Verdichterkupplung P_{Ku} powerconsumption on the coupling P_{Ku}	Antriebsdrehzahl n_{Mot} driving speed n_{Mot}	Hauptkolbendrehzahl n_{HK} main rotor speed n_{HK}	Dichte im Ansaugzustand ρ_1 density at intake conditions ρ_1	Durchflussrichtung direction of flow
89 °C	3159,00 kW	1485 1/min	506 1/min	1,360 kg/m³	N. LINKS

Messwerte measuring values — Index V = Versuch = test — **Auswertung** evaluation

φ_0	t_0	p_0
47 %	23 °C	1007 mbar

$p_{M1,V}$	bar	- 0,026		$p_{1,V}$	mbar	981					
$p_{M2,V}$	bar	0,690		$p_{2,V}$	mbar	1697					
Blende orifice				$p_{2,V} - p_{1,V}$	mbar	716					
DIN EN ISO 5167-1	mm Ø	410		$r_{1,V}$	kg/m³	1,153					
$\Delta p_{,V}$	mbar	37		$T_{1,V}$	K	295					
$t_{0,V}$	°C	28		$V_{1,V}$	m³/min	379,39					
$t_{1,V}$	°C	22		$V_{t,V}$	m³/min	549,00					
$t_{2,V}$	°C	77		$n_{HK,V}$	1/min	183					
$n_{M,V}$	1/min	450		$P_{Ku,V}$	kW	695,30					
F_V	kg/kp N	15450,00			η_M						
$P_{M,V}$	kW			$V_{vol,V}$	m³/min	169,61					
$t_{Ol,V}$	°C	34		$\eta_{vol,V}$		0,69					
$p_{Ol,V}$	bar	3,0									

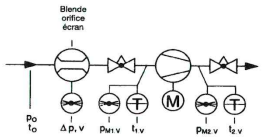
Messwerte umgerechnet auf Bestelldaten in Anlehnung an die ISO 1217
Measuring values converted into order data based acc. to ISO 1217

Index um = umgerechnet auf Bestelldaten = converted into order data

$\eta_{vol,um}$	$V_{vol,um}$	$V_{t,um}$	$V_{1,um}$	$V_{1,um}$	$P_{Ku,um}$	$P_{Ku,um}$
0,87	200,57 m³/min	1.518,00 m³/min	1317,43 m³/min	-3,07 %	3171,09 kW	0,38 %

Maximale Erprobungsdaten
Maximum test data

p_1	$t_{1\,max}$	$n_{HK\,max}$
bar	°C	
p_{2a}	$t_{2\,max}$	1/min
bar	°C	



Abnahmestempel / acceptance stamp

Datum / date: 02.08.2022
Name / name: Rzepka

Prüfstand Nr.: / test bench no.: 03

Bemerkungen / remarks

Stempel für Druckprobe / Stamp for pressure test

F 000 D 000

Megdad Esfandyaripour
02.08.2022

Fb 371

AERZEN

Werkszeugnis 2.2
anlehnend an EN 10204, jedoch für Maschinen und Teile

Works Certificate 2.2
as per EN 10204, but for machines and parts

Compressed air, gas
and vacuum solutions

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Auftraggeber: Committer:	AERZEN Deutschland GmbH & Co. KG
Bestellzeichen: Order no:	Aerzen D 284697
Auftragsnummer: Our order no:	4000369 / 50
Lieferant und Hersteller: Supplier and manufacturer:	**Aerzener Maschinenfabrik GmbH Reherweg 28, D-31855 Aerzen**
Fabriknr. / Serial Nr. Agg: Serial no stage/Serial no unit:	4115420 4117027
Beschreibung der Ware: Description of the goods:	Gebläse / blower GQB22.23

Die montierten Gehäuseteile wurden einer Festigkeitsprüfung mit Öl / Wasser bei 5,000 bar Überdruck unterzogen. Der vorgegebene Prüfdruck wurde für die Dauer von 5 Minuten gehalten.

The mounted housing parts were subject to a pressure test with oil / water of 5,000 bar overpressure. The stipulated test pressure was maintained for 5 minutes.

Eine Dichtheitsprüfung mit 0,500 bar Überdruck wurde durchgeführt. Durchlässigkeiten wurden nicht festgestellt.

A leakage test with 0,500 bar overpressure has been effected. Permeabilities have not been discovered.

Aerzener Maschinenfabrik GmbH
Qualitätswesen und Prüffeld

Datum: 12.09.2022
Date:

i.A. Dreyer

AERZEN

AERZEN

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

anlehnend an EN 10204, jedoch für Maschinen und Teile
as per EN 10204, but for maschines und parts

Compressed air, gas
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Auftraggeber: Committer:	AERZEN Deutschland GmbH & Co. KG
Bestellzeichen: Order no:	Aerzen D 284697
Auftragsnummer: Our order no:	4000369 / 50
Lieferant und Hersteller: Supplier and manufacturer:	**Aerzener Maschinenfabrik GmbH Reherweg 28, D-31855 Aerzen**
Fabriknr. / Serial Nr. Agg: Serial no stage/Serial no unit:	4115420 4117027
Beschreibung der Ware: Description of the goods:	Gebläse / blower GQB22.23

Die montierten Gehäuseteile wurden einer Festigkeitsprüfung mit Öl / Wasser bei 5,000 bar Überdruck unterzogen. Der vorgegebene Prüfdruck wurde für die Dauer von 5 Minuten gehalten.

The mounted housing parts were subject to a pressure test with oil / water of 5,000 bar overpressure. The stipulated test pressure was maintained for 5 minutes.

Eine Dichtheitsprüfung mit 0,500 bar Überdruck wurde durchgeführt. Durchlässigkeiten wurden nicht festgestellt.

A leakage test with 0,500 bar overpressure has been effected. Permeabilities have not been discovered.

Aerzener Maschinenfabrik GmbH
Qualitätswesen und Prüffeld

Datum: 15.08.2022
Date:

i.A. Rzepka

Cooling gas stage

Serial no. 4115956

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

nach DIN EN 10204
acc. to DIN EN 10204

AERZEN

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Rev.: 13-070618

Typ / type	Fabriknummer / serial no.	Serialnummer/ serial no. unit	KANR / purchase order no.
GQB22.23	4115956		4000369/60

Besteller / committer	Volumen pro Umdrehung q_t volume per rotation q_t	Getriebeübersetzung i gear transmission i	p_i / v_i
AERZEN Deutschland GmbH & Co. KG	3000,000 dm³/Umdr.	0,407	

Bestelldaten order data	ITEM-Nr.: ITEM-No.:	Betriebsfall case
Aerzen D 284697		A

Ansaugvolumen V intake volume flow V	Ansaugdruck p_1 intake pressure p_1	Enddruck p_2 discharge pressure p_2	Druckunterschied p_1 - p_2 pressure difference p_1 - p_2	Fördermedium conveying medium	Ansaugtemperatur t_1 intake temperature t_1
1813,27 m³/min	2,792 bar(abs.)	3,331 bar(abs.)	539 mbar	CO2,H2,H2O,CH4	50 °C

Endtemperatur t_2 discharge temperature t_2	Leistungbed. an der Verdichterkupplung P_{Ku} powerconsumption on the coupling P_{Ku}	Antriebsdrehzahl n_{Mot} driving speed n_{Mot}	Hauptkolbendrehzahl n_{HK} main rotor speed n_{HK}	Dichte im Ansaugzustand ρ_1 density at intake conditions ρ_1	Durchflussrichtung direction of flow
51 °C	2004,00 kW	1485 1/min	640 1/min	1,506 kg/m³	N. LINKS

Messwerte measuring values — Index V = Versuch = test — **Auswertung** evaluation

φ_0	t_0	p_0
51 %	28 °C	993 mbar

$p_{M1,V}$	bar	- 0,027		$p_{1,V}$	mbar	966					
$p_{M2,V}$	bar	0,660		$p_{2,V}$	mbar	1653					
Blende orifice				$p_{2,V}$ - $p_{1,V}$	mbar	687					
DIN EN ISO 5167-1	mm Ø	410		$r_{1,V}$	kg/m³	1,117					
$\Delta p,v$	mbar	37,9		$T_{1,V}$	K	299					
$t_{0,V}$	°C	34		$V_{1,V}$	m³/min	389,72					
$t_{1,V}$	°C	26		$V_{t,V}$	m³/min	549,00					
$t_{2,V}$	°C	64		$n_{HK,V}$	1/min	183					
$n_{M,V}$	1/min	450		$P_{Ku,V}$	kW	654,80					
F_V	kg/kp N	14550,00			η_M						
$P_{M,V}$	kW			$V_{vert,V}$	m³/min	159,28					
$t_{Ol,V}$	°C	35		$\eta_{vol,V}$		0,71					
$p_{Ol,V}$	bar	3,1									

Messwerte umgerechnet auf Bestelldaten in Anlehnung an die ISO 1217
Measuring values converted into order data based acc. to ISO 1217

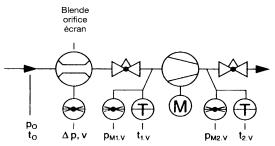
Index um = umgerechnet auf Bestelldaten = converted into order data

$\eta_{vol,um}$	$V_{vert,um}$	$V_{t,um}$	$V_{1,um}$	$V_{1,um}$	$P_{Ku,um}$	$P_{Ku,um}$
0,94	121,50 m³/min	1.920,00 m³/min	1798,50 m³/min	-0,81 %	2094,18 kW	4,50 %

Maximale Erprobungsdaten
Maximum test data

p_1 bar	$t_{1\,max}$ °C	$n_{HK\,max}$ 1/min
p_{2e} bar	$t_{2\,max}$ °C	

Datum / date: 15.08.2022
Name / name: Rzepka



Abnahmestempel / acceptance stamp

Prüfstand Nr.: test bench no.: 03

Bemerkungen / remarks

Stempel für Druckprobe
Stamp for pressure test

F 000 D 000

Fb 371

AERZEN

Werkszeugnis 2.2
anlehnend an EN 10204, jedoch für Maschinen und Teile

Works Certificate 2.2
as per EN 10204, but for machines and parts

Compressed air, gas
and vacuum solutions

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Bestellzeichen: Order no:	Aerzen D 284697
Auftragsnummer: Our order no:	4000369 / 60
Lieferant und Hersteller: Supplier and manufacturer:	**Aerzener Maschinenfabrik GmbH Reherweg 28, D-31855 Aerzen**
Fabriknr. / Serial Nr. Agg: Serial no stage/Serial no unit:	4115956 4117690
Beschreibung der Ware: Description of the goods:	Gebläse / blower GQB22.23

Wir bescheinigen hiermit, dass das für vorgenannte Ware verwendete Material den Vorschriften der Stückliste entspricht und nach Zeichnung einwandfrei bearbeitet wurde. Alle qualitätsbestimmenden Prüfungen wurden mit kalibrierten Messmitteln im Toleranzrahmen der ISO 1217, der DIN ISO 21940 und der VDI-Richtlinien 2618 durchgeführt. Die Restunwucht der Drehkolben mit Wellen übersteigt nicht die zulässigen Werte der Auswucht-Gütestufe 2,5 nach DIN ISO 21940. Die unten aufgeführten Werkstoffe erfüllen bzgl. ihrer chemischen Zusammensetzung und ihrer physikalischen Eigenschaften die Anforderungen der jeweiligen Werkstoffnormen DIN EN 1561, DIN EN 10083-2, DIN EN 10084 und DIN CEN/TS 13388.

We herewith certify that the materials used for the above mentioned order correspond to the specification of the bill of materials and were fabricated perfectly as per drawing. All quality-determining inspections were carried out with gauged measuring devices within the tolerance of ISO 1217, DIN ISO 21940 and VDI Guidelines 2618. The residual balance error of the rotary pistons with shafts does not exceed the admissible values of the balance quality rating 2,5 shafts acc.to DIN ISO 21940. The materials mentioned below comply with the requirements of the material standards DIN EN 1561, DIN EN 10083-2, DIN EN 10084 and DIN CEN/TS 13388 concerning their chemical composition and their physical properties.

AERZEN

Werkszeugnis 2.2

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Zylinder / Cylinder	5.3103
Räderseitenplatte / Wheel-side plate	5.3103
Räderseitenplatte / Wheel-side plate	5.3103
Radkasten / Wheel case	EN JS 1030
Gehäusedeckel-Unterteil / Housing cover lower part	EN JS 1030
Gehäusedeckel-Oberteil / Housing cover upper part	EN JS 1030
Drehkolben / Rotary piston	1.4317
Antriebswelle / Drive shaft	1.7225
Verschlussdeckel / VERS	1.4057
Verschlussdeckel / VERS	1.4057
Drehkolben / Rotary piston	1.4317
Nebenwelle / Secondary shaft	1.7225
Steuerräder / Timing gears	1.7131+QT (550HV) / 1.7131+QT
Deckel / Cover	1.4059

Aerzener Maschinenfabrik GmbH
Qualitätswesen und Prüffeld

Datum: 21.10.2022
Date:

i.A. Dreyer

Seite 2 / 2

C Vibration guard

Name	Data
Designation	PCH Engineering GmbH
Type	PCH 1275/ATEX,Eex
Number	
Type of manual	*Technical documentation*
Manufacturer	

C.1 Operating instructions

User Manual for Vibration Guard Type PCH1275

Valid for the following customer specifications - refer to PCH 1275					
PCH 1275:					
CHF8002 ☐	**CHF8005** ☐	**CHF8006** ☐	**CHF8007** ☐	**CHF8008** ☐	**CHF8009** ☐
CHF8012 ☐	**CHF8015** ☐	**CHF8017** ☐	**CHF8023** ☐	**CHF8043** ☐	**CHF8047** ☐
CHF8048 ☐					

Ex d IIC T6 (standard) Ex d I T6 (Einsatz Untertage)
CE 0539 Ex II 2 GD T75°C (standard) CE 0539 Ex I M2 (Einsatz Untertage)
T_{amb}: -20° C ≤ T_a ≤ + 65° C
NEMKO 07ATEX1261

PCH Engineering A/S
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Vibration Guard Type PCH1275

Copyright

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Internet: www.pch-engineering.dk

Safety

This apparatus has been designed and tested according to IEC publication 61010. "Safety Requirements for Electronic Measuring Apparatus" and complies with Safety Class III. This User Manual contains information, which should be followed by the user in order to ensure safe operation and maintain the PCH 1275/1277 Compact Vibration Guard in a safe condition.

Explosion Hazard
The PCH 1275/1277 Compact Vibration Guard is certified according to the ATEX directive 94/9/EC for Zone 1 installations. It makes use of a Flameproof Enclosure (d) according to EN 60079-1.

PCH 1275/1277 Compact Vibration Guard has the following certification codes:

Ex d IIC T6 (standard) — Ex d I T6 (for use in mines)
CE 0539 Ex II 2 GD T67°C (standard) — CE 0539 Ex I M2 (for use in mines)
T_{amb}: -20° C ≤ T_a ≤ + 65° C
07ATEX1261

⚠ **Warnings:**

- ***Do NOT open the PCH 1275/1277 Compact Vibration Guard when an Explosive Gas Atmosphere may be present***
- **If the PCH 1275/1277 Compact Vibration Guard develops a fault, switch it off and secure it against unintended use**
- **For models with cables fixed to the housing:**
  - **Do *NOT* try to remove the cable gland from the house, because this will damage the PCH 1275/1277 Vibration Guard beyond repair**
  - **Do *NOT* carry the PCH 1275/1277 Compact Vibration Guard around while holding it by the cable**

Vibration Guard Type PCH1275

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Vibration Guard Type PCH1275

We congratulate you with your new Vibration Guard and thank you for choosing vibration products from PCH Engineering A/S.

1.0. Applications

The PCH 1275/1277 Compact Vibration Guard is an ATEX certified product under the ATEX Directive 94/9/EC. The PCH 1275/1277 Compact Vibration Guard is designed in a Flameproof Enclosure (d) and certified according EN 50014 and EN 50018, making it applicable for Zone 1 installations.

The PCH 1275/1277 Compact Vibration Guard is maintenance free and can be used to monitor overall True RMS vibration levels in applications with machines like pumps, blowers, ventilators, decanters, separators, centrifuges, mills and milling equipment.

⚠ **Warning:**
However, if the Vibration Guard after half a year of operation needs to have removed the lid for change of or check of settings, the O-ring that seals the lid should be replaced. Please contact the manufacturer PCH Engineering for delivery of a new O-ring.

2.0. Monitoring capabilities

The PCH 1275 Vibration Guard constantly keeps track of the machine vibration level. The Vibration Guard has two adjustable alarms, which can be used to give alarms if the machine vibration exceeds the acceptable or allowed limit. Hence the user obtains an active protection of the machine resulting in a considerable reduction of machine damages and accidents and thereby decreasing the maintenance expenses.

3.0. Functionality

The Vibration Guard consists of a vibration accelerometer as well as conditioning-, alarm- and output circuitry, all situated in a Stainless Steel housing. The PCH 1275 monitors seismic mechanical vibrations according to DIN/ISO 10816. PCH 1275 can be configured to measure Velocity **(mm/s)** or Acceleration **(m/s^2).** This measuring parameter is to be determined prior to ordering.

Measurement Range and Alarm Limits can be **adjusted directly** in the PCH 1275, according to the machine type and size it has to monitor. The present vibration level is constantly compared with the two Alarm Limits and if an Alarm Limit is exceeded the corresponding **Alarm Relay** (A1 or D1) will trigger and thereby inform the user, e.g. via a connected rotor light, beeper, controller or by directly shutting down the machine. Both Alert (A1) and Danger (D1) have build in Delay Time, which prevents false alarms due to momentary transients. Also the PCH 1275 has a built in **Latch function**, ensuring that the Alarm Relay stays triggered, even though the vibration level has decreased again, until it has been manually/remotely reset. PCH 1275 also provides a **4-20 mA DC** output signal, which always expresses the vibration level relative to the chosen measuring range. The 4-20 mA DC output is also used to read out the Alarm Limits of the Vibration Guard.

Vibration Guard Type PCH1275

4.0. Technical data

Vibration measuring parameter Refer to label	Velocity in mm/s Option: Acceleration in m/s^2 (This must be stated when ordering)
Measuring range in mm/s Measuring range in m/s^2	Velocity: 10 mm/s, 20 mm/s, 50 mm/s, or 100 mm/s (Selectable by DIP Switch) Option: Acceleration: 2.5 m/s^2, 6 m/s^2, 12 m/s^2 or 24 m/s^2 (Selectable by DIP Switch)
Frequency range Filters comply with ISO 2954-1975(E) Refer to Label	10 Hz – 1000 Hz @ -1dB, >-18 dB/octave Options: 1Hz – 1000 Hz @ -1dB, >-18 dB/octave (This must be stated when ordering)
Alert & Danger alarm trigger levels	Default: Alert: 50% of maximum measuring range Danger: 80% of maximum measuring range Selectable by DIP-switch: 1-100% of the maximum measuring range
Alarm Delay	Default: Alert = 10 sec. & Danger = 5 sec. Selectable by DIP-switch: 0 – 100 sec.
Alarm Hang Time	1 sec.
Overall accuracy Accelerometer: Non-linearity Temperature sensitivity Cross-axis sensitivity Filters: Non-linearity 4-20mA analogue output: Sensitivity	± 1.5% for frequency range 10–1000 Hz ± 0.2% of full scale (typical) ± 0.45% (within temperature range -20 – 65°C) ± 2% (max) ± 2.3% = 0.2 dB (typical and depending on filter type) ± 0.3% (typical)
DC Output Current	4-20 mA, max load resistance 400 Ω

Vibration Guard Type PCH1275

Alarm output	The monitor is equipped with two relays with break function: Alert and Danger. Both relays are latched. (Max 30 V, 100 mA)
Self-test	A self-test can be activated by dip switch and remotely. The Alert and Danger relays are only activated after the duration of their respective delay times if the analogue output during self-test is higher than the alarm trigger level
Sensor watchdog	The accelerometer sensor is equipped with an internal watchdog that continuously checks the functioning of the sensor At a sensor failure the system failure relay is activated
Power Failure	If the power is cut, all relays will become activated, i.e. break, thus FAIL SAFE
Measuring direction	Measuring direction axis is parallel to the length axis of the cylindrical enclosure. See drawing in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**.
Power supply	+24 V DC ± 10 % typical 1.0 W Power Consumption max. 1.3 W 49 mA @ 26,4 V 60 mA @ 21,6 V
Cable	Oil resistant, PUR, screened. 12 x 0,25 mm^2 open end Standard cable length: 2 meters.
Enclosure material and dimensions	Material: Stainless Steel Type 1.4305 Option: Stainless Steel Type 1.4404 Dimensions: Height 117 mm, incl. mounting stud Diameter 63,5 mm without cable gland Width across hexagon 55 mm
Mounting	Internal thread M12; depth of thread max. 10 mm Mounting torque approx. 6.8 Nm See mounting instructions in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**.

Vibration Guard Type PCH1275

Ingress Protection	IP68
Operational Temperature range	$T_{amb} = -20° C \leq T_a \leq +65° C$
Installation locations	NO outdoor installation is allowed

CE compliance	EMC Directive & Low Voltage Directive
Security	EN61010-1 and IEC 101-1
EMC Emission	EN50081-1 and CISPR22
EMC Immunity	EN50082-2
Maximum Humidity	IEC68: 95% RH
Mechanical Vibration (non-operating)	IEC68-2-6: 0.3 mm, 20 m/s^2, 10-500 Hz
Mechanical Shock (non-operating)	IEC68-2-27: 750 m/s^2
Mechanical Bump (non-operating)	IEC68-2-29: 1000 bumps at 250 m/s^2

PCH 1275/1277 Compact Vibration Guard - standard

ATEX certified According to ATEX directive 94/9/EC EN60079 and EN60079-1	Ex d IIC T6 CE 0539 Ex II 2 GD T67°C T_{amb}: $-20° C \leq T_a \leq +65° C$ NEMKO 07ATEX1261

PCH 1275/1277 Compact Vibration Guard – for use in mines

ATEX certified According to ATEX directive 94/9/EC EN60079 and EN60079-1	Ex d I T6 CE 0539 Ex I M2 T_{amb}: $-20° C \leq T_a \leq +65° C$ NEMKO 07ATEX1261

Production Quality Assurance Notification by UL Demko 0539.

Vibration Guard Type PCH1275

5.0. Configuring the PCH1275 Vibration Guard

To configure the Vibration Guard the lid must be removed. ***Do NOT open the PCH 1275 Vibration Guard when an Explosive Gas Atmosphere may be present.*** First dismount the three screws of the lid using a 2 mm Allen key and then unscrew the brass bolt using a 10 mm Allen key. The configuration pad showed in figure 5.1 will then appear. The configuration elements on the pad are explained below.

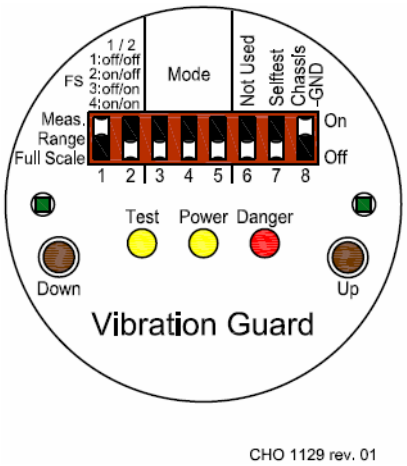


Figure 5.1 Label inside the PCH 1275, configuration pad

5.1. LED indicators

There are three LED's inside the PCH 1275:

Test	LED will light when Test function is activated (from remote)
Power	LED will light when power (+24V) is connected
Danger	Red LED will light when Alert level is exceeded

5.2. Switch Functions

SW1, SW2	Measuring range settings
SW3, SW4, SW5	Selects output read-out, A1 D1, Delay time and self-test
SW6	PC setup, not function by PCH1275
SW7	Latch or Auto-reset function of Alert and Danger
SW8	Connects housing (chassis) of Vibration Guard to Power GND

5.2.1 Left and right bottom Functions

Down / Up	The Down and Up button to adjustments, the Alarms value A1, D1, delay time and self-test value

Vibration Guard Type PCH1275

5.3. Switch settings:

	SW1	SW2
10mm/s	Off	Off
20mm/s	On	Off
50mm/s	Off	On
100mm/s	On	On

	SW3	SW4	SW5
Vib. level	Off	Off	Off
Alert	On	Off	Off
Danger	Off	On	Off
Delay A1	On	Off	Off
Delay D1	Off	Off	On
Self-test	On	Off	On
NB. Only one SW must be off at the time			

	SW6	SW7
PC Setup ***Only PCH1277***	On	
Manuell	Off	
Self-test		On
Self-test		Off

	SW8
Gehäuse mit-GND Verbund.	On
nicht Verbund.	Off

Standard Factory Settings:

SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
On	Off	Off	Off	Off	Off	Off	On

5.3.1 User tip: The connection relating to SW8 is based on the fact that in an industrial environment there are often many electrical disturbances, which may influence the Vibration Guard. Therefore the SW8 is a function enabling the user to choose whether or not the GND should be connected to the Vibration Guard main housing (chassis). If the SW8 is in the **ON** position, the housing will be connected to GND, if set to **OFF** there is no connection between chassis and GND.

6. Alarm, delay time and self- test Level Adjustments

The Down and Up button are provided for the adjustment of the alarm levels and delay time for Alert and Danger and the self-test level, respectively. The preset level can be monitored on the DC current output (4-20 mA), when actual Switch is engaged, see chapter 6.

6.1 Configuration of the Alarms

4-20mA DC Read Out	SW3	SW4	SW5
Present Vibration level	OFF	OFF	OFF
Alert level A1	ON	OFF	OFF
Danger level D1	OFF	ON	OFF
Delay time A1	ON	ON	OFF
Delay time D1	OFF	OFF	ON
Self-test value	ON	OFF	ON

Table 6.1 Switch settings for desired read out

PCH 1275 offers two build in independent Alarm detectors. The first is intended for warning and hence it is named Alert (A1) and the second is intended for immediate action and hence it is named Danger (D1). For each of the two Alarm levels a potentiometer is available for adjustment.

To adjust the Alarm Levels first set the switches according to table 6.1 to read out the desired output type. Connect an Amp meter that can measure the 4-20mA DC signal with a load resistor of 200 – 400 Ω and then adjust the Down and Up button (Alert or Danger) to the desired level.

Vibration Guard Type PCH1275

6.2 Configuration of the Alert alarm

To change the Alert alarm the dipswitch **SW3 has to be set to the ON position, SW4 OFF and SW5 OFF**. Connect a 4-20 mA measuring device to the Vibration Guard, and read the alarm limit value on the display. The user can change the value of the Alert alarm to push the Down and Up button Alert Level using.

6.2.1 Configuration of the Alert delay time

To change the Alert delay time the dipswitch **SW3 has to be set to the ON position, SW4 ON and SW5 OFF**. Connect a 4-20 mA measuring device to the Vibration Guard, and read the alarm limit value on the display. The user can change the value of the Alert delay time to push the Down and Up button Alert delay time using.

6.3. Configuration of the Danger alarm

To change the value of the Danger alarm the dipswitches has to have the following settings: **SW 3 OFF, SW 4 OFF and SW 5 ON.** Follow the procedure for setting the Alert level, but use to push the Down and Up button for Danger Level to change the value.

6.3.1 Configuration of the Danger delay time

To change the Danger delay time the dipswitch **SW3 has to be set to the OFF position, SW4 OFF and SW5 ON**. Connect a 4-20 mA measuring device to the Vibration Guard, and read the delay limit value on the display. The user can change the value to push the Down and Up button Danger delay time using.

6. 2.1 Configuration Example of alarms: If the measuring range is 0 – 20 mm/s, this results in a proportional 4 – 20 mA output. If the Alert alarm is to trigger at 10 mm/s, then the Alert potentiometer has to be turned to reach a value of (4 mA+8 mA) = 12 mA. When 12 mA is shown on the display of the connected 4-20 mA measuring device, the Alert relay will trigger at 10mm/s.

6.3.2 Configuration Example of delay time: The user can use any value between 1 sec. and 100 sec. be pre-set. This results in a proportional 4 – 20 mA output. If the Alert delay time is to trigger at 10 sec., then push the Down or Up button to be turned to reach a value of 5,6mA) = 10 sec..

User tip: The alarm relays will be activated when the vibration level exceeds the preset alarm values after the end of the delay time, standard value is 10 sec for Danger and 5 sec for Alert.
User tip: Please be sure that the dipswitches are set at the following settings when you have finished configuring the Vibration Guard: **SW 3 OFF, SW 4 OFF and SW 5 OFF**. If the settings do not conform to these values under operation, the Vibration Guard will have no alarm functions active.

6. 4 Alarms Latch function

The latch feature of the PCH 1275/1277 Compact Vibration Guard, ensures that the alarm relays stay triggered, even though the vibration level is reduced to below the alarm trigger level for longer than the hang time. Applying a GND signal to wire #8 can latch the relays. If the alarm value is fallen below, then the alarm relay switches back to normal., after disconnection cable vein 4 #, of GND mass the potential.

Vibration Guard Type PCH1275

7.0. System Test

The user can at any time force the Vibration Guard into Test Mode, to use the dipswitch **SW 7 from OFF** to **ON**, or connecting the remote terminal for this operation to GND. wire #7 to GND (0 V).

When System Test Function is chosen, the Test LED will light, indicating that the Vibration Guard is in test mode. The DC output will increase to the self-test level and both alarm relays will trigger when their delay time expire, respectively. When the dipswitch **SW 7 switch back from ON** to **OFF,** or wire #7 is disconnected from the GND, the DC output will return to the actual vibration level. The relays, if in reset mode, will be deactivated and go back to normal.

8.0 Watchdog

The PCH 1275 Vibration Guard has a built in watchdog which constantly monitors the bias of the internal accelerometer. The Bias of the accelerometer is a measure for the health of the vibration transducer itself. If failure in the Bias is detected, the Danger relay will be triggered.

9.0 Relays

Both alarm relays are FAIL SAFE, meaning they are energized when Power is connected to the PCH1275.

10.0 4-20 mA DC Output

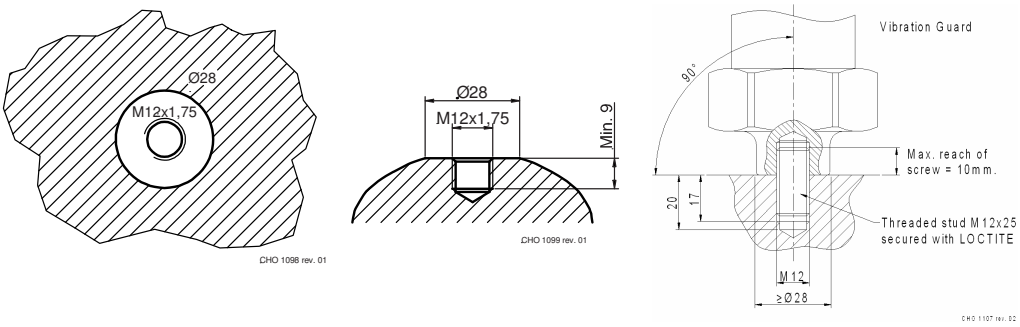
The resistance of the loading resistor must be in the range of 200 to 400 Ω

Vibration Guard Type PCH1275

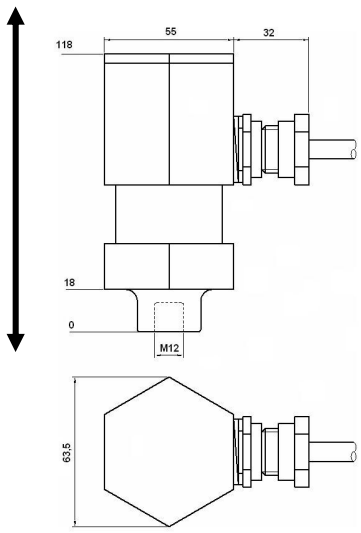
11.0. Mounting of the PCH1275 Vibration Guard

The Vibration Guard is only sensitive to vibration in the direction parallel to the threaded stud, as indicated on the right hand drawing below. For proper mounting of the Vibration Guard, a smooth surface of min. Ø28 with an M12x 1,75 thread in the middle, should be prepared. The M12 thread must have a depth of at least 9 mm.

Arrow direction = Measuring direction



Arrow direction = Measuring direction



Vibration Guard Type PCH1275

12.0. Cable connections

Standard cable configuration for any PCH 1275 with the following CHFxxxx.

CHF8002 ☐ **CHF8005** ☐ **CHF8008** ☐ **CHF8009** ☐ **CHF8015** ☐ **CHF8017** ☐
CHF8023 ☐ **CHF8026** ☐ **CHF8037** ☐ **CHF8043** ☐ **CHF8047** ☐ **CHF8048** ☐

Cable #	Function	Colour
1	+24 V	Red
2	GND	Black
3	Danger relay (common)	Red / Blue
4	Danger relay (break)	White
5	Alert relay (common)	Purple
6	Alert relay (break)	Blue
7	/ Self-test	Green
8	/ Latch alarms	Yellow
9	4-20 mA output	Pink
10	RS485 A TX, only PCH1277	Grey
11	Cable shield only PCH1277	Brown
12	RS485 B RX only PCH1277	Grey / Pink
	House	Screen

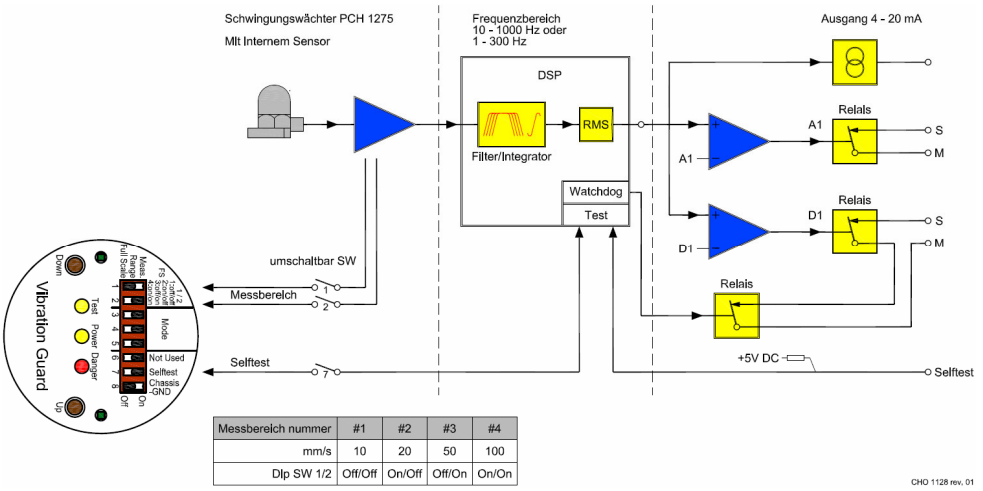
CHF8006 ☐

Cable #	Function	Colour
1	+24 V	Red
2	GND	Black
3	Danger relay 1	Purple
4	Danger relay 1	Blue
5	Alert relay 2	Red/Blue
6	Alert relay 2	White
7	/ Self-test	Green
8	/ Latch alarms	Yellow
9	4-20 mA output	Pink
10	RS485 A TX, only PCH1277	Grey
11	Cable shield	Brown
12	RS485 B RX only PCH1277	Grey / Pink
	House	Screen

Vibration Guard Type PCH1275

CHF8007 ☐

Cable #	Function	Colour
1	+24 V	Pink
2	GND	Blue
3	Danger relay 1	Brown
4	Danger relay 1	White
5	Alert relay 2	Green
6	Alert relay 2	Yellow
7	/ Self-test	Purple
8	/ Latch alarms	Red
9	4-20 mA output	Gray
10	RS485 A TX, only PCH1277	Red/Blue
11	Cable shield	Black
12	RS485 B RX only PCH1277	Grey / Pink
	House	Screen



Version 3/2008

C.2 EC type-examination certificate

Nemko

Page 1 of 2

[1] EC-TYPE EXAMINATION CERTIFICATE
[2] Equipment or Protected System Intended for use in Potentially explosive atmospheres Directive 94/9/EC

[3]	EC-Type Examination Certificate Number:	Nemko 07ATEX1261
[4]	Equipment or Protective System:	Vibration Guard
[5]	Applicant/ Manufacturer:	PCH Engineering
[6]	Address:	Ved Klædebo 9 2970 Hørsholm Denmark

[7] This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] Nemko AS, notified body number 0470 in accordance with Article 9 of Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. 94149

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 60079-0: 2004
EN 60079-1: 2004
EN 50281-1-1: 1998

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EC-TYPE EXAMINATION CERTIFICATE relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

[12] The marking of the equipment or protective system shall include the following:

II 2 GD T75°C	Ex d IIC T6 Ta: 65°C
I M2	Ex d I T6 Ta: 65°C

Oslo, 2007-10-30

p.p. Rolf Hoel
Certification Manager

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Postal address:	*Office address:*	*Telephone:*	*Enterprise number:*
P.O.Box 73 Blindern N-0314 OSLO, NORWAY	Gaustadalléen 30 0373 OSLO	+47 22 96 03 30 *Fax:* +47 22 96 05 50	NO 974404532

Nemko

[13] Schedule

[14] EC-TYPE EXAMINATION CERTIFICATE No Nemko 07ATEX1261

[15] Description of Equipment or Protective System

The PCH1270 and 1275 Vibration Guard comprises a stainless steel enclosure containing an electronic unit for measuring vibrations. The unit is delivered with a permanently connected cable attached to it and a certified cable gland is used for the entry.

Type

PCH 1270 and PCH 1275

Technical Data

24VDC Max 1,3W

[16] Report No. 94149

Descriptive Documents

Name/Number	Rev.	Date	Title/Description	Sheets
CHI 1126-3	1	2007-09-19	PCB schematic, grund modul, PCH 1072, 1270, 1275 og 1277	1
CHI 1126-7	-	2007-10-25	Part list	14
CHF5302	01	2007-08-30	Gevindinspektion af Acc_hus PCH 1275 / 1277	1
CHF5303	01	2007-08-30	Gevindinspektion rapport PCH 1275 / 1277	1
CHF5307	01	2007-04-17	Energi beregning PCH 1275 / 1277 ATEX	1
CHP1232	01	2007-08-30	EarthTag for PCH 1275 / 1277 i stål 1.4404	1
CHS 1100	01	2007-08-30	Låg PCH 1275 / 1277 stål 1.4404	1
CHS 1101	01	2007-08-30	Låg PCH 1275 / 1277 stål 1.4305	1
CHF 5295	02		Hovedstykliste til PCH 1275 / 1277 Vibration Guard	3
CHW 1367	01	2007-08-16	Samlingstegning PCH 1275 / 1277	1
CHL 1100	01	2006-11-21	Kabelbearbejdning PCH 1275 / 1277 12 leder	1
CHL 1103	01	2007-06-27	Kabelbearbejdning PCH 1275 / 1277 8 leder	1
CHW 1364	02	2007-05-13	ATEX del af HUS for PCH 1275 / 1277	1
CHR 3342	01	2007-04-03	typenummer label for PCH 1275 (ATEX)	1
CHR 3344	01	2007-04-03	Generel Serienummer label for PCH 1275	1
CHR 3343	01	2007-04-03	Typenummer Label 1277 (Standard)	1
CHR 3345	01	2007-04-03	Serienummer label (1277 Standard)	1
CHP 1128	02	2007-03-29	Plastforplade for PCH 1270 / 1275 (uden kommunikation)	1
CHP 1207	04	2006-04-26	Plastforplade for PCH 1272 / 1277 (med kommunikation)	1
CHS 1095	01	2007-05-14	Hus PCH 1275/1277 ATEX stål 1.4305 (afløser CHS 1068 1255)	1
CHS 1092	01	2007-04-17	Hus PCH 1275/1277 ATEX stål 1.4404 (afløser CHS 10xx 1255)	1
CHS 1098	01	2007-08-21	Hus PCH 1275 / 1277 ATEX Stål 1.4404 (afløser CHS1062 1255)	1
CHS 1097	01	2007-08-21	Hus PCH 1275 / 1277 ATEX Stål 1.4305 (afløser CHS1057 1255)	1
CHS 1096	01	2007-08-21	Hus PCH 1275 / 1277 ATEX Stål 1.4305	1
CHR 3361	01	2007-08-26	Typenummer Label for PCH 1275 / CHH 1158	1
CHR 3363	01	2007-08-26	Typenummer Label for PCH 1277 / CHH 1158	1
CHR 3362	01	2007-08-26	Label for Låg på PCH 1275 / 1277 / CHH 1158	1
CHW 1370	01	2007-08-27	Samlingstegning af PCH 1275 / 1277 / CHH 1158	1
CHL1104	01	2007-08-28	Bearbejdet kabel til PCH 1257 / 1277 / CHH 1158	1
CHR3379	01		Label for låg på PCH 1275 / 1277	

[17] Special Conditions for Safe Use

None

[18] Essential Health and Safety Requirements

See item 9

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Telephone:
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Fax:
+47 22 96 05 50

Enterprise number:
NO 974404532

C.3 Data sheets

THE VIBRATION MONITORING SPECIALISTS

PCH ENGINEERING

PRODUCT INFORMATION

PCH 1275/1277 COMPACT VIBRATION GUARD

The PCH 1275/1277 Compact Vibration Guard serie is Ex certified and approved for mines and other hazaradous areas. It is suitable for monitoring blowers, ventilators, pumps, decanters, separators, compressors and mills. The vibration guard continuously monitors the machine vibration level. Two adjustable alarms can be used to ensure that the machine vibrations do not exceed the acceptable level. The operator will gain an active protection of the machine, which limits the damages to the machine and consequently will reduce the maintenance costs.

Bearing damages

A bearing damage often occurs due to undetected unbalance or misalignment of a machine. Hence the machine runs for a very long time period with a much too high vibration level. This is the most common reason for serious machine crashes and down time.

Avoid unscheduled production stops

Deciding not to invest in vibration monitoring simply due to price can be a very unwise decision. Often will this leads to unexpected expenses to machine repairs, not to mentioned the further economic loss due to the production stop.

Price attractive alternative

For users who want a simple protection against damaging vibrations. PCH 1275/1277 is very **price attractive** and can easily be connected to a PLC or CTS system.

Functionality

The PCH 1275/1277 consists of a vibration sensor as well as conditioning-, alarm– and output circuitry, all embedded in stainless steel housing. The PCH 1275/1277 monitors seismic mechanical vibrations according to DIN/ISO 10816. PCH 1275/1277 can be configured to measure velocity (mm/s) or acceleration (m/s²). **Low frequency versions** are available. Individual measuring parameters can be customized. Measurement range, alarm limits and delay times can be adjusted directly in the PCH 1275/1277 according to the machine type and size, it has to monitor. For the PCH 1277 all settings can also be changed by using the PC control and display software. Incl. readout of vibration level, status and FFT analysis.

The present vibration level is continuously compared with the two alarm limits and if the alarm limits are exceeded the **two alarm relays** A1/D1 will trigger and thereby inform the user, e.g. via a connected rotor light, beeper, controller or by directly shutting down the machine. Both alert (A1) and danger (D1) have build in delay time, which prevents false alarms due to momentary transients.

Also the PCH 1275/1277 has a built in **latch function**, ensuring the alarm relay stays triggered until it has been manually/remotely reset, even though the vibration level has decreased again. PCH 1275/1277 also provides a 4-20 mA signal, which always expresses the relative vibration level. The **4-20 mA output** can also be used to verify the alarm limits of the Vibration Guard.

VED KLÆDEBO 4 • DK-2970 HØRSHOLM • COPENHAGEN • DENMARK
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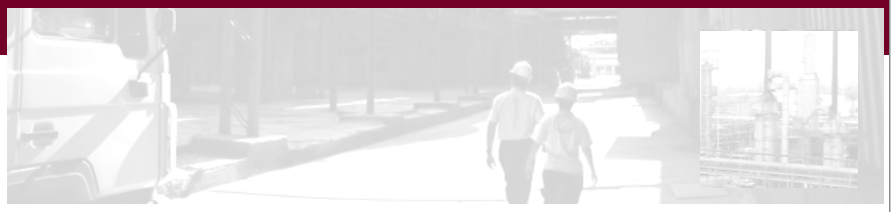
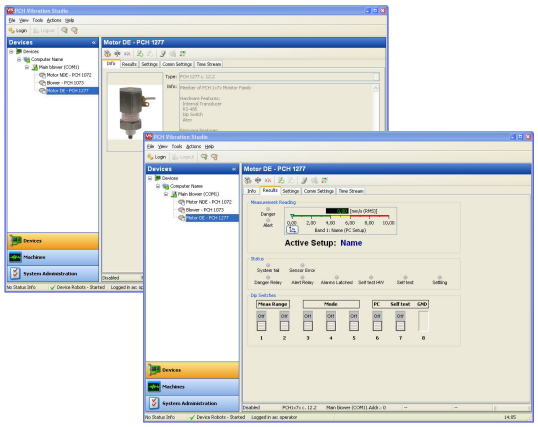
THE VIBRATION MONITORING SPECIALISTS

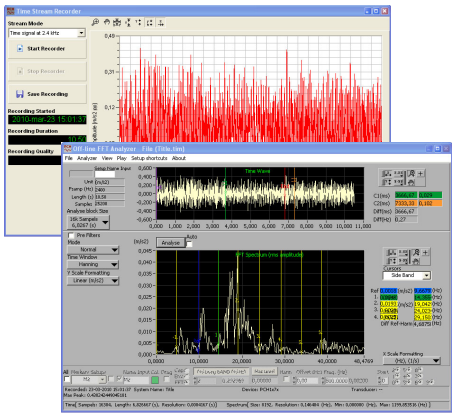


Technical data

PCH 1275/1277 COMPACT VIBRATION GUARD



Monitor set up



Frequency analysis

Sensor: Capacitive accelerometer

Measuring parameter: Velocity (mm/s)
Optional: Acceleration (m/s^2)

Measuring ranges (selectable):
10 or 20 or 50 or 100 mm/s
Optional: 10, 20, 50 or 100 m/s^2

Frequency range: 10 Hz - 1000 Hz, -1 dB, >18 dB/oct. (>60 dB/dec.)
Optional: 1 - 300 Hz - Low Freq Version (or to be agreed upon at ordering)

Detector: True RMS detector

DC output: 4 - 20 mA, relative to 0 - 100 % of measuring range. Load: max. 400 Ω

Measuring accuracy: ± 1.5 %
Max. measuring range: ± 18 g or ± 6 g
Shock: 1000 g

Alarm detectors:
Alert alarm with adjustable alarm limit.
Danger alarm with adjustable alarm limit.

Alarm relays, break:
A1: Alert relay, break
D1: Danger relay, break

Alert and Danger with Latch or auto reset (selectable)

Max voltage:……30 V
Max current:……100 mA

Delay time:
A1: 10 s, D1: 5 s
The delay times are adjustable from 0 - 100 s. Other delay times can be agreed upon.

Hang time for both A1 and D1: 1 s.

Manual reset function:
If alarm relays are latched reset can be made, via controller/PLC or switch,

Test function:
Can be activated remotely or by switch.

Grounding:
Common/ground (0V) and chassis can be disconnected via built-in switch.

Power supply:
+24 V DC, +/- 10 %, max. 60 mA DC

Operating temperature:
- 20 °C to + 65 °C

Housing (IP68):
Stainless steel type 1.4305
Optional: 1.4404

Cable: 2 m PUR oil resistant, screened. Different lengths can be ordered.

Mounting:
M12 internal thread with M12 threaded stud.

Dimensions:
Height:.....117 mm
Diameter, without cable gland:.....64 mm
Weight:.....1560 g

Compliance:
Rated according to EN 13849, PL-d
ATEX:
Ⓔx II 2G Ex db IIC T6
Ⓔx II 2D Ex tb IIIC T75 °C
Ⓔx IM2 Ex db I T6
Tamb: -20 °C ≤ Ta ≤ + 65 °C
NEMKO 07ATEX1261

CE 0359

PCH Engineering A/S reserves the right to change all specifications and accessories listed in this sheet without notice.

CHF 1130-UK16

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D Gearbox

Name	Data
Designation	Pekrun Getriebebau GmbH
Type	ASR 450-R-CCW
Number	
Type of manual	*Technical documentation*
Manufacturer	

D.1 Technical documentation

Stage 1

TAG No. AERZEN	Link
2.7.1.151	
2.7.1.251	
2.7.1.351	

[pekrun]

Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Deutschland
www.pekrun.de

TECHNISCHE DOKUMENTATION

TECHNICAL DOCUMENTATION

ENGLISCH

ZUM AUFTRAG
TO THE ORDER

IHRE BESTELL NR. YOUR ORDER NO.	4500494756 Pos. 10		
WERKS NR. WORKS NO.	2000064788 4001310646, 4001308822		
KENNWORT CODE WORD	GLAUCH TOOBA		
TAG-No	2.7.1.151	2.7.1.251	2.7.1.351
PEKRUN SERIAL NR.	10002289	10002290	10002291
PEKRUN KOM. NO.	19396-10		
GETRIEBE TYP GEAR UNIT TYPE	ASR 450-R-CCW		
GEWICHT WEIGHT	3324 kg		
BAUJAHR YEAR OF MANUVACTURE	2022		

[pekrun]

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany

Technisches Datenblatt

Technical datasheet

zur Betriebsanleitung
to the Operating Instructions

DEUTSCH / ENGLISCH

Geltungsbereich / *Scope*:			
Pekrun – Auftrags Nr. *Pekrun – order no.*	19396-10		
Kunden – Referenz *Customers - Reference*	4500494756; 2000064788 4001310646, 4001308822		
Getriebe / Typ *Gearbox / type*	ASR 450-R-CCW		
Pekrun - Teile Nr. / Serial Nr. *Pekrun - Part no. / serial no.*	PART-060561 / 10002289 - 10002291		
Dokument-Nr. / *Document no*:	OFF-039791	Rev.:	-
erstellt am / *created by*:	19.05.2022	erstellt von / *created by*:	B. Schröder
Anhang zur *Annex to the*	**WERKNORM N9100** ***COMPANY STANDARD N9100***		

[pekrun]

Erstellt am/*created at*: 19.05.2022
Erstellt von/*created by*: B. Schröder

Inhalt / *content*

1. Allgemeine technische Daten 3
General technical data 3
2. Umgebungsbedingungen 3
Environmental conditions 3
3. Schmierung 3
Lubrication 3
4. Grenz- und Einstellwerte zur Überwachung des Getriebes: 4
Limit and setting values for gearbox monitoring: 4
5. Wichtige zusätzliche Informationen: 4
Important additional information: 4
6. Montageanleitung Verschleißhülse (Innenring) 5
Assembly instruction wear sleeve (inner ring) 5

[pekrun]

Erstellt am/*created at*: 19.05.2022
Erstellt von/*created by*: B. Schröder

1. Allgemeine technische Daten
General technical data

Maße: *dimensions:*	ca. L= 2207 mm. B=1490 mm, H=1148 mm
Gewicht: *weight:*	3324 kg
Leistung: *rated power:*	P = 4100 kW
Antriebsdrehzahl: *input speed:*	n_1 = 1493 min^{-1}
Antriebsdrehzahl: *input speed:*	n_2 = 609,82 min^{-1}
Übersetzung: *transmission ratio:*	i = 2,4483 : 1
Service-Faktor: *Service factor:*	K_a = 2 DIN

2. Umgebungsbedingungen
Environmental conditions

Umgebungstemperatur: -16…+45°C
ambient temperature:

3. Schmierung
Lubrication

Typ: *type:*	Ölumlaufschmierung *Oil circulation lubrication*	
Schmierstoff: *lubricant:*	Ölviskosität: *oil viscosity:*	ISO VG 320
Schadenskraftstufe: *Scuffing resistance:*	12 (FZG-Test DIN 51354)	
Ölfüllmenge: *oil filling quantity:*	ca. 270 l	
Ölbedarf: *oil demand:*	ca. 56 l/min.	
Öldruck: *oil pressure:*	2 bar(g)	
Ölzulauftemperatur: *oil inlet temperature:*	+38…+47°C	

Dokument-Nr.: OFF-039791 Rev.: - 3 / 8

[pekrun]

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4. Grenz- und Einstellwerte zur Überwachung des Getriebes:
Limit and setting values for gearbox monitoring:

		Warnung *warning*	Abschaltung *shutdown*	Normal *normal*
Gehäuseschwingungen *Housing vibration*		[mm/s]	[mm/s]	[mm/s]
- horizontal *- Horizontal*	:	> 4,5	> 7,1	≤ 4,5
- vertikal *- Vertical*	:	> 4,5	> 7,1	≤ 4,5
Temperaturen *Temperatures*		[°C]	[°C]	[°C]
- Ölzulauf *- Oil inlet*	:	< 15… > 60	< 10…> 80	38 ... 47
Öldruck *Oil pressure*		[bar]	[bar]	[bar]
vor dem Getriebe *in front of the gearbox*	:	< 1,4	< 1,2	1,6…6

5. Wichtige zusätzliche Informationen:
Important additional information:

ACHTUNG / CAUTION

Sachschaden

Beschädigungen am Getriebe durch zu große Wellenverlagerung.

Die kundenseitig zu montierende Kupplung an der Antriebswelle muss im Betrieb eine Wellenverlagerung von bis zu 2 mm ausgleichen können!

Risk of property damage!

Risk of damage to the gearbox due to large shaft misalignment.!

The coupling to be mounted on the drive shaft by the customer must be able to compensate a shaft misalignment of up to 2 mm during operation!

HINWEIS / NOTE

Beachten Sie bei Montage von Kupplungen die speziellen Betriebsanleitungen des Herstellers.

When installing couplings, always follow the specific instructions from the manufacturer.

Dokument-Nr.: OFF-039791 Rev.: - 4 / 8

[pekrun]

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Erstellt von/*created by*: B. Schröder

6. Montageanleitung Verschleißhülse (Innenring)
Assembly instruction wear sleeve (inner ring)

Abmaße / Dimensions:

- Wellendurchmesser / shaft diameter: ø140m6 (+0,040 / +0,015)
- Verschleißhülse / wear sleeve: ø140 (+0,00 / -0,025)

Vorbereitung / Preparation:

1. Reinigen Sie Welle und O-Ring- Nut mit geeigneten Mitteln von allen Rückständen.
Clean shaft and O-ring groove from all residues using suitable means.
2. Glätten Sie eventuell vorhandene Grate und Riefen.
Smooth out any burrs and grooves that may be present.

Hilfsmittel, Personal / Auxiliary means, personnel

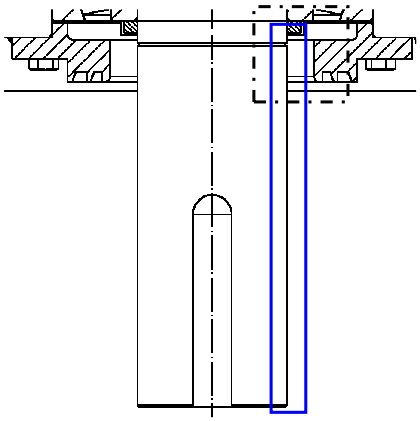
3. Fett / *grease* (z.B./*e.g.* Klüber Staburags NBU 12 K)
4. Induktionserwärmung / *induction heating*
5. Thermometer / *thermometer*
6. Hitzebeständige Handschuhe / *heat-resistant gloves*
7. Innenring / inner ring IR140x160x50 EGS PART-001292
(drallfrei geschliffen / *twist-free ground*)
8. 2x Wellendichtring / *shaft seal ring* DIN 3760-160x190x15-BAUMX7-FKM
9. 2x Schonhammer / *soft-face hammer*
10. 2x Messingdorn / *brass mandrel*
11. 2 Monteure / 2 fitters

Montage / Assembly

12. Die Temperatur der Welle muss kleiner 30°C sein.
Temperature of the shaft must be less than 30°C.

13. Fetten Sie das Wellenende leicht ein. (siehe blauer Bereich in Abbildung 1)
Lightly grease the shaft end. (see blue section in Figure 1)

Abbildung / Figure 1



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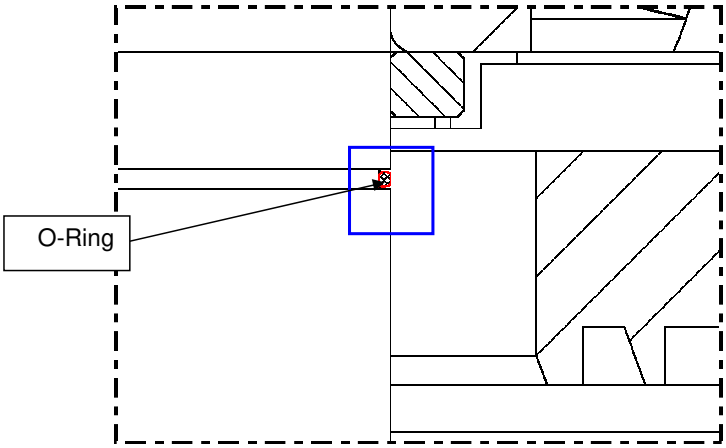
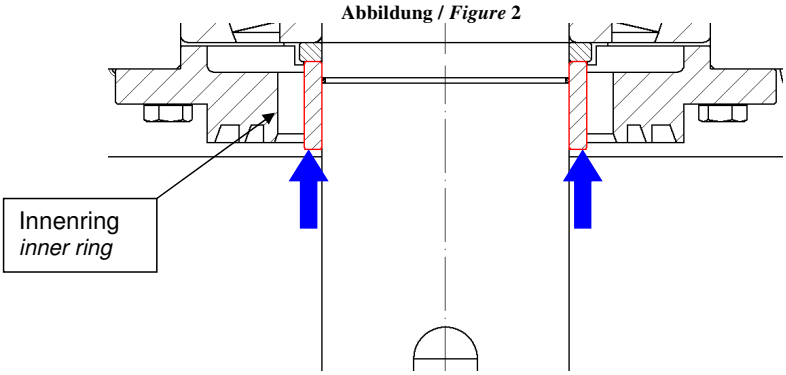
14. Fetten Sie den O-Ring ein.
    Grease the O-ring
15. Schieben Sie den O-Ring vorsichtig über die Welle bis in die Nut.
    Carefully push it over the shaft into the groove
16. Fetten Sie den O-Ring in der Nut noch einmal überall leicht ein.
    Lightly grease the O-ring in the groove once again

Ausschnitt aus Abbildung / Detail from figure 1



17. Erwärmen Sie den Innenring langsam auf 130°C.
    Slowly heat the inner ring to 130°C.
18. Nehmen Sie nun sofort den Innenring vom Erwärmungsgerät und schieben Ihn anschließend schnell über die Welle bis zum O-Ring.
    Immediately remove the inner ring from the heating device and then quickly slide it over the shaft to the O-ring.
19. Treiben Sie nun innerhalb von 15 Sekunden den Innenring gleichzeitig (auf 2 Seiten um 180° versetzt) mit den Messingdornen und Schonhammer axial über den O-Ring bis dieser am Anlagebund anliegt.
    Now, within 15 seconds, drive the inner ring simultaneously (offset by 180° on 2 sides) axially over the O-ring with the brass mandrels and soft-face hammer until the O-ring is in contact with the contact collar.

Abbildung / *Figure* 2



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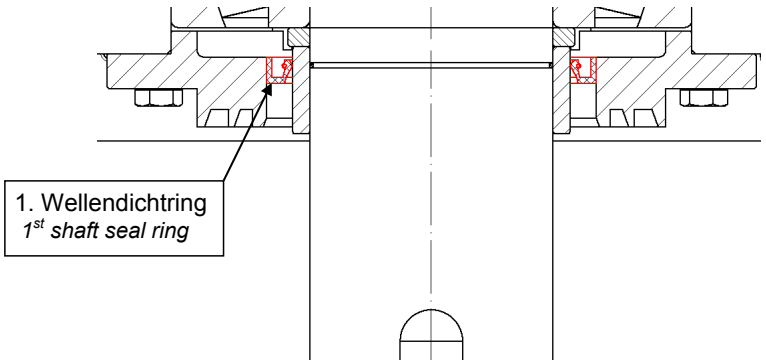
20. Lassen Sie den Innenring abkühlen und montieren anschließend den ersten Wellendichtring.
Allow the inner ring to cool down and subsequently install the first shaft seal ring.

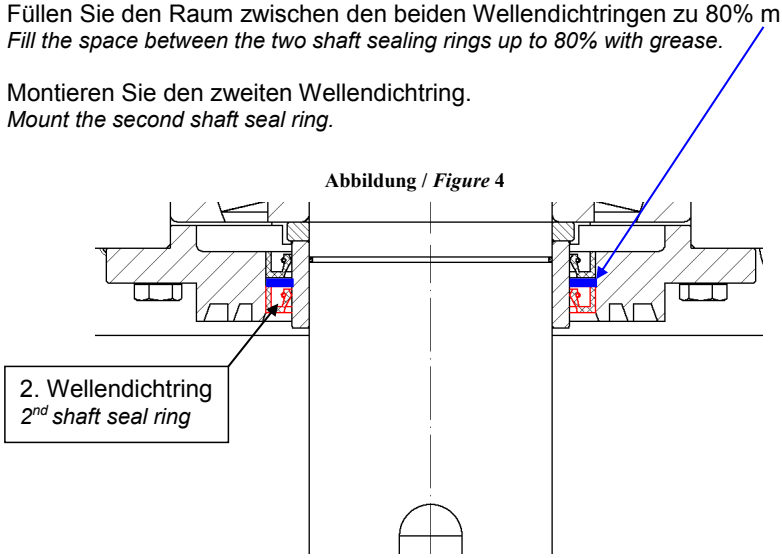
Abbildung / *Figure* 3



21. Füllen Sie den Raum zwischen den beiden Wellendichtringen zu 80% mit Fett.
Fill the space between the two shaft sealing rings up to 80% with grease.

22. Montieren Sie den zweiten Wellendichtring.
Mount the second shaft seal ring.

Abbildung / *Figure* 4



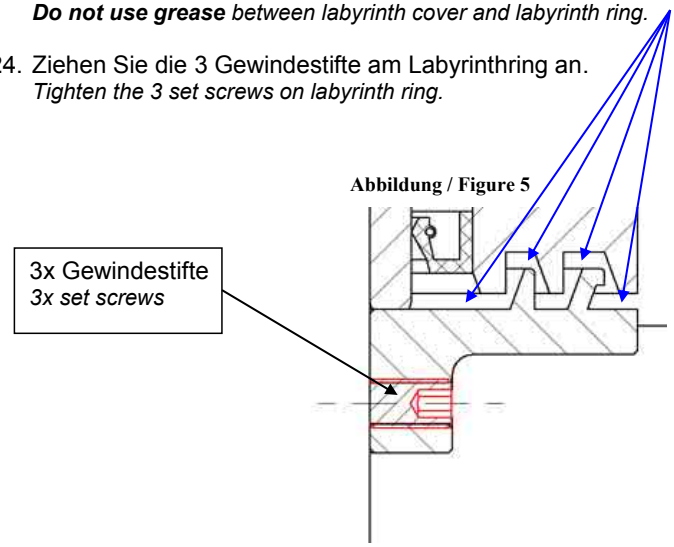
[pekrun]

Erstellt am/*created at*: 19.05.2022
Erstellt von/*created by*: B. Schröder

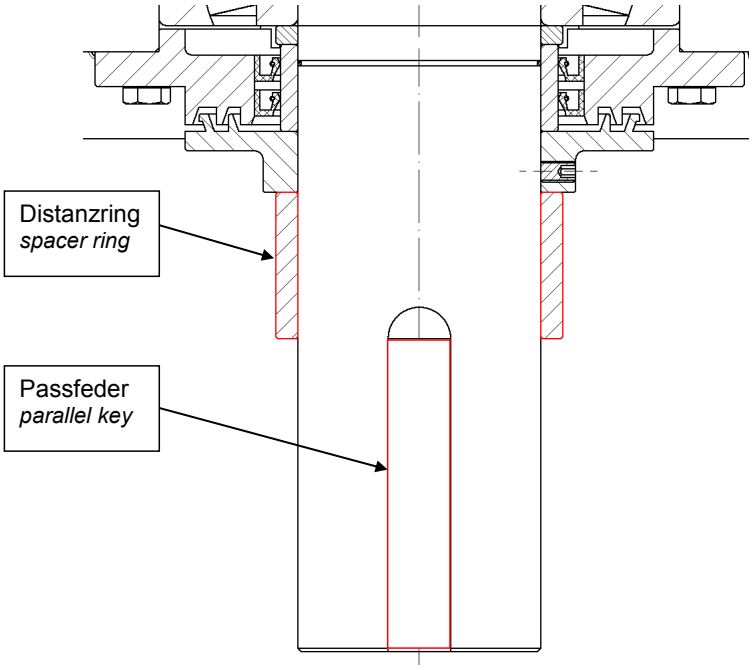
23. Montieren Sie den Labyrinthring.
    Mount the labyrinth ring.
    Verwenden Sie **kein Fett** zwischen Labyrinthdeckel und Labyrinthring.
    Do not use grease *between labyrinth cover and labyrinth ring.*

24. Ziehen Sie die 3 Gewindestifte am Labyrinthring an.
    Tighten the 3 set screws on labyrinth ring.

Abbildung / Figure 5



25. Montieren Sie Distanzring und Passfeder.
    Install the spacer ring and parallel key.



Dokument-Nr.: OFF-039791 Rev.: - 8 / 8

[pekrun]

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany

Translation of the original

Operating instructions

(including assembly instructions according to EU Machinery Directive 2006/42/EC, Annex VI for partly completed machinery)

for

Pekrun gearboxes

Scope :	Worm gearboxes, Cylindrical gearboxes (except turbo gearboxes), Bevel gearboxes(except mill gearboxes), Planetary gearboxes, Combinations of these / special-purpose gearboxes
Type :	…ALG... / ..AGZ… / ..AG… /..PG… / ..GV… / ..LG… / ..HS… ASR… / BSR… / CSR… / DSR… /..SR… / ..SH… / ..VN… / ..VG… / ..VH… AKR… / BKR… / ..KR… / ..KS.. / ...PL… …SO… / ..KZ… / ..MK…/ ..SV… / ..VH… / ..VH… / ..VN… SN*../ SNU*../ SNO*../ SNV*../ SNC*../ SNA*../ SNAF*.. SW*../SHS*../ SDA*../ SVA*../.SZA*../ ZVA*../ SEO*.. K*../KN*../ KNV*../ KNA*../ KS*../ KW*../ KZV*../ VKZ*../ SKV*.. SSN *../ SSNV*../ SSW*../ KSN*..

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1 Important background information

1.1 Scope of supply

- Gearbox
(for delivery quantity and gearbox type, see confirmation of order and service spec/delivery agreement)
- Operating instructions incl. declaration of incorporation

1.2 Responsibilities

1.2.1 Responsibilities of the manufacturer

Pekrun Getriebebau GmbH completes assembly of the gearbox.

All instrumentation and all required monitoring devices are mounted on the gearbox. (If included in the scope of supply or provided by the customer.)

1.2.2 Responsibilities of the manufacturer of the completed machinery

The machine manufacturer or end customer is responsible for the execution of the foundation and its stability.

Further assembly of the machine is the responsibility of the machine manufacturer or end customer. The same applies to the electrical installation of the instruments and all required monitoring devices on the gearbox.

The assembly and provisioning of the required supply connections/lines is the responsibility of the machine manufacturer/operator.

The manufacturer of the completed machine must integrate all information relevant for operation (such as safety instructions, regulations and descriptions) from these operating instructions into the operating instructions for the completed machinery and keep these up to date over the entire lifetime of the gearbox.

1.2.3 Responsibilities of the operator

The operator or end customer is responsible for commissioning.

The operating instructions form part of the delivery. These instructions must be available at all times to persons tasked with carrying out assembly, operation, repairs, cleaning and maintenance.

	NOTICE
	The operator must ensure that the abovementioned persons have read and understood the operating instructions. The owner must ensure these instructions are followed to the letter, in order to: – prevent hazards to the life and limb of users and third parties; – ensure the operational safety/reliability of the gearbox; and – rule out failures and environmental hazards resulting from incorrect handling.

1.3 External interfaces

For existing and/or relevant interfaces, please see the order-specific dimensional or section drawing and the technical data sheet in the appendix to these instructions.

Gearbox – machine:

The gearbox is connected to the rest of the machine by one or more drive shafts or by one or more gear output shafts.

Gearbox – energy supply:

The electrical energy supply for the instrumentation and monitoring devices (if included in the scope of supply or provided by the customer) is connected and provided by the operator or end customer.

The hydraulic energy supply for switching cylinders (if included in the scope of supply) is connected and provided by the operator or end customer.

Gearbox – process media supply:

When connected to an external oil supply system:

- the relevant oil inlet and outlet connections are connected and provided by the operator or machine manufacturer.

When connected to a coolant supply system (water/oil cooler or cooling coil):

- the relevant cooling water inlet and outlet connections are connected and provided by the operator or machine manufacturer.

Gearbox – housing:

The gearbox is connected with fixing screws to the foundation or the steel structure provided by the operator or end customer. End stops intended for levelling the gearbox precisely on the foundation are provided by the machine manufacturer, operator or end customer.

1.4 Legal information

The copyright to these operating instructions is retained by:

Pekrun Getriebebau GmbH

The present operating instructions are an integral part of the delivery and must always be kept close to the gearbox.

Pekrun Getriebebau GmbH accepts no liability for damage or operational disruption resulting from a failure to follow the operating instructions.

The gearbox must not be opened during the warranty period except by Pekrun employees. If this is not possible, obtain written approval from Pekrun before having the gearbox opened by other personnel – failure to do this will void the warranty! This does not include the opening of inspection covers or oil feed inlets.

1.5 Documentation

1.5.1 Background information about content and structure

These operating instructions provide you with important information about your gearbox.

They are intended to help you to handle the gearbox safely.

1.5.2 Content and structure

These operating instructions provide you with important safety information for all of the gearbox's lifecycle phases.

The order-specific appendix includes the following documentation: handling instructions and technical data, as well as drawings and spare parts lists (as applicable).

User information provided by other suppliers (also included in the appendix) also forms an integral part of these operating instructions.

1.5.3 Conventions

General terms used

Dimensional drawing/data sheet: *

An assembly schematic for the gearbox, which includes the most important dimensions for installation into the overall plant as well as basic data for the intended use. These instructions use the term "dimensional drawing".

Section drawing/MRP drawing:*

Assembly schematic for the gearbox, which includes the gearbox structure and the positioning of all of the parts as a sectional view. These instructions use the term "section drawing".

Spare parts list/bill of materials:*

List of all parts in the gearbox that are required for repairs or when purchasing spare parts. These instructions use the term "spare parts list".

Technical data sheet (per order):*

Data sheet created for each order and which includes other important items of data (as needed) relevant for the intended use. This information must be followed in addition to the operating instructions and dimensional drawing.

* The documents supplied will vary according to the requirements and use case.

Abbreviations:

OI = Operating instructions

PPE = Personal protective equipment

EM = Electric motor

OSS = Oil supply system

Special technical terms:

Skilled personnel, qualified personnel:

A person whose appropriate training and experience enables them to detect risks, and to avoid possible hazards that can be caused by operating or servicing a product.

User:

A person or organisation capable of commissioning a product and/or using it to carry out a required function, including activities that range from cleaning to decommissioning at the end of the product's lifetime.

Guard:

A physical barrier that is designed to offer protection as an integral part of the machine.

1.6 Service address

If you have any technical queries, please contact our factory:

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2 Safety

2.1 Conventions for safety instructions

2.1.1 Formatting

Certain kinds of information are emphasised and highlighted by means of appropriate formatting:

Table 2-1

Convention	Type of information
Bold type	Especially important components, as well as headings
Red type	Important warning notices

2.1.2 Symbols

The following symbols are used throughout the operating instructions:

Table 2-2

Symbol	Description
	Risk of **personal injury** A failure to observe this safety instruction can lead to serious injury or death
	Warning, general
	Warning about a potential hazard Entanglement hazard
	Warning about a potential hazard (hot surfaces) Risk of burn injuries
	Warning about a potential hazard Suspended loads
	Operating instructions (general) Follow operating instructions and other relevant documents
	General mandatory sign Risk of damage
	Mandatory sign for lashing point/crane transportation Use the lashing points provided

2.1.3 Explanation of safety information provided

These operating instructions use the following signal words and symbols for warnings. If multiple hazards apply, the warning notice is used for the next-higher level in each case.

	DANGER Indicates an immediate hazard. A failure to follow this safety warning can lead to death or serious injury.

	WARNING Indicates a potential hazard with a moderate risk. A failure to follow this safety warning can lead to death or serious injury.

	CAUTION Indicates a hazard with a low risk. A failure to follow this safety warning can lead to minor or moderate injury.

	TAKE CARE Provides important advice about avoiding damage to property. A failure to follow such safety instructions can lead to damage to the gearbox or the overall machine, and to the environment.

	NOTICE Used to provide information about general handling and operation. Should be followed at all times.

	NOTICE Provides important advice about the operating instructions and order-specific documents.

2.2 Emergency procedures

DANGER

Danger to life from faulty gearbox or overall machine

Switch off the drive unit immediately in an emergency!

The drive unit must be taken out of service immediately if you identify any changes to the gearbox during operation, such as an elevated operating temperature or changes in the noises made by the gearbox.

TAKE CARE

Risk of damage

A failure of the gearbox can cause consequential damage.

Take appropriate action to avoid further damage to the gearbox.

2.3 Intended use

2.3.1 Area of application

The gearbox is intended exclusively for use in an industrial environment.

The gearbox is intended for installation in a machine.

The gearbox must be deployed and operated within the operating conditions and performance limits specified by the service spec/delivery agreement.

NOTICE

For important information about the intended use and the application area, also see the type plate and the dimensional drawing as well as the order-specific technical data sheet.

2.3.2 Requirements for personnel

The operating instructions form part of the delivery. These instructions must be available at all times to persons tasked with carrying out assembly, operation and maintenance.

NOTICE

Steps must be taken to ensure that all abovementioned persons have read and understood the operating instructions. It is advisable to assign the tasks listed above to people who have received appropriate professional training in these areas.

(Skilled personnel/qualified personnel)

The following persons are authorised to handle the product:

- Hauliers: personnel with basic training
- Fitters: Skilled personnel, qualified personnel
- Installers: Skilled personnel, qualified personnel
- Users: trained personnel
- Servicing personnel: Skilled personnel, qualified personnel

NOTICE

All work must be carried out with the greatest of care and due attention to **safety**. Observe the minimum requirements for safety and health protection when using work equipment, in accordance with the respective regulations of the country of use.

2.3.3 Safety-relevant ambient conditions

DANGER

Danger to life when operated in a potentially explosive atmosphere!

The gearbox must be deployed and operated within the ambient conditions specified by the service spec/delivery agreement.

NOTICE

For important safety-relevant information about ambient conditions, see the dimensional drawing and the order-specific technical data sheet.

2.3.4 Safety-relevant information for specific lifecycle phases

Set-up conditions:

Set up the gearbox on a foundation or steel structure that is as level, safe and inelastic as possible. The flatness tolerance of the set-up area is 0.1 mm per 1 m.

Connection conditions:

The connection to the drive unit and the working machine must be installed by the machine manufacturer/operator, using the respective gear shafts and with the help of a suitable coupling. This work also includes the guards to be installed in accordance with DIN EN ISO 12100-1 for all shafts and moving parts.

The connection from an external oil supply system to the gearbox must be provided and assembled by the machine manufacturer/operator by using suitable connections/lines. (If applicable.) To avoid overpressure or leaking oil lines, the machine manufacturer/operator should install a pressure monitoring system or pressure relief valve.

The connection from the hydraulic or pneumatic supply unit to the switching cylinders must be provided and appropriately assembled by the machine manufacturer/operator by using suitable connections/lines. (if applicable)

The electrical installation of the instrumentation and monitoring devices on the gearbox must be completed by the machine manufacturer/operator using qualified personnel (electricians). (if applicable)

Assembly

During set-up of the gearbox, there is a risk of injury to limbs due to crush and shear injuries. Damage to the musculoskeletal system can also occur, as can fatigue and discomfort as a result of incorrect posture.

If guards are not installed properly, this can lead to hazards from touching the machine accidentally.

During dismantling work, there is a risk of slip/fall injuries from pools of oil formed by leaking lines or flanged connections.

During installation work, there is a risk of injury during assembly on live parts. All live parts must be de-energised before carrying out assembly work.

Avoid placing the assembly personnel at any risk. Keep to safety clearance distances.

Operation

The rotation of the shafts presents a risk of entrapment injuries.

Due to the movement of external parts (such as switching cylinders for switching operations), there is a risk of crush/shear injuries to limbs.

Mount a guard that complies with DIN EN ISO 12100-1.

Depending on the operating conditions, the surface temperature of the gearbox can be very high. Contact with the housing can cause burn injuries to the skin.

Switch gearbox gears only when it is at a standstill and without any applied torque. (if applicable)

Maintenance and servicing

If guards are not installed properly, this can lead to hazards from touching the machine accidentally.

Maintenance and servicing must be performed when the gearbox is at a standstill.

During maintenance work, there is a risk of injury during assembly on live parts. All live parts must be de-energised before carrying out assembly work.

During servicing and maintenance work, there is a risk of slip/fall injuries from pools of oil formed by leaking lines or flanged connections.

When changing the oil, escaping hot oil can cause scald injuries on the skin.

Depending on the operating conditions, the surface temperature of the gearbox can be very high. Even after having been at a standstill for a while, contact with the housing can cause burn injuries to the skin.

Dismantling

Dismantle the gearbox only when it is at a standstill.

When draining the oil, escaping hot oil can cause scald injuries on the skin.

Depending on the operating conditions, the surface temperature of the gearbox can be very high. Even after having been at a standstill for a while, contact with the housing can cause burn injuries to the skin.

During dismantling work, there is a risk of slip/fall injuries from pools of oil formed by leaking lines or flanged connections.

During removal of the gearbox from the machine, there is a risk of crush, shear and amputation injuries to limbs.

Disposal

During disposal work, skin may come into contact with dirty oil. Use suitable personal protective equipment (PPE).

Always observe the environmental protection regulations in the country of use.

2.4 Possible misuse

Operation of the gearbox in a potentially explosive atmosphere
⇨ Consequence: Explosion hazard.

Operating the gearbox in the opposite direction of rotation or at too high a speed. This presents the risk of damage to the gearbox. Gearing parts and bearings may also be destroyed.
⇨ Consequence: Risk of breakage during operation

Operating the gearbox with the inspection cover open.
Dirt can enter the housing, and oil or other particles can be ejected out of the housing.
⇨ Risk of injury resulting from ejected parts and fluids
Personnel can reach into the housing during operation and their limbs can be caught between rotating shafts inside the gearbox.
⇨ Risk of shear and crush injury

Operating the gearbox without a functional oil supply or with the wrong grade or quantity of oil. This presents a risk of damage to the gearbox. Gearing parts and bearings may also be destroyed.
⇨ Possible risk of breakage during operation

Switching gearbox gears during operation. This presents a risk of damage to the gearbox. Gearing parts and bearings may also be destroyed.
⇨ Possible risk of breakage during operation

Performing welding work on the gearbox. Using the gearbox as a return during welding work. Gearing parts and bearings can be destroyed.
⇨ Possible risk of breakage during operation

Personnel who are **not** qualified are assigned assembly, commissioning and maintenance work. All personnel assigned assembly, commissioning and maintenance work must have read and understand the operating and maintenance instructions for the gearbox. It is advisable to assign the tasks listed above to people who have received appropriate professional training in these areas.
⇨ Danger arising from incorrect assembly

2.5 Following the operating instructions

These operating instructions are an integral part of the gearbox delivery.

Always keep these operating instructions close to the gearbox.

Retain the operating instructions for the entire lifetime of the gearbox.

If necessary, pass the operating instructions on to the next owner or user of the gearbox.

2.6 Residual risks and protective measures

2.6.1 Residual risks and protective measures for certain lifecycle phases

⚠ Hazard area: Transportation (manufacturer, haulier, operator)	
Residual risks:	Protective measures:
During transportation and loading/unloading of the gearbox, the gearbox may slip, fall or drop from a height onto personnel because loads have been secured and/or anchored incorrectly, or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if operators are trapped between obstacles and the load.	- Inform all personnel entrusted with the transportation and setup of the gearbox about the existing residual risks, and especially about the selection of suitable load-handling equipment and proper securing of loads. - Always commission properly trained personnel with the transportation and loading/unloading of the gearbox. - Keep the speed of travel as low as possible. - Avoid rapid changes between moving and stopping the load, and the oscillations that this causes. - Avoid any endangerment to personnel. - Take care to ensure that personnel do not become trapped between obstacles and the load. - Keep to safety clearance distances. Wear PPE. - Transport the gearbox slowly and carefully, and especially when in a raised position. - Ensure the gearbox is anchored safely and correctly - Note the centre of gravity (which may be off-centre), weight and dimensions of the gearbox. Follow instructions about load distribution on the packaging or dimensional drawing. - Use suitable vehicles and loading platforms for transportation (load-bearing capacity, dimensions) - Secure the gearbox safely to the loading platform. - Choose ancillary equipment providing an adequate means to fix and lift the unit, with appropriate dimensions. (See section 5.)

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Safety

Hazard area:Assembly and installation (operator)	
Residual risks:	Protective measures:
General	- Only entrust the assembly and installation of the gearbox to properly qualified personnel, preferably those with relevant professional training. - Wear suitable PPE. - Inform all personnel entrusted with the assembly and installation of the gearbox about the existing residual risks. (See sections 5, 6, 7 and 8.)
During setup of the gearbox on the base frame, the unit may slip, fall or drop from a height onto personnel because loads have been anchored incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if operators are trapped between obstacles and the load.	- Keep the speed of travel as low as possible. - Avoid rapid changes between moving and stopping the load, and the oscillations that this causes. - Avoid any endangerment to personnel. - Take care to ensure that personnel do not become trapped between obstacles and the load. - Keep to safety clearance distances. Wear PPE. - Transport the gearbox slowly and carefully, and especially when in a raised position. - Ensure the gearbox is anchored safely and correctly - Note the centre of gravity (which may be off-centre), weight and dimensions of the gearbox. Follow instructions about load distribution on the packaging or dimensional drawing. - Ensure personnel have physical aptitude for the task
Damage to the musculoskeletal system can occur, as can fatigue and discomfort as a result of incorrect posture.	
When assembling the couplings on the shaft or during assembly of the remaining machine, there is a risk of injury to limbs due to crush and shear injuries	
If guards are missing or not installed properly, this can lead to hazards from touching the machine accidentally.	- Instruct personnel entrusted with assembly and installation about the importance of machine guards
During installation work, there is a risk of injury during assembly on live parts.	- All live parts must be de-energised before carrying out assembly work.
When removing the anticorrosion protection with solvents or when opening the inspection cover, there is a risk of injury from escaping toxic or combustible gases.	- The handling of hazardous substances (solvents or spills of corrosion inhibitor oils) should be entrusted only to qualified personnel, ideally with appropriate professional training. - These regulations must be followed: the German Ordinance on Hazardous Substances, EU Regulation 1907/2006, and EU Directives 2010/75/EU and 89/656/EEC
When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.	- Observe the safety data sheet for the media being used. - Wear suitable PPE (safety goggles and gloves). - Have suitably-qualified personnel carry out the work. - Remove any oil spills that occur immediately (e.g. with oil binder).
When working on parts filled with oil, such as pipelines and the interior of the gearbox, skin can be exposed to contact with aggressive media.	

During assembly and installation work, personnel may slip or fall as a result of leaking oil or existing spills of oil.	- Clean up any oil spills or oil leaks with an oil binder. - Seal any leakage points as soon as possible.

Hazard area: First use (operator)	
Residual risks:	Protective measures:
General	- Only entrust the first use to properly qualified personnel, preferably those with relevant professional training - Wear suitable PPE. - Inform all personnel entrusted with the first use of the gearbox about the existing residual risks. (See section 8 and 9.)
During the first use, leaky lines or flanged joints may spray out oil as a result of overpressure in the oil supply system or when pressurising the hydraulic lines in the switching unit. As a result, this oil may come into contact with personnel (e.g. get into eyes).	- Before the first use, check all oil supply lines and flanged joints to and on the gearbox, and check that these are connected/seated tightly. - Before the first use, check all hydraulic connecting lines and hoses for correct seating as well as any leaks - Use suitable PPE (eye protection)
During the first use, personnel may slip or fall as a result of leaking oil or existing spills of oil.	- Clean up any oil spills or oil leaks with an oil binder. - Seal any leakage points as soon as possible.
If guards are missing or not installed properly, this can lead to hazards from touching the machine accidentally.	- Inform all personnel entrusted with the first use of the gearbox about the existing residual risks
During operation, foreign objects such as sand and dust can land on the rotating parts and then be ejected forcefully by these parts. When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit. This creates a risk of eye injuries from objects being ejected with force from the unit, as well as sprays of pressurised oil escaping from the unit.	- The operator/customer must set up guards to prevent access to the danger zone involving rotating machine shafts. - Before the first use, all oil supply lines and flanged joints to and on the gearbox should be checked for leaks and proper seating. (If applicable.) - All hydraulic connecting lines and hoses must be checked for leaks and correct seating. (If applicable.) - Observing correct maintenance intervals (checking for leaks at/on connection points/parts that are pressurised) - Ensure that all work on pipelines is carried out with due care and attention. - Wear appropriate protective clothing and suitable eye protection.

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Hazard area: troubleshooting, servicing, maintenance and cleaning (operator)	
Residual risks:	Protective measures:
General	- Only entrust troubleshooting, maintenance and cleaning work to properly qualified personnel, preferably those with relevant professional training - Wear PPE. - Only perform work on the gearbox when it is at a standstill. - Inform all personnel entrusted with troubleshooting, servicing, maintenance and cleaning work on the gearbox about the existing residual risks. (See section 10 and 11.)
There is a risk of crush injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers)	- Always wear PPE (gloves and shoes).
Personnel may come into contact with the hot surface of the gearbox housing (even after a while at a standstill) and can suffer burn injuries by then touching it.	- Check the temperatures at the gearbox and on the gearbox surface, and avoid starting any work before the surface has cooled down to a safe temperature.
When changing the oil, escaping hot oil can cause scald injuries on the skin.	
During troubleshooting work, leaky lines or flanged joints may spray out oil as a result of overpressure in the oil supply system or when pressurising the hydraulic lines in the switching unit. As a result, this oil may come into contact with personnel (e.g. get into eyes).	- Before the first use, check all oil supply lines and flanged joints to and on the gearbox, and check that these are connected/seated tightly. - Before the first use, check all hydraulic connecting lines and hoses for correct seating as well as any leaks
When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.	- Observe the safety data sheet for the media being used. - Wear suitable PPE (safety goggles and gloves). - Have suitably-qualified personnel carry out the work. - Remove any oil spills that occur immediately (e.g. with oil binder).
When working on parts filled with oil, such as pipelines and the interior of the gearbox, skin can be exposed to contact with aggressive media.	
Personnel may slip or fall as a result of leaking oil or existing spills of oil.	- Clean up any oil spills or oil leaks with an oil binder. - Seal any leakage points as soon as possible.
During this work, there is a risk of injury during assembly on live parts.	- All live parts must be de-energised before carrying out assembly work.

Hazard area: decommissioning and dismantling (operator)	
Residual risks:	Protective measures:
General	- Only entrust decommissioning and dismantling work to properly qualified personnel, preferably those with relevant professional training - Wear PPE. - Only perform work on the gearbox when it is at a standstill. - Inform all personnel entrusted with the decommissioning and dismantling of the gearbox about the existing residual risks. (See section 12.)
There is a risk of crush injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers)	- Always wear PPE (gloves and shoes).
During removal of the gearbox from the machine or base frame, the unit may slip, fall or drop from a height onto personnel because loads have been anchored incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if operators are trapped between obstacles and the load.	- Keep the speed of travel as low as possible. - Avoid rapid changes between moving and stopping the load, and the oscillations that this causes. - Avoid any endangerment to personnel. - Take care to ensure that personnel do not become trapped between obstacles and the load.
Damage to the musculoskeletal system can occur, as can fatigue and discomfort as a result of incorrect posture.	- Keep to safety clearance distances. Wear PPE. - Transport the gearbox slowly and carefully, and especially when in a raised position.
When removing the couplings from the shaft or other parts of the machine, there is a risk of injury to limbs due to crush and shear injuries	- Ensure the gearbox is anchored safely and correctly - Note the centre of gravity (which may be off-centre), weight and dimensions of the gearbox. Follow instructions about load distribution on the packaging or dimensional drawing. - Ensure personnel have physical aptitude for the task
Personnel may come into contact with the hot surface of the gearbox housing (even after a while at a standstill) and can suffer burn injuries by then touching it.	- Check the temperatures at the gearbox and on the gearbox surface, and avoid starting any work before the surface has cooled down to a safe temperature.
When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.	- Observe the safety data sheet for the media being used. - Wear suitable PPE (safety goggles and gloves). - Have suitably-qualified personnel carry out the work. - Remove any oil spills that occur immediately (e.g. with oil binder).
When working on parts filled with oil, such as pipelines and the interior of the gearbox, skin can be exposed to contact with aggressive media.	
Personnel may slip or fall as a result of leaking oil or existing spills of oil.	- Clean up any oil spills or oil leaks with an oil binder.
During removal work, there is a risk of injury during assembly involving live parts.	- All live parts must be de-energised before carrying out assembly work.

When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit. This creates a risk of eye injuries from objects being ejected with force from the unit, as well as sprays of pressurised oil escaping from the unit.	- During dismantling work, oil supply lines and flanged joints to and on the gearbox should be checked. (If applicable.) - All hydraulic connecting lines and hoses must be checked for leaks. (If applicable.) - Ensure that dismantling work on pipelines is carried out with due care and attention. - Wear appropriate protective clothing and suitable eye protection.

2.6.2 General protective measures

	DANGER
	Danger to life when working on a switched-on machine **As a general rule, always shut down the gearbox and all parts of an installed and connected oil supply system.** **Ensure that the entire machine is de-energised and depressurised.** Secure the drive unit against accidental switch-on (e.g. by locking the key switch or removing the fuse from the power supply unit). Secure the gearbox's start-up console by posting up a sign indicating that work is in progress on the gearbox.

Only perform work on the gearbox when it is at a standstill.

	DANGER
	Danger to life from rotating and/or moving parts **Risk of injury from being trapped and pulled in by rotating and/or moving parts!** Secure all rotating drive parts such as couplings, gears/sprockets or belt drives so they cannot be touched. All external moving parts such as switching cylinders must be shielded so they cannot be touched. Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

Secure rotating and/or moving parts with guards so that they cannot be touched.

[pekrun]

Safety

DANGER

Danger to life from dangerous electrical voltage

During installation work on the gearbox, there is a risk of injury during assembly on live parts.

Ensure that all work on electrical parts is carried out only by suitably qualified electricians.

Always observe the 5 safety rules according to DIN EN 50110-1:
Before starting work:

– Disconnect from the mains (isolate all power lines, including any ancillary circuits)
– Secure against re-connection
– Verify that the system is dead
– Carry out earthing and short-circuiting
– Provide protection from adjacent live parts

All live parts must be de-energised before carrying out work on the gearbox.

WARNING

Risk of eye injuries from objects being ejected with force from the unit, as well as escaping sprays of pressurised fluids!

During operation, foreign objects such as sand and dust can land on the rotating parts and then be ejected forcefully by these parts.

Wear appropriate eye protection.

When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.

Wear appropriate protective clothing and eye protection.

For all work, always use suitable PPE. This includes hand protection (protective gloves), eye protection (safety goggles), head protection (hard hat), foot protection (safety boots) and hearing protection (ear muffs or ear plugs).

Only use PPE that complies with the safety requirements from the EU PPE Regulation 2016/425.

WARNING

Risk of burn injury from touching the gearbox!

This may cause serious burn injuries.

During operation and for a period of time after standstill, serious burn injuries can be caused by touching hot surfaces (>55 °C).

– Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)
– Let the gearbox cool down to a safe temperature before you touch it.
– Wear suitable protective gloves and protective clothing.

	WARNING **Risk of burn injuries from escaping hot working fluid!** **This may cause serious scald injuries.** During maintenance and repair work as well as oil changing work directly following operation – and for a period of time after standstill – there is a risk of serious injury from escaping hot working fluid (>55 °C). – Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.) Keep protection in place while temperatures are not safe. – Let the working fluid cool down to a safe temperature before performing any work. – Wear suitable protective gloves and protective clothing.

	WARNING **Risk of injury from direct contact!** **Contact with cold surfaces carries a risk of serious injury.** While the machine is at a standstill (if this has cooled down to the ambient temperature), potentially serious injuries can be caused by extreme cold (pain, numbness, frostbite) if cold surfaces (<0 °C) touch exposed skin. – Check the temperatures of the gear unit and/or gearbox surface before touching it/them. - Wear suitable protective gloves and protective clothing.

	CAUTION **Risk of injury from incorrect posture!** Incorrect or unhealthy bodily posture during assembly work can lead to ergonomic hazards in the form of disorders of the musculoskeletal system, fatigue and discomfort. – All persons tasked with the installation must be informed of the residual risks associated with assembly work. – Entrust all assembly work to qualified personnel, ideally with appropriate professional training.

[pekrun]

Safety

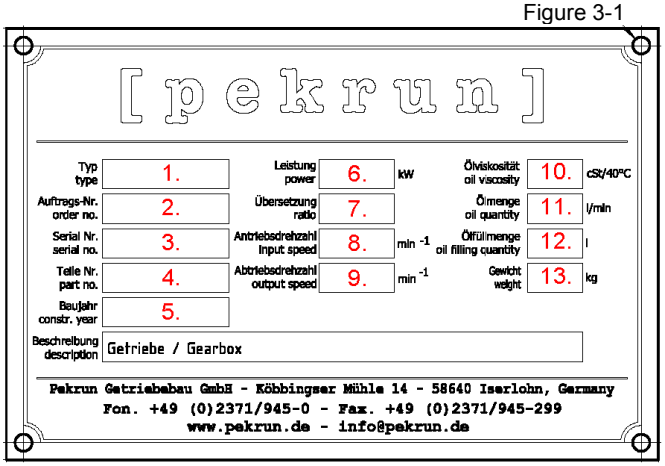
	TAKE CARE
	Risk of damage **Risk of damage from the ingress of moisture!** **Do not** clean the gearbox with a pressure washer: this can cause moisture to penetrate inside the gearbox, where it can cause serious damage.
	Risk of damage to gearbox by switching during operation! **Switch gearbox gears only when it is at a standstill.** **Also ensure that the gearbox is de-energised. The input and output sides must be able to rotate freely.** It must not be possible to actuate the switching cylinders unless the shafts are not rotating at all and there is no torque acting on the shafts. **An interlock must therefore be used.** If necessary, alter the position of the gear selectors using jog mode on the drive unit, so as to make it easier for the gear selectors to engage. The drive unit must not be released for normal operation until the gear has been fully engaged in its final position on the gearbox.
	Risk of damage from changes affecting the gearbox! The drive unit must be taken out of service immediately if you identify any changes to the gearbox during operation, such as an elevated operating temperature or changes in the noises made by the gearbox.
	Risk of damage from welding work! Do not carry out any welding work on the gearbox. Do not use the gearbox as a grounding point for welding work. This could damage gearing parts and bearings.

	NOTICE
	Replace any bolts/screws rendered unusable by assembly or dismantling work. Always replace with bolts/screws of the same design and strength class (screw lock, tightening torque, etc.).
	Help to protect the environment! – When changing the oil, collect used oil in appropriate containers – Clean up any oil spills immediately – Store corrosion inhibitors separately from used oil – Dispose of used oil, corrosion inhibitors, oil binders and cleaning rags soaked in oil according to the applicable local environmental regulations
	Follow signs affixed to the gearbox, such as the type plate, arrow indicating the direction of rotation, etc. These must be free from dirt and paint. Replace any missing signs.

3 Technical data

The technical data and the agreements specified in the contract between the ordering party and Pekrun set the limits within which the product is intended to be used. For the most important items of technical data, please see the type plate that is permanently affixed to each Pekrun gearbox.

Figure 3-1



1. Type: Serial/type designation is made up of the model no. and size

2. Order no.: Pekrun order number, e.g. 12345

3. Serial no.: Sequential serial number, e.g. 10000123

4. Part no.: Material/article number, e.g. PART-012345

5. Year of construction: Year of production

6. Power rating: Nominal power rating in kW

7. Gear ratio: i, e.g. 1: 2.345

8. Input speed: n_1 in rpm

9. Output speed: n_2 in rpm

10. Oil viscosity: ISO VG XXX in c/St/40 °C

11. Oil quantity: Oil quantity for recirculating lubrication in l/min.

12. Oil fill quantity: For gearbox with minimum oil fill level, e.g. for splash lubrication

13. Weight: Total weight in kg

	NOTICE
	For other technical specifications, please see the dimensional drawing and the technical data sheet, which is prepared according to the order. (See appendix.)
	Type plates or other information on the device must not be removed, made illegible or otherwise rendered unrecognisable. If this rule is not complied with, it will void all guarantees and manufacturer liability. Also observe all type plates on attachment parts.

4 Structure and function

4.1 Structure

These operating instructions apply for Pekrun gearboxes comprising cylindrical gearboxes, bevel gearboxes, planetary gearboxes, worm gearboxes or combinations of these types. The gearboxes may incorporate 2-stage or multi-stage designs.

For the gearbox structure and layout, consult the supplied dimensional or section drawing.

Torque transmission parts (excepting the input/output shafts) are completely enclosed by the housing. The shaft ends protruding from the housing are intended for connection to the overall machine.

TAKE CARE

Risk of damage

Risk of irreparable damage to the gearbox or parts from incorrect direction of rotation!

For the direction of rotation, see the direction of rotation arrow on the gearbox, or the enclosed and authoritative dimensional drawing or order-specific technical data sheet.

If no direction of rotation if specified in the supplied technical documents, then the gearbox can be operated in both directions.

4.1.1 Housing

The gearbox housing is made from either cast iron or structural steel (welded housing designs). The design is torsion-resistant.

To check gearing, inspection windows are provided in the form of inspection covers or inspection holes.

Where applicable, oil fill levels can be checked by an oil level window located on the side, or an oil sight glass, oil dipstick or oil level indicator.

Options for oil filling include drilled holes (e.g. for the aeration filter) as well as other holes or inspection covers.

An oil drain plug (flange connection or attached ball valve with oil supply system) is provided to drain oil for an oil change.

The housing is equipped with appropriately sized transportation lugs or transportation eyes.

For the exact design, please see the order-specific dimensional or section drawing.

4.1.2 Gearing and shafts

Depending on requirements and use case, different types of gearings or combinations of gearings are provided in the gearbox. These may consist of cylindrical and bevel gear pairs or planetary and worm gear pairs.

For the exact design, please see the order-specific dimensional or section drawing.

The gearwheels are joined to the shafts (also including hollow shafts) with parallel key connections, interference fits, etc.

Parts that transmit torque are manufactured from steel (as well as non-ferrous metals for

worm gear pairs). The exact materials used are specified as part of the engineering design in accordance with the intended use.

The high quality of the gearing as well as the worm gear pairs guarantees reliable running and minimises noise levels.

4.1.3 Shaft bearing

Gearbox shafts are typically mounted in anti-friction bearings. Depending on requirements and use case, the bearing arrangement can also use slide bearings or bearing bushes.

For the exact design, please see the order-specific dimensional or section drawing.

4.1.4 Lubrication

The type of lubrication (oil or grease lubrication, splash or pressure lubrication), oil viscosity and oil volume are all determined as part of the engineering design.

TAKE CARE

Risk of damage

Risk of damage to the gearbox if operated without lubrication!

Ensure that lubrication is performed regularly and correctly. Use appropriate lubricants. This approach achieves the highest levels of operational reliability for the gearbox and a long lifetime.

- Attach parts supplied separately or which were removed for transportation, such as pressure gauges, thermometers, piping, etc.
- **Always ensure the gearbox is filled with oil.**
  (Exception: for gearboxes lubricated with grease, check the fill level.)
- Proceed with commissioning as described in **section 8**.

Splash lubrication

If no particular kind of lubrication is described in the supplied technical documents, adequate lubrication of the gear pairs and bearings is ensured with the gearing and splash lubrication. This makes the gearboxes especially low-maintenance.

Pressure lubrication

Pressure lubrication using oil pumps is needed in the following cases:

a) Providing lubrication to gearing and bearings at high circumferential speeds
b) Cooling by an oil cooler
c) Roller bearing lubrication for higher speeds of larger bearings
d) Slide bearing lubrication
e) Special installation setups and for gearboxes where splash lubrication is not possible.

Pressure lubrication is provided as follows:

- By a flange-mounted oil pump directly to a gear shaft

or

- By a motor oil pump attached to the gearbox housing
- By a separate oil supply system
- By a centralised, customer oil supply system

The piping and connecting lines are laid onto/in the gearbox and fixed in place.

Monitoring of the lubrication system

Monitor the following operational states to ensure error-free operation of the oil circuit:

a) Oil pressure => Pressure gauge/pressure switch, etc.

b) Oil temperature => Dial-type thermometer/resistance thermometer, etc.

c) Oil flow rate => Flow indicator/flow sensor, etc.

TAKE CARE

Risk of damage

Risk of damage to the gearbox if operated without lubrication!

For gearboxes with an attached oil supply system, ensure that the instrumentation provided is properly functional before commissioning.

NOTICE

For operation and maintenance of the pump, filters and monitoring instruments, follow the operating instructions listed in the order-specific appendix as provided.

4.1.5 Sealing

Depending on requirements, rotary shaft seals or labyrinth seals (depending on the use case) on the extended shaft ends prevent oil from leaking out of the gears as well as impurities from entering the gearbox.

4.2 Functional description

Pekrun gearboxes consist of one or more gear pairs (either interlocking pairs or worm gear pairs) that are completely enclosed by the housing. The housing does not enclose the shaft ends on the input and output shafts. These shaft ends extend out the housing and are intended for connection to the overall machine.

The gear or worm wheels are used for the direct transmission of the smallest to the largest forces and speeds between parallel, skewed or intersecting shafts.

5 Inbound delivery, in-house transportation

5.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

NOTICE

Pay attention to the safety instructions in **section 2**: Safety

DANGER

Danger to life, risk of crush/shear injuries!

Risk of serious injury from suspended loads!

During transportation and loading/unloading of the gearbox, the gearbox may slip, fall or drop from a height onto personnel because loads have been lashed incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if users are trapped between obstacles and the load.

Comply with the following protective measures:

– Inform all personnel entrusted with the transportation and set-up of the gearbox about the existing residual risks, and especially about the selection of suitable load-handling equipment and proper load lashing.

– Avoid any endangerment to personnel:
  Take care to ensure that personnel do not become trapped between obstacles and the load. Keep to safety clearance distances. Wear PPE.
  Transport the gearbox slowly and carefully, and especially when in a raised position.

– Ensure the gearbox load is lashed safely and correctly:
  Do not exceed the load limits of the lifting gear
  Distribute the load evenly when using multiple slings for load lashing (take care: centre of gravity may be off-centre) Follow instructions about load distribution on the packaging or dimensional drawing.

– Always commission properly trained personnel with the transportation and loading/unloading of the gearbox:
  Keep the speed of travel as low as possible.
  Avoid rapid changes between moving and stopping the load, and the oscillations that this causes.

TAKE CARE

Risk of damage

Risk of damage to gearbox if incorrect lashing points are used!

Never use the shaft journals to lift the gearbox. Do not lift by the threads on the end face!

Do not use piping as a support during transportation.

All load lashing must use only the transportation lugs or eyes provided on the housing.

These are marked on the gearbox with the corresponding symbol.

5.2 Delivery

	TAKE CARE
	Risk of damage **Risk of damage to gearbox from corrosion!** Do not open the packaging at any time. This will reduce the durability of the gearbox anti-corrosion protection. If the packaging has been opened, please read **section 6** of these operating instructions. *Please contact Pekrun in case of doubt.*

The contents of the delivery are listed in the shipping documents. On receipt, check whether the consignment has been damaged in transit and ensure that it is complete.

Immediately report to us in writing any deviations from the shipping documents and/or damage in transit.

The gearbox is supplied assembled and ready for operation but without its oil filling. Additional equipment (e.g. piping, oil cooler, valves and fittings, and monitoring instruments) may be delivered packed separately.

5.3 In-house transportation

The gearbox must be transported so that injuries to personnel and damage to the gearbox are avoided.

Transportation of the gear unit depends on the local conditions at the place of use.

When transporting on pallets using a forklift truck, pay particular attention to the load-bearing capacity of the forklift truck. For safe transportation, ensure the load is balanced on the forks.

	NOTICE
	When transporting using a crane, always use the lashing points provided on the gearbox housing. These are marked on the gearbox with the corresponding symbol.
	The gearbox must be transported only with load-handling equipment and lifting gear according to EU directive 2006/42/EC**.**
	For the gearbox weight, refer to the technical data sheet in the appendix or the gearbox type plate. To ensure safe transportation, observe the centre of gravity (which may be off-centre) and gearbox dimensions. See the dimensional drawing in the appendix to these operating instructions.

[pekrun]

	NOTICE
	When lashing the load, ensure that the lifting gear has adequate load-bearing capacity. Do not exceed the load-bearing capacity of the lifting gear being used. If load lashing uses several ropes, only 2 of these should be assumed to be load-bearing. In the case of ropes, chains and lifting slings, do not exceed an angle of inclination of ß=60°.

Wrong –
The angle of inclination is >60°

Correct –
The angle of inclination is <60°

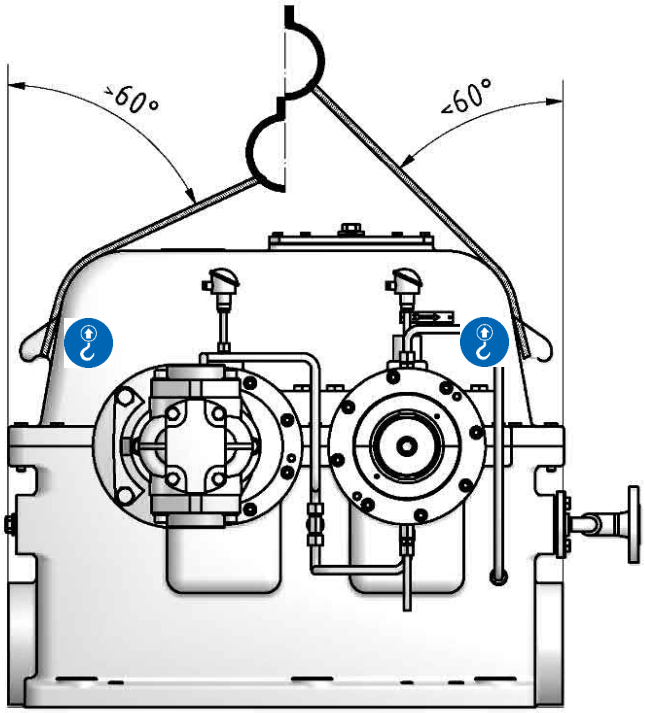


Figure 5-1

[pekrun]

Inbound delivery, in-house transportation

	TAKE CARE
!	**Risk of damage** **Risk of damage to gearbox from shocks/impact!** Avoid exposing the gearbox to shocks when setting it down. This could damage component parts or bearings.
	Risk of damage to attached piping and/or instruments! When transporting the gearbox, take care not to damage the attached instruments and piping.
	Environmental damage **The gearbox should not be transported when filled with oil.**

6 Storage conditions

6.1 Safety

DANGER

Danger to life from tipping/falling gearbox!

Risk of fatal injury from being struck or crushed by a tipping/falling gearbox! Risk of amputation injuries if persons become trapped between obstacles and the load.

Do not stack gearboxes on top of one another.

NOTICE

Pay attention to the safety instructions in **section 2**: Safety

6.2 Condition as delivered

Where possible, a test run is performed at our facilities before delivering the gearbox. This involves the use of running-in/corrosion protection oil.

The gearbox is supplied ready for operation:

Condition as delivered:

– Without oil filling (for safety reasons during transportation)

– Grease lubrication points are filled with grease (if applicable/check before commissioning)

– Shaft ends and hollow shaft holes are coated with anti-corrosion protection

– This outer coating is resistant to weak acids and alkalis, oils and solvents, and the effects of weathering. The coating is also resistant to seawater and tropical conditions, and thermally stable up to 120 °C (briefly up to 140 °C).

6.3 Gearbox storage

TAKE CARE

Risk of damage

Risk of damage to gearbox from vibration at storage location!

Do not expose the gearbox to vibrations during storage.

If this is not possible, all shafts should be occasionally (monthly) rotated in order to avoid marks due to shutdown. This procedure depends on the gearbox structure and the circumstances at the place of use.

For gearboxes with labyrinth seals on the exposed shaft exits, close the gap to the housing immediately so it is air-tight.

(Contact Pekrun for details.)

TAKE CARE

Risk of damage

Risk of damage to gearbox from corrosion!

Do not open the packaging at any time. This will reduce the durability of the gearbox anti-corrosion protection.

The corrosion protection applied must be maintained during storage. To avoid a risk of corrosion, this protective coat must not be damaged.

– Take care to ensure that the coating is not damaged. Damage to the coating leads to corrosion and causes the external protection to fail.

– The gearbox must remain sealed airtight during its storage period. This makes long periods of storage possible with internal anti-corrosion protection using a VCI concentrate without loss of this protection.

– During longer periods of temporary storage, check the internal/external anti-corrosion protection and refresh it as necessary. (See **section 6.4**, “Anti-corrosion protection”.)

Store the gearbox level on a dry, soft substructure (e.g. wood). Use a suitable cover to protect the gearbox.

Do not stack gearboxes on top of one another.

When storing outdoors, take particular care to cover the gearbox well. When doing this, make sure that it is not possible for damp or foreign materials to settle on the gearbox. *(Seek advice from Pekrun.)*

The temperature in the immediate vicinity of the gearbox must not drop below 0 °C and must not exceed 20 °C. Consult Pekrun if this temperature range cannot be maintained due to the environmental circumstances on site.

6.4 Anti-corrosion protection

Gearboxes require special *internal anti-corrosion protection* when stored for prolonged periods or for export, including intermediate storage. In extreme conditions, it is not sufficient to *only apply external anti-corrosion protection* to especially corrosion-sensitive, unpainted outer areas such as shaft stubs, flanges or similar parts.

As a rule, internal anti-corrosion protection is provided for the gearbox as a result of the running-in or corrosion protection oil applied during the test run. A VCI concentrate is added to this oil.

The corrosion protection is provided by the inhibitor’s vapour phase. This type of internal anti-corrosion protection offers the major advantage that, during the test run, oil can access and take effect in hard-to-reach cavities or otherwise inaccessible parts of the gearbox.

The high proportion of VCI concentrate in the remaining residual oil together with airtight packaging before shipping means that corrosion protection is ensured during normal freight conditions and typical haulage/storage periods. No cleaning/flushing is normally required before commissioning. (See also **section 6.4.1**.)

In special cases, where the main components are not completely enclosed by the housing – and therefore making airtight packaging inadvisable or impossible – a shorter period of storage applies (see **table 6-1**). If a longer period of storage is in fact required here, this must be specified in the delivery agreement and a solution found to the problem. (*Consult Pekrun for details*.)

CAUTION

The handling of corrosion inhibitors is subject to the provisions of the German Ordinance on Hazardous Substances, EU Regulation 1907/2006, and EU Directives 2010/75/EU and 89/656/EEC.

– Wear suitable PPE (safety goggles, protective gloves, respiratory protection) while working with anticorrosion agents.

– Have experienced specialists carry out anticorrosion application work.

– Clean up any oil spills that occur immediately (e.g. with oil binder).

NOTICE

If you have any questions about anticorrosion protection, contact us at the Customer Service address given in **section 1.6** of these operating instructions.

6.4.1 Internal anti-corrosion protection with VCI concentrate

WARNING

Risk of injury, environmental hazard

Risk of injury from escaping vapours

Highly flammable vapours can escape when opening a gearbox protected with a corrosion inhibitor (VCI).

– Keep hot objects, open flames, fire and sparks away from the gearbox.

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil!

Avoid incompatibilities with the lubricating oil used later on:

Use only mineral oils and oils based on PAOs or esters. This typically avoids any need for flushing before commissioning. (See **section 6.6**.)

When using a polyglycol-based gear oil (if approved):

The corrosion protection oil cannot be mixed with the lubricating oil!

– Drain off all of the corrosion protection oil.

– Flush the gearbox thoroughly with the lubricating oil to be used later. (See **section 6.6**.)

– Fill with the lubricating oil (see **section 8**)

(Contact Pekrun for details.)

[pekrun]

Storage conditions

A test run is performed at our facilities before delivering the gearbox.

Unless otherwise agreed, this involves the use of a running-in/corrosion protection oil

ISO VG 220 or ISO VG 320 with a VCI concentrate additive.

For details of the durability of this anti-corrosion protection and storage periods, see **section 6.5**.

To extend the durability of the internal anti-corrosion protection, proceed as follows:

- The oil remaining in the gearbox does not need to be drained.
- Check the gearbox temperature: it should be ≥5 °C.
- Working outside the gearbox, mix the VCI concentrate with gear oil (later lubricating oil) at the recommended ratio. (As specified by the manufacturer.)

	NOTICE
!	Follow the manufacturer's usage instructions (see current data sheet) For a Pekrun recommendation for the correct concentrate selection, see the lubricant table enclosed with these operating instructions. (See **section 8.4**.) Depending on the manufacturer, the VCI concentrate can (but does not have to) be used mixed with gear oil (ideally, the later lubricating oil). For the mixing ratio, please see the data sheet for the VCI concentrate. **You can use the gearbox dimensions (LxWxH) to achieve an approximation of the unit's available inner volume.**

- Clean the area around the oil filler neck, inspection cover, aeration filter and all other openings that will be used for filling.
- Ideally, you should open the gearbox at multiple places spread over the unit (e.g. at the oil filler neck, aeration filter, inspection cover).
- Check the interior of the gearbox for signs of moisture and corrosion. If signs of moisture can be identified, resolve the problem and ensure you discover the cause. Initial signs of corrosion must be removed before any corrosion inhibitor is re-applied. *(Consult Pekrun for details.)*
- Fill the VCI concentrate or the VCI concentrate/gear oil mixture at various points on the gearbox to achieve an even distribution throughout the interior.
- Close the oil filler neck and all other openings present and seal them off.
- Replace all aeration filters with screw plugs. (Store the original components safely for future use.)
- Seal off all air gaps (e.g. in labyrinth seals) with suitable materials (e.g. adhesive tape).

TAKE CARE

Risk of damage

Risk of damage to gearbox from corrosion!

Since corrosion protection is based on the agent in its vapour phase, it can only become fully effective when the gearbox is sealed airtight.

The period of time between opening the gearbox and then sealing it airtight again should not exceed 1 hour.

This has now extended the durability of the internal anti-corrosion protection in the gearbox.

This can be up to 24 months. (See **section 6.5**, “Storage periods”.)

This process can be repeated as often as required.

Before commissioning, the following points must also be observed:

- Install the aeration filters removed before adding the anti-corrosion protection at the required locations. (See cross-sectional/section drawing.)

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil!

Do not use the corrosion protection oil as a lubricating oil in the following circumstances:

– If the proportion of VCI concentrate in the oil is higher than 5%

– If pumps, filters or electronic equipment is/are being used

(Check first with the component manufacturer.)

– If polyglycol-based lubricating oils are being used

In this case, the gearbox must be flushed before commissioning. (See **section 6.6**.)

6.4.2 External anti-corrosion protection

If additional packaging work is not required or planned, apply external anti-corrosion protection to the gearbox as follows:

Unpainted external surfaces:

- Coat surfaces such as gearbox stub shafts, flange surfaces, shaft ends, etc. with a scuff-resistant wax coat, e.g. Tectyl 846, Tectyl 502 C or similar (for indoor storage, a soft film of corrosion inhibitor is sufficient).

If outdoor packaging is needed but was not planned or for longer storage periods, also complete the following steps:

- Also seal the gearbox from the outside (exposed shaft exits, oil ports, venting filters, and so on).

We also recommend the following precautions:

- Apply internal anti-corrosion protection with a VCI concentrate. (See **section 6.4.1**.)

6.5 Storage periods

6.5.1 Without additional packaging

Storage periods apply for outdoor storage and for roofed storage without additional packaging.

	NOTICE
!	**Measures to ensure safe storage:** **Gearbox interior not sealed so it is airtight:** During storage, gearbox vents and other openings/ports should always be covered to prevent the ingress of water into the gearbox interior due to weathering (rain, etc.). **Gearbox interior sealed so it is airtight:** – Seal off all openings on the gearbox. (This includes labyrinth seals at exposed shaft exits.) – Replace all air filters with threaded sealing plugs or tape these carefully to seal them. (The air filter must be put back into place before commissioning.)

Standard internal anti-corrosion protection with VCI concentrate

Table 6-1

Gearbox sealing	Time of anti-corrosion protection application	Storage period Indoors	Storage period Outdoors
Gearbox interior **not** sealed so it is **airtight**:	Delivery to commissioning:	4 months	2 months
Gearbox interior sealed so it is **airtight**:	Delivery to commissioning:	24 months	12 months
	Delivery to re-application:	20 months	8 months
	Re-application to re-application:	20 months	8 months
	Re-application to commissioning:	24 months	12 months

The storage period can be extended by the re-application of the VCI concentrate. (See **section 6.4.1**.)

6.5.2 With additional packaging

If storage periods longer than those given in the table are required, then the following kinds of measures should be taken:

- Seal off the gearbox with internal anti-corrosion protection at shaft grommets and other openings, so it is water vapour-tight.

NOTICE

Sealing off the gearbox is meant to imply that all shaft grommets and all other openings are sealed so they are tight against water vapour.

- Apply a sufficient quantity of desiccant (ideally with an indicator) outside the gearbox and then shrink-wrap the gearbox in a water vapour-tight film.

or

- Pack the gearbox with internal anti-corrosion protection as if for export (without desiccant).

TAKE CARE

Risk of damage

Risk of damage to gearbox from incorrect storage

If packaging is hermetically sealed, temperature fluctuations will cause condensation to form. This presents a risk of rust formation.

- Apply a desiccant inside the packaging space.

Desiccants should be used to keep the relative humidity as low as possible. Indicators or moisture sensors used with desiccants can provide information about climatic conditions/moisture levels inside the packaging.

For longer storage periods, suitable anti-corrosion protection and additional packaging is to be provided for unpainted parts as appropriate for the total storage period.

Risk of damage to gearbox from excessively long storage periods!

Long-term storage is also associated with other factors such as material deformation and similar kinds of outward changes. These can affect the total storage period possible. Appropriate measures should therefore be taken.

(Contact Pekrun for details.)

NOTICE

Anti-corrosion protection and packaging work goes hand in hand. Sealing work should therefore also be seen as part of packaging activities.

Consult with specialist firms or the Seaworthy Packaging Office in Hamburg (Germany), for example, about which additional packaging measures and packaging materials are suitable.

6.6 Flushing before commissioning

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil!

Do not use the corrosion protection oil as a lubricating oil in the following circumstances:

– If the proportion of VCI concentrate in the oil is higher than 5%

– If pumps, filters or electronic equipment is/are being used

(Check first with the manufacturer.)

– If polyglycol-based lubricating oils are being used

In this case, the gearbox must be flushed before commissioning.

The oil grade used for normal operation is used here. For the correct choice of oil, see **section 8.4** in these operating instructions.

Before commissioning (as described in **section 8**), the gearbox must be flushed with oil to remove residues of the corrosion inhibitor. These could cause the formation of oil foam.

Proceed as follows:

- Fill the gear oil (75–100% of the normal oil quantity) into the gearbox via the inspection cover openings or oil feed inlet points.
- Clean up any oil spills with an oil binder.
- a) For gearboxes with splash lubrication or a directly attached oil pump:

  Flush the gearbox by rotating the gearbox or operating it briefly

  Duration of flush procedure: 15…30 minutes

  b) For gearboxes with oil lubrication recirculated by an oil pump:

  Flush the gearbox by operating the oil pump

  Duration of flush procedure: 1 hour (approx.)
- Drain the oil carefully from the gearbox **as soon as possible after the flush procedure**.

NOTICE

Check to ensure complete drainage of the housing bottom part and all housing interiors, and the devices in the oil supply system (if present).

- For commissioning, fill in **fresh, new** oil of the same grade and the same brand that was used for flushing the gearbox.
- Continue by completing the commissioning steps in **section 8**.

[pekrun]

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil!

– Use only unused oils that are free from all impurities. Use a filling filter when filling. (Filter grade max. 25 µm.)

– Do not fill oil directly out of drums into the gearbox. Ensure that the proportion of water in the oil is not too high. This can lead to the oil foaming during operation.

Normal value for fresh oil: <250 ppm H_2O.

In case of doubt, check with oil manufacturer/Pekrun.

Risk of damage to gearbox from dirt in oil!

Always use oil that meets the purity class recommended by Pekrun as a minimum requirement. (See **section 8.4**.)

Do not re-use flushing oil as normal lubricating oil!

7 Set-up conditions

7.1 Safety

NOTICE
Pay attention to the safety instructions in **section 2**: Safety

7.2 Installation plan

NOTICE
During setup, take into account the enclosed order-specific dimensional drawing, and the piping and hydraulic diagrams or junction box layout (if present and/or applicable).

7.3 Total space requirements

Ensure that there is enough space around the gearbox for assembly, and for carrying out future maintenance and cleaning work.

Ensure that the oil can be drained and that there is an adequate supply of air.

Keep all inspection windows easily accessible, to enable the inspection of internal parts.

NOTICE
If connecting pipes for an oil supply system are part of the Pekrun scope of supply, consult the piping plan included in these operating instructions.

7.4 Dimensions and weights

NOTICE
For information about weights and other technical data, refer to **section 3** (or the order-specific **technical data sheet** as well as the enclosed **dimensional drawing**). (in the appendix)

7.5 Foundations and floor

Ensure that the set-up area is horizontal and level.

We recommend basing the maximum deviation of the flatness/evenness of the base plate (gearbox supporting surface) on tolerance class IT 7 (DIN EN ISO 286-1). The maximum deviation must not exceed 0.1 mm per 1 m.

When tightening the fixing screws, avoid placing any strain on the gearbox.

Complete the foundations so that no resonance vibrations can be generated. The machine

manufacturer or end customer is responsible for the stability of the foundations.

Ensure neighbouring foundations cannot transmit any shocks or vibrations.

If the gearbox is mounted on a steel structure, this structure must be torsion-resistant. The structure must be rated for the corresponding forces acting on the gearbox.

Tighten fixing screws and nuts using the prescribed amount of tightening torque. Use bolts with a minimum strength class of 8.8 or the specified strength class. The specifications for anchor bolts are the responsibility of the machine manufacturer.

7.6 Ambient conditions

When setting up the gearbox out of doors, protect it from the damaging effects of weathering.

Always maintain the ambient conditions as set out in the service spec and delivery agreement. Talk to us if these conditions change (including individual parameters such as setup height or ambient temperature). We will check and confirm that the supplied gearbox (or gear unit) can meet these conditions.

We offer no warranties for a gearbox that is operated in ambient conditions other than those explicitly specified.

7.7 Supply connections

The following supply connections must be provided:

(If applicable/included in the Pekrun scope of supply.)

- *For the lubricating oil supply*: supply lines to an external oil supply unit and connecting lines to the gearbox
- *For the gearbox cooling*: lines to the coolant supply system and connecting lines to the water/oil cooler
- *For the energy supply to the switching cylinders*: hydraulic supply lines to an external hydraulic unit and connections to the switching cylinders
- *For the energy supply to the electrical components*: provisioning of the energy supply parameters as specified in the service spec/delivery agreement and connections to the same.
- *For an oil supply system*: all supply lines and connections in accordance with the enclosed piping, junction box layout and hydraulic plan.

	NOTICE
	Observe the special operating instructions, plans, drawings and layouts for the various components and assemblies. These are enclosed in the appendix to these operating instructions (if included in scope of supply).

7.8 Safety precautions to be taken by the customer

DANGER

Danger to life, risk of crush/shear injuries!

Risk of serious injury from suspended loads!

During transportation and loading/unloading of the gearbox, the gearbox may slip, fall or drop from a height onto personnel because loads have been lashed incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if users are trapped between obstacles and the load.

Comply with the following protective measures:

– Inform all personnel entrusted with the transportation and setup of the gearbox about the existing residual risks, and especially about the selection of suitable load-handling equipment and proper load lashing.

– Avoid any endangerment to personnel:
Take care to ensure that personnel do not become trapped between obstacles and the load. Keep to safety clearance distances. Wear PPE.
Transport the gearbox slowly and carefully, and especially when in a raised position.

– Ensure the gearbox load is lashed safely and correctly:
Do not exceed the load limits of the lifting gear
Distribute the load evenly when using multiple slings for load lashing (take care: centre of gravity may be off-centre) Follow instructions about load distribution on the packaging or dimensional drawing.

– Always commission properly trained personnel with the transportation and loading/unloading of the gearbox:
Keep the speed of travel as low as possible.
Avoid rapid changes between moving and stopping the load, and the oscillations that this causes.

DANGER

Danger to life from rotating and/or moving parts

Risk of injury from being trapped and pulled in by rotating and/or moving parts!

– Secure all rotating drive parts such as couplings, gears/sprockets or belt drives so they cannot be touched.

– All external moving parts such as switching cylinders must be shielded so they cannot be touched.

– Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

	WARNING **Risk of burn injury from touching the gearbox!** **This may cause serious burn injuries.** During operation and for a period of time after standstill, serious burn injuries can be caused by touching hot surfaces (>55 °C). – Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.) – Let the gearbox cool down to a safe temperature before you touch it. – Wear suitable protective gloves and protective clothing.

7.9 Local requirements for the delivery

For transportation, provide a crane of adequate size with adequate load-handling equipment.

Have suitably-qualified personnel carry out the transportation work.

	NOTICE Follow the instructions given in **section 5**: Delivery, in-house transport.

8 Assembly and installation, initial commissioning

8.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

	NOTICE
	Pay attention to the safety instructions in **section 2**: Safety

	WARNING
	Risk of injury during assembly, installation and initial commissioning There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers). Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts during assembly work. Personnel may slip or fall as a result of leaking oil or existing spills of oil. – Clean up any oil spills or oil leaks with an oil binder. – Wear PPE. – Have assembly, installation and commissioning work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with assembly, installation and commissioning work about the existing residual risks (see **section 2**, “Safety”) **Keep to safety clearance distances!**

	WARNING
	Risk of injury, environmental hazard **Risk of injury from escaping vapours** Highly flammable vapours can escape when opening a gearbox protected with a corrosion inhibitor (VCI). – Keep hot objects, open flames, fire and sparks away from the gearbox.

⚠	**CAUTION** **Risk of injury from toxic vapours or fluids!** When filling oil, there is a risk of injury from breathing in and/or coming into contact with lubricants or other process media. When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants. When working on parts filled with oil, such as piping and the interior of the gearbox, skin can be exposed to contact with aggressive media. – Observe the safety data sheet for the media being used. Wear suitable personal protective equipment (safety goggles, protective gloves) for oil-changing work. – Have suitably-qualified personnel carry out the work. – Clean up any oil spills that occur immediately (e.g. with oil binder).

⚠	**CAUTION** **Risk of injury from hazardous vapours or fluids!** When removing external anti-corrosion protection, there is a risk of injury from breathing in and/or coming into contact with hazardous substances. The handling of solvents is subject to the provisions of the German Ordinance on Hazardous Substances, EU Regulation 1907/2006, and EU Directives 2010/75/EU and 89/656/EEC. – Wear suitable PPE (safety goggles, protective gloves, respiratory protection) while working with solvents. – Have suitably-qualified personnel carry out the work. – Clean up any oil spills that occur immediately (e.g. with oil binder).

8.2 Assembly and installation

NOTICE

At the start of assembly work, ensure enough load-handling equipment is available as well as lifting gear, etc. The load-bearing capacity of the load handling gear must at least match the weight of the gearbox.

For information about transportation, please refer to **section 5**.

Assembly must be carried out with the greatest of care and by skilled personnel.

1. Remove any packaging materials present (such as adhesive tape and protective caps) before installing the gearbox.
2. Remove the external anti-corrosion protection with a suitable solvent.

TAKE CARE

Risk of damage

Risk of damage to shaft ends when removing anti-corrosion protection!

Never remove the anti-corrosion protection by sanding it off.

Sanding off will irreparably damage the surface of the shaft ends, which can lead to connection problems in the overall machine.

3. After prolonged storage of the gearbox before commissioning, remove the inspection covers and seals by undoing the fixing screws, and store these in a safe place for subsequent re-use.
4. Perform a visual inspection of the internal parts for corrosion.

TAKE CARE

Risk of damage

If corrosion damage is present, contact Pekrun at the Customer Service address (see **section 1.6** in these operating instructions).

To avoid further damage, do not operate the gearbox.

5. Seal the inspection holes again with the available covers, seals and plugs. The seal surfaces must be clean and undamaged.
6. Remove the internal anti-corrosion protection (if present).

NOTICE

In general, internal anti-corrosion protection is provided by the use of a corrosion protection oil with VCI concentrate during the test run at our factory.

No cleaning/flushing is normally required before commissioning. (See **section 6.4.1**.)

Check whether the gearbox must be flushed before commissioning:
– Which corrosion inhibitor was used?
– Are residues of this corrosion inhibitor present inside the gearbox?
Also read and follow **section 6.6**.

In case of doubt, please contact Pekrun.
*(See **section 1.6** for Customer Service address.)*

8.2.1 Setting up the gearbox

NOTICE

Set up the gearbox on a foundation that is as level, safe and inelastic as possible.

We recommend basing the maximum deviation of the flatness/evenness of the base plate (gearbox supporting surface) on tolerance class IT 7 (DIN EN ISO 286-1). The maximum deviation must not exceed 0.1 mm per 1 m. This prevents deformation in the shaft train.

For secure mounting, ensure that bolts are only used if their number and size corresponds to the screw holes specified on the dimensional drawing.

Observe the set-up conditions as set out in **section 7**.

TAKE CARE

Risk of damage

Risk of damage from inaccurate levelling work!

Incorrect levelling can cause the following problems with the gearbox:

– Jamming of the bearings
– Inadequate tooth flank contact
– Reduced lifetime
– High levels of vibration

Ensure that all the shafts on the gearbox and the working machine are exactly flush with one another under operating conditions.

Even if elastic couplings are used, levelling and alignment is still necessary.

With rigid gearbox mounting, mounting flanges must conform to true running and axial runout accuracy according to DIN SPEC 42955.

Drive and output sides should be levelled to correct alignment problems, although transmission parts may be able to compensate to an extent.

Proceed as follows:

- Before setting up the gearbox, clean the seating surfaces on the gearbox and on the foundation.
- Use metal shims to compensate for any unevenness of the foundation, so as to ensure that warping of the housing is not possible in any circumstances.
- After levelling the gearbox, fit the pins specified on the dimensional drawing.
- If necessary, fit side stops to prevent the gearbox from shifting about.

8.2.2 Assembling couplings and other accessories

TAKE CARE

Risk of damage

Risk of damage to the gearbox from shocks and impacts!

Driving fixings on with heavy blows or impacts must be avoided: this would have the effect of damaging bearings, retaining rings, etc.

– When fitting couplings, washers, gearwheels, sprockets or similar, pull these on using the threaded centring at the shaft ends.

– In the case of other types of fixings, comply with procedures agreed during ordering, e.g. joining together by heating the coupling, for example.

Coupling:

Clean the shaft ends and coupling components carefully before starting assembly.

Secure couplings so they cannot shift about axially.

NOTICE

When assembling couplings, always follow the specific operating instructions from the manufacturer.

Gearbox with hollow shaft design:

For *gearboxes with hollow shafts*, conditions for joining are the same as for the installation of couplings.

Drive unit or drive motor alignment:

Align the *drive unit* as accurately as possible along the centre line of the input shaft of the gearbox and then secure in place. The lifetime of the shafts, bearings and couplings depends on the accuracy of alignment between the shafts.

	NOTICE
	The maximum values allowed during alignment for axial, radial and angular displacement depend on the coupling dimensions, coupling type and the speed. These are given in the coupling manufacturer's operating instructions.
	For motor assembly, always follow the specific operating instructions from the manufacturer.
	If permissible lateral forces are shown on the dimensional drawing, forces must remain within these permissible limits.

8.2.3 Installing piping

For gearboxes designed for use with an external oil supply system, any piping removed earlier must be attached using the enclosed piping plan.

Proceed as follows:

- Remove all the plugs and blind flanges. (if present)
- Check the inside of the piping for cleanliness. If necessary, clean this thoroughly before assembly.
- Fit the piping in accordance with the enclosed piping plan.
- When setting up the gearbox, the flange bolts must be tightened with the appropriate torque.
- Use rubber expansion joints to compensate for minimal alignment errors in oil lines.
- **Piping must not be subjected to tension during installation.**
- If necessary, support piping using appropriate pipe supports.

	TAKE CARE
	Risk of damage **Risk of damage from soiling present in piping.** Bearings and gearing can become damaged as a result of dirt in piping. Acid clean all piping thoroughly that was modified by welding work on the construction site. **Ensure that no dirt enters the gearbox when assembling the connection piping.**

8.2.4 Final checklist

Proceed as follows:

- After setting up the gearbox, check that all threaded connections are firmly seated.
- Ensure that the alignment has not been disturbed by tightening the fasteners.
- Use the device list and drawings to check that all instruments removed for transportation have been fitted again.
- Check to confirm the correct and safe installation of external supply lines (e.g. hydraulic lines to the switching cylinder/water supply lines to the cooler/connecting lines to an oil supply system) (as applicable). (To be provided by operator.)
- Check the installation of all monitoring equipment. (Interlocks – if present.)
- Check that machine guards are correctly fitted and firmly seated.

8.3 Initial commissioning

8.3.1 Measures before initial commissioning

	TAKE CARE
!	**Risk of damage to property/environment!** **Risk of damage from leaks of oil!** In the case of non-standard installation positions where the oil filler neck is above the inspection opening, the cover and plug can be sealed with a single sealant. In this case, however, do not remove the inspection cover until the oil level has sunk below the inspection opening – otherwise oil will leak out. **Each time the inspection cover is removed, it must be sealed with a new sealant**. (This is not necessary when seals or O-rings are used.)
!	**Risk of damage** **Risk of damage to gearbox from unsuitable lubricating oil!** For the oil viscosity, refer to the type plate or the enclosed dimensional drawing. A lubrication table is enclosed with these operating instructions, providing Pekrun's recommendations for the correct lubricant (see also **section 8.4**). – Only use lubricants of proven equivalence for the lubrication of the gearboxes. – Use only unused oils that are free from all impurities. – Do not fill oil directly out of drums into the gearbox. – Ensure that the proportion of water in the oil is not too high. This can lead to the oil foaming during operation. Normal value for fresh oil: <250 ppm H_2O. *In case of doubt, check with oil manufacturer/Pekrun*. **Risk of damage to gearbox from dirt in oil!** Always use oil that meets the purity class recommended by Pekrun as a minimum requirement. (See **section 8.4**.) Ensure that no dirt enters the gearbox when filling or when assembling the connection piping. Use a filling filter when filling. (Filter grade max. 25 µm.)
!	**Risk of damage** **Risk of damage to the gearbox from internal overpressure!** If the gearbox is operated without a aeration filter fitted, this can lead to damage on the shaft sealing rings. Ensure the aeration filter is fitted correctly during commissioning. Also follow the supplied dimensional drawing.

Proceed as follows:

1. Unscrew the oil drain plug or open the oil drain valve to drain residues of the running-in oil from the gearbox into a suitable vessel. Dispose of this used oil. (If applicable.)
2. Clean up any oil spills with an oil binder. Comply with applicable legal requirements regarding disposal.

For gearboxes with splash lubrication/integrated oil supply system:

3. a)

- Undo and remove the aeration filter or drain plug on the oil feed inlet or the inspection cover opening (as applicable).
- Lay the screws, cover and seals, etc. to one side in a safe place for re-use later.
- Fill the gearbox with oil in accordance with the specified viscosity either through the inspection opening or oil filling holes on the gearbox and on the piping. When doing so, follow the details provided on the order-specific dimensional drawing (if applicable

NOTICE

If oil dipstick fitted: The attached oil dipstick has 2 markings – the oil level must be between these at all times. Fill oil up to the upper marking.

If oil sight glass or sight glass fitted: Fill oil up to the middle of the sight glass.

Wait awhile when filling the oil:

the oil should have enough time to distribute itself evenly and the final oil level can then be read off.

Take time to ensure that oil is distributed evenly – especially in the case of multi-stage gearboxes having interconnected oil chambers – otherwise not enough oil will be filled.

TAKE CARE

Risk of damage

Risk of damage to oil pump by running dry

During initial commissioning as well as during re-commissioning following a prolonged standstill, damage to the equipment may be caused by dry running if the oil pump is above the oil level in the gearbox or lubricating oil is not being applied in sufficient quantities.

Fill the pump with lubricating oil. Monitor the oil pressure.

Also follow the supplied operating instructions for the oil pump.

Also fill all oil feed inlets in the piping. (if present)
(see dimensional drawing)

	TAKE CARE
!	**Risk of damage** **Risk of damage to gearbox from incorrect oil level!** The oil level (if applicable) must be checked via the oil level monitoring function. *If oil dipstick fitted:* The oil level should reach at least the lower marking on the dipstick or the oil sight glass. *If oil sight glass or sight glass fitted:* The oil level should be visible at least at the bottom edge of the oil sight glass. The oil quantity on the type plate, the dimensional drawing, the technical data or in other printed materials is offered as a **guide value**. **The quantity of oil to be filled is always determined only by the oil level marking on the oil sight glass or oil dipstick, or the oil overflow opening on the gearbox.** When using an auxiliary oil tank, use the oil sight glass or oil dipstick in the tank to gauge the oil quantity. Check the oil level from time to time when the gearbox is at a standstill and the oil has cooled down. **Never allow the oil level to fall below the lower marking on the oil dipstick or the bottom edge of the oil sight glass.**

Or

For gearboxes connected to an external oil supply system:

3. b)

- Undo and remove the blind flanges and seals and/or remove the blanking plugs attached for shipping from the gearbox piping connections.
- Fit the connection piping to the external oil supply system and, before commissioning, ensure that the existing external oil supply system to be used is fully functional, connected and operational. (if applicable)

4. Clean up any oil spills that are present with an oil binder.

8.3.2 Gearbox with attached backstop or flange-mounted oil pump

NOTICE

Observe the special operating instructions, plans, drawings and layouts for the various components and assemblies. These are enclosed with these operating instructions (if included in scope of supply).

For backstops and oil pumps connected in the installation space, lubrication is via the gearbox.

For backstops whose installation space is separate from the gearbox, fill oil to the middle of the oil sight glass before commissioning. Follow the manufacturer's specifications about lubrication.

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil or incorrect oil level!

The backstop is lubricated with oil according to manufacturer specifications.

Check the oil level from time to time when the gearbox is at a standstill and the oil has cooled down.

Never allow the level to fall below the lower marking.

TAKE CARE

Risk of damage

Risk of irreparable damage to the gearbox or parts from incorrect direction of rotation!

Only a single direction of rotation is possible for the backstop and flange-mounted oil pumps (except universal pumps) fixed to the gearbox. These can suffer irreparable damage if the direction of rotation is wrong.

When setting up the gearbox, check that directions of rotation match up before connecting up the motor and the backstop or oil pump.

For the direction of rotation, consult the technical data in **section 3**, the direction of rotation arrow on the gearbox or the enclosed (and authoritative) dimensional drawing.

If no direction of rotation if specified in the supplied technical documents, then the gearbox can be operated in both directions.

The direction of rotation arrow on the gearbox input shaft must match the direction of rotation of the motor.

8.3.3 Gearbox with cooling coil/water-oil cooler

NOTICE

Observe the special operating instructions, plans, drawings and layouts for the various components and assemblies. These are enclosed in the appendix to these operating instructions (if included in scope of supply).

NOTICE

For gearboxes with an integrated cooling coil and with oil coolers, the operator must prepare and provide the required water supply connections.

Ideally, you should use soft water; also check the specification for the respective order.

Water can flow through the cooling coils in either direction.

TAKE CARE

Risk of damage

Risk of breakage from overpressure!

Excessively high water pressure in the lines can cause damage to the water cooler.

Water overpressure must not exceed 10 bar (or as otherwise specified in the order documents).

Proceed as follows:

- Remove the connecting sleeves of the cooling coil prior to connecting the coil.
- Flush out possible impurities.
- Install a cooling water intake and drain line.

NOTICE

Refer to the enclosed dimensional drawing and the piping plan for the location of the connections.

- The shut-off valves for the coolant supply and drain must be opened fully for commissioning.

NOTICE

The direction of water flow for separately installed oil coolers must be matched to the information on the coolers.

TAKE CARE

Risk of damage

Risk of damage from frozen cooling water!

Cooling water must be drained if there is a risk of frost or in the event of a prolonged gearbox shutdown; residual water must be blown out with compressed air.

8.3.4 Gearboxes with ventilation using a cooling vane

Cooling vanes and a protective hood are fixed permanently to the gearbox. The protective hood prevents accidental contact with the cooling vane and also serves to guide the cooling air along the surface of the gearbox.

DANGER

Danger to life from rotating and/or moving parts

Risk of injury from being trapped and pulled in by rotating parts!

– Secure all rotating drive parts such as cooling vanes so they cannot be touched.

– Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

TAKE CARE

Risk of damage

Risk of damage to gearbox from overheating!

Care must be taken during operation that both the air intake openings and the outlet openings are always clear; cooling may otherwise be impaired.

8.3.5 Gearbox with oil heater

TAKE CARE

Risk of damage

Risk of damage to gearbox from lubricating oil that is too cold!

For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold (= oil cooling in the shutdown period to temperatures close to the pour point).

Accordingly, the gear oil and, if applicable, the oil in the auxiliary tank, must be heated to approx. +10 °C before commissioning.

Preferably, you should heat the oil with an electric heater.

Oil heater with electric heating element:

To keep the oil filling at a certain temperature, monitor the heating temperature as follows:

- Contact thermometer

  The heater is activated or deactivated by the “min. and max.” contacts via a relay.

or

- Resistance thermometer (Pt100)
- Thermostats
- Heaters with direct thermostatic control function

DANGER

Danger to life when operated in a potentially explosive atmosphere!

The standard version of the devices is not suitable for use in machines exposed to explosion hazards.

For use in a potentially explosive atmosphere, conversion work will be required – please talk to the manufacturer.

TAKE CARE

Risk of damage

Risk of damage to gearbox from overheating of the heater!

During operation, ensure that the heating element is covered completely with oil, since overheating may otherwise result.

Preferably, limit the max. temperature with a thermostat or resistance/contact thermometer:

Heater must shut down at >40 °C

NOTICE

All electrical devices are rated as at least IP54 according to DIN EN 60529:2000-09

	NOTICE
	The electrical wiring of the heater and temperature monitoring device must be completed according to the operating instructions for these instruments. These are enclosed in the appendix to these operating instructions (if included in scope of supply).

8.3.6 Gearbox with other add-on parts

Refer to the order-specific device list/data sheets for the technical data for the add-on parts.

	NOTICE
	Wire up the control and instrumentation devices according to the instructions as provided by the device suppliers. Please refer to the suppliers' enclosed operating instructions for the operation and maintenance of these components.

8.3.7 Gearbox with switching mechanism

DANGER

Danger to life from rotating and/or moving parts

Risk of injury from being trapped and pulled in by moving parts!

– All external moving parts such as switching cylinders must be shielded so they cannot be touched. Connecting lines must be routed safely and not placed inside the machine's danger zone or near rotating and/or moving components.

– Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

WARNING

Risk of eye injuries from escaping sprays of pressurised fluids!

When operating a gearbox with hydraulically operated switching mechanism, leaks can occur at connection points, resulting in oil being sprayed out into the air.

- Wear appropriate protective clothing and eye protection.

TAKE CARE

Risk of damage

Risk of damage to gearbox by switching during operation!

Switch gearbox gears only when it is at a standstill.

Also ensure that the gearbox is de-energised. The input and output sides must be able to rotate freely.

It must not be possible to actuate the switching cylinders unless the shafts are not rotating at all and there is no torque acting on the shafts.

An interlock must therefore be used.

Cylinder pressure must remain constant during the entire switching procedure until the target switching position is reached.

If necessary, alter the position of the gear selectors using jog mode on the drive unit, so as to make it easier for the gear selectors to engage.

The drive unit must not be released for normal operation until the gear has been fully engaged in its final position on the gearbox.

To ensure continuous trouble-free and reliable switching, complete the following measures before commissioning:

For all switchable Pekrun gearboxes:

- Ensure that an interlock is provided that stops the gearbox from starting up during the switching procedure.

For Pekrun gearboxes with manual switching:

Gearboxes with manual switching have a switching lever that is secured with a locking knob.

For a switching operation, proceed as follows:

– Release the locking knob

– Move the switching lever to the new position

– Slide the locking knob back into the hole provided until it locks into place

	TAKE CARE
	Risk of damage **Risk of damage to gearbox if excessive force is used during switching!** When the gearbox comes at a standstill, the teeth may be exactly opposite and no switching operation may be possible. Do not exert excessive force on the switching lever under any circumstances: this can cause damage both to the switching mechanism and to the gearing. Change the tooth positions by rotating the drive shaft by hand. This will make it easier to switch into the next gear.

For Pekrun manual gearboxes with switching cylinders:

- Fit the required hydraulic/pneumatic lines to the switching cylinders, and ensure that these lines are laid securely and safely. (Responsibility of the operator.)

End stop monitoring for the switching cylinders is generally provided by contactless limit switches. If included in the scope of supply, these are fitted to the gearbox by Pekrun.

- Connect the limit switches to the electrical supply and integrate them with the control system.

	NOTICE
	Wire up the control and instrumentation devices according to the instructions as provided by the device suppliers. Please refer to the suppliers' enclosed operating instructions for the operation and maintenance of these components.

8.3.8 Advice for the starting phase of drive motors for gearboxes

	NOTICE
	Always follow the specific operating instructions from the motor manufacturer.

Drive system using variable-speed motors:

	TAKE CARE
	Risk of damage **Risk of damage to gearbox from uneven start-up or resonances**! A sudden increase in speed can result in steps being lost within the gearbox. The speed control becomes involved in turn, with the result that entire frequency ranges can become critical (in terms of resonances). This can result in undesirable resonance effects from the system. Accordingly, highly accurate adjustment of parameters – e.g. in the frequency inverter – to the process is needed.

Simultaneous drive system using 2 motors:

	TAKE CARE
	Risk of damage **Risk of damage to gearbox from drive motors starting up asynchronously!** If a gearbox is being driven simultaneously by 2 or more motors, damage to the gearing can occur if the motors start up asynchronously. Take appropriate precautions to ensure that drive motor start-up is synchronised.

8.3.9 First run for gearboxes with grease lubrication

Gearboxes are provided with grease lubrication for special operating conditions. The gearboxes are filled with grease at the acceptance test bench and are also delivered in this condition.

Commissioning such a gearbox can take place as soon as the grease filling has been confirmed by checking the filling level check bolt.

In special cases, the unit may also be supplied without a grease filling. In this case, the operator must complete the grease filling before the first run.

The drive unit can be started directly once all measures in section 8.3.1 have been completed and complied with (as applicable).

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable grease!

The type of lubrication (oil or grease lubrication, splash or pressure lubrication), oil viscosity and oil volume are all determined early on at the design stage.

If the gearbox is being used for a different use case, some modifications may be needed – e.g. changes in grease quality.

Consult with the grease manufacturer or Pekrun if deviations from the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement) are seen during operation.

The grease lubrication is intended to last for the gearbox's lifetime.

Consult with the manufacturer before changing prior to this date

NOTICE

For important technical specifications, see the type plate, the dimensional drawing and the technical data sheet, which is prepared according to the order. (See appendix.)

8.3.10 First run for gearboxes with splash lubrication

The drive unit can be started directly once all steps in section 8.3.1 have been completed and complied with.

	TAKE CARE
!	**Risk of damage** **Risk of damage to gearbox from lubricating oil that is too cold!** **Do not start the drive unit if the gearbox oil is too cold.** For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold. The gear oil should normally have a minimum temperature of 10 °C (50 °F). **Accordingly, the gear oil and, if applicable, the oil in the auxiliary tank, must be heated to approx. 10 °C (50 °F) before commissioning.** For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

8.3.11 First run for gearboxes with pressure lubrication

This applies both for gearboxes with an attached motor oil pump and for gearboxes that are connected to an external oil supply system (provided by the end customer).

WARNING

Risk of eye injuries from pressurised fluids!

When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.

– Follow the assembly instructions provided in **section 8.2.3**.
– Wear appropriate protective clothing and eye protection.

NOTICE

For required operating parameters (minimum lubricant pressure, required oil flow rate), please see **section 3** of these operating instructions, the dimensional drawing or the order-specific technical data sheet (in the appendix).

TAKE CARE

Risk of damage

Risk of damage to gearbox from lubricating oil that is too cold!

Do not start the drive unit if the gearbox oil is too cold.

For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold.

The gear oil must have a minimum temperature of 10 °C (50 °F).

For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

Oil temperature ≥10 °C (50 °F)

Proceed as follows:

- Complete all steps from section 8.3.1 onwards.
- Apply lubricating oil to the gearbox via the oil inlet connections from the external oil supply system.

  or

  Start the motor oil pump. (Follow the operating instructions from the pump manufacturer in the appendix.)
- Check to confirm all necessary operating parameters are OK.
- After a warm-up time of at least 10 minutes, then start the drive motor.

TAKE CARE

Risk of damage

Risk of damage to gearbox from inadequate lubrication!

Do not start the drive unit until all specified operating parameters (lubricant pressure, oil feed quantity, oil temperature) are OK. This ensures an even supply of lubricant, especially during the start-up procedure.

The minimum lubricant pressure, P min, is 0.5 bar.

The pre-lubrication phase has the effect of safely supplying all the bearings and gearing with oil.

For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the operating parameters agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

NOTICE

For operation and maintenance of the pump, filters and monitoring instruments, follow the operating instructions listed in the order-specific appendix as provided.

8.3.12 First run for gearboxes with oil supply system

This applies to gearboxes with an oil supply system provided separately. If this oil supply system is also set up outdoors, this can expose it to extreme ambient temperatures.

WARNING

Risk of eye injuries from pressurised fluids!

When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.

– Follow the assembly instructions provided in **section 8.2.3**.

– Wear appropriate protective clothing and eye protection.

NOTICE

For required operating parameters (minimum lubricant pressure, required oil flow rate), please see **section 3** of these operating instructions, the dimensional drawing or the order-specific technical data sheet (in the appendix).

TAKE CARE

Risk of damage

Risk of damage to gearbox from lubricating oil that is too cold!

Do not start the drive unit if the gearbox oil is too cold.

For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold.

The gear oil must have a minimum temperature of 15 °C (59 °F).

For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

– Oil temperature <5 °C (41 °F)

TAKE CARE

Risk of damage

Risk of damage to pump from lubricating oil that is too cold!

Do not start the motor pump unit if the gear oil is too cold.

The gear oil must have a minimum temperature of 5 °C (41 °F).

At temperatures below 5 °C (<41 °F), ensure secondary heating equipment is in place before starting the oil pump: the pump cannot otherwise pump oil reliably in these temperature ranges and damage is therefore a possibility.

An interlock must be provided that makes it impossible to switch on the oil pump until a temperature greater than 5 °C (>41 °F) has been reached.

- Use secondary heating equipment (e.g. fan heaters) to ensure the uniform heating of the gearbox, parts used to feed oil and the oil reservoir tank (as needed).
- Check the oil temperatures at various places in the system.

Oil temperature ≥5 °C (41 °F) <15 °C (59 °F)

- Start the oil pump once the minimum temperature of ≥5 °C (≥41 °F) has been reached.
- Switch on the heater provided as described in section 8.3.5.

!	**NOTICE**
	Oil circulation ensures heating is uniform.

Oil temperature ≥15 °C (59 °F)

Proceed as follows:

- First start the oil pump and let it run for at least 30 minutes before you start the drive motor.
- Check to confirm all necessary operating parameters are OK.
- After this, you can start the drive unit.

!	**TAKE CARE**
	Risk of damage Risk of damage to gearbox from inadequate lubrication! Do not start the drive unit until all specified operating parameters (lubricant pressure, oil feed quantity, oil temperature) are OK. This ensures an even supply of lubricant, especially during the start-up procedure. **The minimum lubricant pressure, P min, is 0.5 bar.** The pre-lubrication phase has the effect of safely supplying all the bearings and gearing with oil. For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the operating parameters agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

8.3.13 Measures after the first run

TAKE CARE

Risk of damage

Risk of damage to the gearbox!

Shut down the gearbox immediately if the bearing temperature rises above the permitted limit value and you notice excessive vibrations or abnormal noises – this will avoid any damage to the gearbox.

During the first 12 h of operation under load, we recommend checking bearing temperatures once an hour. Bearing temperatures when idle should not exceed 75 °C and should not exceed 85 °C under load (or as otherwise specified in the service spec/delivery agreement).

In the start-up phase, the gearbox should ideally be run for 12 hours but **not** at full load. If this run produces no faults, the load can then be increased to full load. Continuous monitoring of the gearbox is required at all times.

Proceed as follows:

1. **During the first 6 hours: 50% of load**
2. **During next 6 to 12 hours: 75% of load**

After the first gearbox run of approx. 12 operating hours, perform some initial visual inspections:

- Check the oil level. (if applicable)
- Check the gearbox and the oil supply system (if present) for leak-tightness.
- Check all supply lines (hydraulics and water) and connections for leak-tightness.
- Check that the shaft seal is leak-tight.
- Check that rotating parts (shafts, couplings) do not come into contact with one another.
- Check that moving parts (e.g. switching cylinders) do not come into contact with one another.
- Check all machine guards to ensure they are functional.

3. **After 12 hours and after performing inspections: 100%, full load**

8.4 Recommended lubricants for Pekrun gearboxes

8.4.1 Area of application

The recommendations in this lubricant table apply only to Pekrun gearboxes in the type series as listed below:

Cylindrical gearboxes (except turbo gearboxes)

Bevel gearboxes (except mill gearboxes)

Worm gearboxes

Planetary gearboxes or combinations of these

8.4.2 Recommended lubricants

The lubricant selection table lists a number of different lubricants corresponding to the recommendations of the oil companies.

The recommended oils traverse the 12th load stage in the back-to-back test rig according to DIN ISO 14635-1 without jumping to severe wear.

The listed oils are inhibited mineral oils with additives to increase resistance to aging and corrosion protection, and to improve the mixed friction response in accordance with CLP identification according to DIN 51502.

For Pekrun gearboxes, always use only the oils that fulfil the abovementioned quality criteria.

NOTICE

Always comply with the specifications about oil group and oil viscosity on type plates, the dimensional drawing and the order-specific technical data sheet.

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil!

Always select oils based on the viscosity of the oil that is indicated on the gearbox type plate.

– Only use lubricants of proven equivalence for the lubrication of the gearboxes. Use only unused oils that are free from all impurities.

– Do not fill oil directly out of drums into the gearbox. Ensure that the proportion of water in the oil is not too high. This can lead to the oil foaming during operation.

Normal value for fresh oil: <250 ppm H_2O.

(In case of doubt, check with the lubricant manufacturer/supplier or Pekrun.)

If oils other than the abovementioned oils are to be used, always obtain written approval from Pekrun Getriebebau GmbH. We do not offer any guarantees for the suitability of specific oil grades selected.

	NOTICE
!	Always check with Pekrun if you forget to mention when ordering that ambient temperatures below 10 °C (50 °F) or above 50 °C (122 °F) can occur, or if there are extreme temperature variations or external heating of the gearbox can occur. In these cases, you must use oil with a different viscosity or use special measures like providing oil heating or oil cooling. If the conditions of use change at a later date, always obtain written approval from Pekrun for the use of the lubricant in question.

8.4.3 Lubricating oil purity class

We recommend purity classes of -/18/14 according to ISO 4406/1999 (equivalent to SAE-AS4059 purity class 9) for operating Pekrun gearboxes.

8.4.4 Lubricant table

The Pekrun lubricant table is provided to you along with these operating instructions.

	NOTICE
	The latest version of the Pekrun lubricant table can be requested at any time by writing to the Customer Service address given in **section 1.6**.

8.4.5 Important usage information for the lubricant table

	TAKE CARE
!	**Risk of damage** **Risk of damage to gearbox from unsuitable lubricating oil!** To ensure optimum reliability for lubrication, oils of the same type and viscosity should be used, but should not be mixed from different manufacturers. *Check first with the lubricant manufacturer/supplier.* The base oils used for the anti-friction bearing greases listed here are mineral oils. If polyglycol oils are used, then the grease must also be suitable for use with the polyglycol oil. **Polyglycol-based oils must not be mixed with hydrocarbon-based oils, i.e. with mineral oils or polyalphaolefins (PAOs).**

9 Operation

9.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

	NOTICE
	Pay attention to the safety instructions in **section 2**: Safety

9.2 Operating modes

- Idling

  For set-up and test runs.

- Production

  Operation for the product's intended use.

9.3 Special tools and operating materials

For *transportation*, you will need load-handling equipment, e.g. chains, ropes or lifting slings, which have a minimum load-bearing capacity that at least matches the weight of the gearbox. All load handling gear must comply with Machinery Directive 2006/42/EC.

For *assembly*, you will need standard hand tools such as ring spanners, torque spanners, etc. that match the sizes of the bolts that are used in the product.

For *levelling and measuring*, you will need straight edges, a spirit level, a dial gauge and a thickness gauge.

For *gearbox lubrication*, you will need a suitable oil that corresponds to the enclosed Pekrun lubricant table. Refer to the type plate on the gearbox for the oil quantity.

You will need foundation/anchor bolts matching the size of the anchor holes in the gearbox foot.

9.4 Commissioning

9.4.1 Commissioning after a planned shutdown

Gearbox with splash lubrication:

If the gearbox was shut down only temporarily **(<1 week)**, the drive unit can be started up again immediately.

Gearbox with oil supply system:

For a gearbox shut down only briefly **(<30 min)**, proceed as follows:

- First start the oil pump, to lubricate all bearings and gearwheels.
- You can start the drive unit after the pump has been running for **about 10 minutes**.

9.4.2 Commissioning after a planned shutdown

TAKE CARE

Risk of damage

Risk of gearbox damage from shutting down the oil supply system!

For **short stoppages**, keep the oil supply system running.

For **a longer shutdown**, also keep the oil supply system running for about 60 minutes at first. This avoids a heat build-up.

Risk of damage to gearbox from corrosion!

With **longer stoppages (>1 week to <6 months)**, run the gearbox for a short time once a week to ensure all internal components are wetted with oil. This keeps the gearbox protected from corrosion for a short time.

In the case of **decommissioning** for over **6 months**, provide the gearbox with anti-corrosion protection as described in **section 6, Storage conditions**.

Gearbox with splash lubrication:

After a planned shutdown **(>1 week to <6 months)** for the gearbox, proceed as follows:

– Run the gearbox for a short time once a week to ensure all internal components are wetted with oil.

– The drive unit can then be started again directly.

Gearbox with oil supply system:

After a planned shutdown **(>30 min to <6 months)** for the gearbox, proceed as follows:

- First start the oil pump, to lubricate all bearings and gearwheels.
- You can start the drive unit after the pump has been running for **about 10 minutes**.
- For a shutdown lasting **<6 months**, proceed as described in **section 9.6**.

9.4.3 Recommissioning after an Emergency Stop

TAKE CARE

Risk of damage

You must ensure that there is no damage to the gearbox, the oil supply system or any other attached components.

You must repair any damage before carrying out recommissioning.

Before recommissioning, check the following:

- Levelling/alignment of gearbox and motor (see **section 8**)
- Condition of the couplings
- Oil level
- Tightness of the piping
- Tightness of shaft seals
- Firm seating of all machine guards
- Also follow the instructions in **section 8** (initial commissioning)

9.4.4 Recommissioning after a prolonged standstill (storage)

After a prolonged shutdown (storage) of **more than 6 months**, proceed with recommissioning as follows:

- Carry out the checks described in **section 9.4.3**.
- Remove the coat of corrosion inhibitor as described in **section 8**.
- For recommissioning, proceed as described in **section 8** (initial commissioning).

	NOTICE
	Pay attention to the storage conditions as stated in **section 6**.

9.5 Inspection and maintenance

Performing regular inspection and maintenance on our Pekrun gearboxes ensures maximum operational reliability and safety.

Inspection and maintenance must be performed when the gearbox is at a standstill.

Proceed as follows:

- Keep a maintenance record or maintenance plan. This will help you to keep to the specified maintenance intervals.
- Have regular gearbox inspection and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with the inspection and maintenance of the gearbox about the existing residual risks (see **section 2**, **Safety**)

	NOTICE
	Keep to the inspection and maintenance plan given in **section 11**.

9.6 Decommissioning

To decommission the gearbox, proceed as follows:

- Switch off the drive unit.
- Have decommissioning work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with the decommissioning of the gearbox about the existing residual risks (see **section 2**: **Safety**)
- Close the cooling water intake for gearboxes with water/oil coolers or cooling coils. If there is a risk of frost, drain the water from the cooler or the cooling coil. (See **section 8.3.3**.)

TAKE CARE

Risk of damage

Risk of gearbox damage from shutting down the oil supply system!

For **short stoppages**, keep the oil supply system running.

For **a longer shutdown**, also keep the oil supply system running for about 60 minutes at first. This avoids a heat build-up.

With **longer stoppages (>1 week to <6 months)**, run the gearbox for a short time once a week to ensure all internal components are wetted with oil. This keeps the gearbox protected from corrosion for a short time.

In the case of **decommissioning** for over **6 months**, provide the gearbox with anti-corrosion protection as described in **section 6, Storage conditions**.

10 Troubleshooting

	NOTICE If you have any technical queries, please contact our factory: Our Customer Service address is given in **section 1.6** of these operating instructions.

10.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

	NOTICE Pay attention to the safety instructions in **section 2**, “**Safety**”

	WARNING **Risk of injury during troubleshooting!** There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers). Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts during troubleshooting. Personnel may slip or fall as a result of leaking oil or existing spills of oil. – Clean up any oil spills or oil leaks with an oil binder. – Wear PPE. – Have all troubleshooting work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with troubleshooting work about the existing residual risks (see **section 2**, “Safety”) **Take especial care with troubleshooting when the unit is running!** **Keep to safety clearance distances!** **Always take the gearbox out of service before attempting to resolve faults or problems!**

10.2 Fault identification

	NOTICE Also follow the instructions given in **section 11**, **Servicing**

Always report problems that occur during the warranty period to our service address immediately.

Pekrun provides no warranty whatsoever if the gearbox is not used for its intended purpose. This also applies to any modifications made to the gearbox not agreed with Pekrun in advance as well as to the use of non-original Pekrun spare parts.

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If faults occur and you cannot identify the cause, you are advised to contact our Customer Service at the service address.

Please note the following:

- Have all troubleshooting work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with troubleshooting work about the existing residual risks (see section 2: **Safety**)
- **Always take the gearbox out of service before attempting to resolve faults or problems!**
- Switch off the drive unit when working on the gearbox.
- Secure the drive unit so it cannot be accidentally started up again and post up a sign informing personnel of this on the start-up console.

10.3 Initial steps to take when troubleshooting

Table 10-1

Fault/error message	Possible cause(s)	Remedy
Change in gearbox noises	Damage to the gearing	- Contact Customer Service. => Check gearing. Replace damaged parts as necessary.
	Defective bearings	- Contact Customer Service. => Replace defective bearings
	Increased bearing play	- Contact Customer Service. => Adjust bearing play
Operating temperature too high	Oil level in gearbox too high	- Correct the oil level
	Cooler defective	- Check the cooler => Replace if necessary (check cooler operating instructions)
	Cooling water feed defective (cooling coils -> deposits/ sedimentation)	– Check cooling water supply => Clean the cooling coils and replace if necessary. Check cooler operating instructions.
	Cooling air feed defective or contaminated	– Check cooling air supply => Clean. Check cooler operating instructions.
	Line filter dirty	– Clean the line filter. Check filter operating instructions.
	Oil is very dirty	- Contact Customer Service. => Change oil
	Oil is too old	- Contact Customer Service. => Change oil
	Oil line leaking	=> Check oil-conducting lines. Seal if necessary. – Check oil pump

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Troubleshooting

Fault/error message	Possible cause(s)	Remedy
	Oil pump is defective	=> Check oil pump operating instructions. Repair or replace oil pump.
Increased temperature on the bearing point	Defective bearing Oil pump is defective Oil line leaking Oil is too old Oil level in gearbox is too high or too low	- Contact Customer Service. => Replace defective bearings – Check oil pump => Replace if necessary. Check oil pump operating instructions. - Contact Customer Service. => Check oil-conducting lines. Seal if necessary. => Change oil - Correct the oil level - Contact Customer Service.
Oil leaking from gearbox	Seal faulty on housing cover or housing component joints Radial shaft seals are defective	=> Seal the housing cover or housing component joints => Replace the shaft seals
Oil is foaming in the oil sump Water in the oil	Unsuitable oil or contaminated oil (water in oil) Oil cooler or cooling coil defective Incorrect installation conditions (e.g. high humidity)	- Contact Customer Service. => Have oil condition checked - Contact Customer Service. => Check the oil cooler or cooling coil for leaks. Repair the leak if necessary. Replace the cooler or cooling coil. Check cooler operating instructions. - Contact Customer Service.
Pressure monitoring triggers an alarm	Oil pressure has dropped below minimum lubricating pressure (standard: 0.5 bar)	- Check oil level at room temperature => Correct oil level as necessary – Check oil filter => Clean or replace as necessary - Contact Customer Service. – Check oil pump => Check oil pump operating instructions. Repair or replace oil pump.
Oil filter's contamination display triggers an alarm	Line filter is dirty	=> With switchable line filters, perform switchover according to the operating instructions => Replace the dirty filter cartridge
Switching operation makes noises or does not work	Torque is acting on the shafts.	- Check all shafts involved to see if torque is acting on the shafts;

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Troubleshooting

Fault/error message	Possible cause(s)	Remedy
		release loads on shafts as necessary.
	The shafts are still rotating.	– Check to confirm all shafts are not moving; force shafts to a standstill if necessary.
	Damage to gearing in switching gearwheels	– Contact Customer Service. – Check gearing => Replace damaged parts as necessary
	Monitoring instruments or end stops are faulty or incorrectly aligned	– Contact Customer Service. – Check end stops and also check installation. => Repair or replace end stops. Check end stop operating instructions.
	Switching cylinders do not work. Switching cylinders are faulty	– Check switching cylinder unit to confirm free to move/for any obstructing objects => Remove any obstacles to free movement if found. – Check the pressure being applied to the hydraulic/pneumatic cylinder. => If necessary, pressurise the lines or fix the leaks. – Check hydraulic/pneumatic lines for leaks. => Fix leak or replace lines. – Contact Customer Service. – Check the switching cylinders => Replace defective parts as necessary

11 Servicing and maintenance

	NOTICE
	If you have any technical queries, please contact our factory. Our Customer Service address is given in **section 1.6** of these operating instructions.

11.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

	NOTICE
	Pay attention to the safety instructions in **section 2**, “**Safety**”

	WARNING
	Risk of injury during servicing and maintenance There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers). Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts during troubleshooting. Personnel may slip or fall as a result of leaking oil or existing spills of oil. – Clean up any oil spills or oil leaks with an oil binder. – Wear PPE. – Have servicing and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with servicing and maintenance work about the existing residual risks (see **section 2**, “Safety”) **Take especial care with troubleshooting when the unit is running!** **Keep to safety clearance distances!** **Always take the gearbox out of service before attempting to resolve faults or problems!**

11.2 Maintenance record

Keep a maintenance record or maintenance plan. This will help you to keep to the specified maintenance intervals.

11.3 Control procedures and test jigs

Have regular gearbox inspection and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.

Regularly check all the operating data, e.g. the pressure, the temperature, the current consumption, the level of soiling on line filters and other visual checks. This helps to detect and eliminate faults at an early stage.

For preventive maintenance, it is advisable to use a machine diagnostics system that allows you to check machine states easily.

Using a vibration measurement system, you can generate a trend analysis by collecting measured data on a regular basis.

Other analysis tools let you determine and verify damage to bearings and gearing before a total failure of the system occurs.

Pekrun engineers can carry out vibration measurement and analysis.

If Pekrun engineers perform analysis, the results of comparable Pekrun gearboxes will also be included and taken into account.

11.4 Special tools and operating materials

Contact thermometer for measuring temperatures.

Endoscope for carrying out visual inspections of the inside of gearboxes.

Stethoscope for monitoring running noises in the gearbox.

Standard hand tools, e.g. open-ended spanners, ring spanners, Allen keys, etc.

11.5 Inspection and maintenance plan

NOTICE

The following details apply to operation with mineral oil.

Table 11-1

D = daily, W = weekly, M = monthly, A = annually, 1/2 = every six months

Work to be carried out	D	W	M	A
Check oil temperatures	X*	X*		
Check the gearbox for changes in noises		X		
Check the monitoring instruments on the gearbox and OSS			X	
Check the oil level			X	
Clean the oil filter as soon as the soiling indicator shows a warning			X	
Check that the gearbox is leak-proof			X	
Check that the piping is leak-proof			X	
Check that the oil supply system is leak-proof and functioning properly			X	
Check the condition of the air/oil cooler				X
Check the condition of the water/oil cooler				X
Check the water content of the oil				X
Check the machine guards				X
Clean the venting filter				1/2
Check fixing screws for firm seating				1/2
Check cooling coil for deposits	At same time as oil change			
Change oil filter	At same time as oil change			
Change oil	See table 11-2 + 11-3			
Re-apply grease lubrication to bearing points/seals	After 3000 operating hours or 6 months at the latest			
Full inspection of gearbox				X

* Depending on the use case, the oil temperature may also need checking daily.

11.6 Lubrication plan

11.6.1 Oil lubrication

Important information before changing oil:

⚠	**CAUTION** **Risk of injury from toxic vapours or fluids!** When changing oil, there is a risk of injury from breathing in and/or coming into contact with lubricants or other process media. – Observe the safety data sheet for the media being used. – Wear suitable personal protective equipment (safety goggles, protective gloves) for oil-changing work. – Have suitably-qualified personnel carry out the work. – Clean up any oil spills that occur immediately (e.g. with oil binder).

!	**TAKE CARE** **Risk of damage** **Risk of damage to gearbox from unsuitable lubricating oil!** Avoid incompatibilities with the lubricating oil used later on. To ensure optimum reliability for lubrication, oils of the same type and viscosity should be used, but should not be mixed from different manufacturers. Do not mix oils of different types or ones made by different manufacturers. In particular, do not mix synthetic oils with mineral oils or other synthetic oils. When switching from a mineral oil to a synthetic oil or vice versa, or when switching from synthetic oils with one base chemistry to synthetic oils with a different base chemistry: – Drain off the old lubricating oil completely. – Flush the gearbox thoroughly with the lubricating oil to be used later. (See **section 6.6**, “Flushing before commissioning”.) – Fill with the new lubricating oil (see **section 8**) *Check first with the lubricant manufacturer/supplier.*

When changing the oil, always try to use the grade that you used before.

When changing the oil, flush the housing and clean it thoroughly.

Before filling with fresh oil, completely remove any and all oil sludge, abraded matter and used oil residue.

In special operating conditions, e.g. ambient air that is very damp, has a high dust content or contains chemical vapours, it may be necessary to change the oil more often. In the same way, favourable operating conditions can extend the useful life of the oil. In special cases, consult the technical customer service of the oil company for advice.

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Oil change interval:

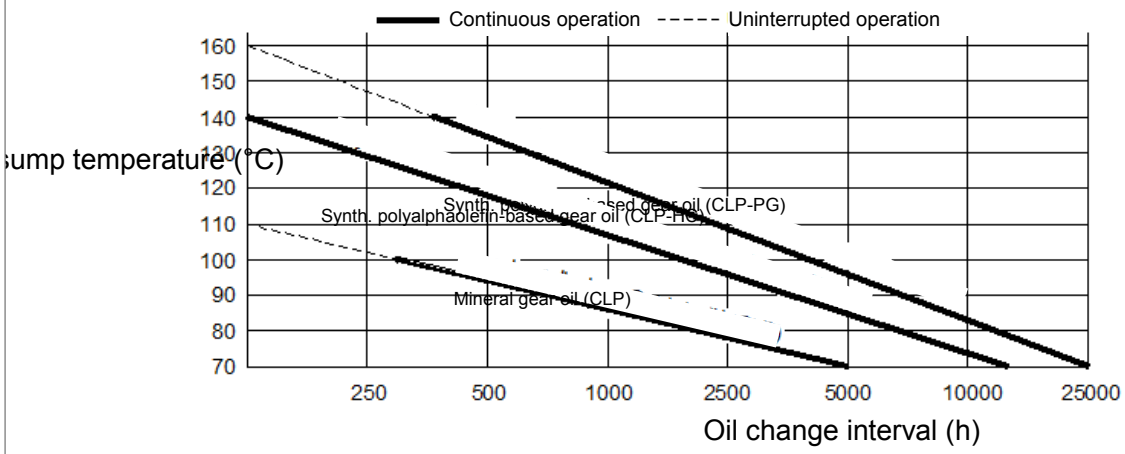
Reference values for oil change intervals can be found in table 11-2. These apply for normal operating conditions and for an oil sump temperature below 70 °C.

Table 11-2

		LUBRICANT TYPE			
		Mineral oil-based CLP	**Synthetic polyalphaolefin-based CLP - HC**	**Synthetic polyglycol-based CLP - PG**	**Grease**
1st oil change	**Worm gearboxes**	500 h	100 to 500 h	250 to 1000 h	
	Cylindrical gearbox Bevel gearbox	1000 h	2000 h	5000 h	
Next oil change	**Worm gearboxes**	3000 to 4000 h	5000 to 7500 h	8000 to 10000 h	5000 h
	Cylindrical gearbox Bevel gearbox	5000 h	12000 h	25000 h	8000 h
Regular intervals	**Worm gearboxes**	12 to 18 months	2 to 3 years	4 to 5 years	2 years
	Cylindrical gearbox Bevel gearbox				

At higher oil sump temperatures, oil change intervals can be determined by consulting diagram 11-3.

Diagram 11-3



Description of oil change work:

	WARNING **Risk of burn injuries from escaping hot working fluid!** **This may cause serious scald injuries.** During oil changing work directly following operation – and for a period of time after standstill – there is a risk of serious injury from escaping hot working fluid (>55 °C). – Have servicing work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with servicing work about the existing residual risks (see **section 2**, “Safety”). – When changing the oil, wear suitable PPE (protective gloves/goggles).

	NOTICE Drain the oil immediately after the system comes to a standstill, when the oil is still warm and has a low viscosity. Collect the used oil in suitable containers. Clean up any oil spills that occur immediately. Dispose of the drained used oil, oil binders and cleaning rags soaked in oil according to applicable local environmental regulations.

- When draining the oil, use a suitable collection container.
- Close the coolant supply to gearboxes with cooling coils or water/oil coolers.
- If you drain the oil through the oil drain hole, place a suitable container below it.
- While draining the oil, ensure that enough air can enter the housing via the aeration filter. If necessary, undo the screws on the aeration filter and remove.
- Use a suitable oil binder to mop up and dispose of any oil that escapes immediately.
- Screw the oil drain plug back in.
- Fill the gearbox with lubricant as described in **section 8.4**.

11.6.2 Grease lubrication:

Gearboxes are provided with grease lubrication for special operating conditions. The gearboxes are filled with grease at the acceptance test bench and are also delivered in this condition.

	NOTICE The grease lubrication is intended to last for the gearbox’s lifetime. Consult with the manufacturer before changing prior to this date.

NOTICE

For gearbox grease recommendations, refer to the lubricant table for Pekrun gearboxes (details given in **section 8.4**).

11.6.3 Grease lubrication of the bearings or seals:

On some gearboxes, grease lubrication is provided for the bearings or the seals of extended shaft ends. Such points are equipped with pressure grease nipples and filled with grease on delivery of the gearboxes.

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable grease!

Do not mix greases with different soap bases.

Check first with the lubricant manufacturer/supplier.

NOTICE

For reapplying or renewing the grease, use only compatible, branded anti-friction bearing greases. For details, see **section 8.4** and the lubricant table for Pekrun gearboxes.

Re-lubrication of the bearing points is required after each **3000 operating hours** or an interval of **6 months**, whichever is the greater.

NOTICE

Seals on extended shaft ends may need to be re-lubricated more frequently, depending on the operating conditions.

When renewing the entire grease filling for a bearing, proceed as follows:

- Wash out the bearing thoroughly with white spirits (or similar).
- Brush the hollow spaces of the anti-friction bearing evenly with grease.
- Also fill 1/3 of the bearing housing cavity with grease, to prevent excessive heating.

NOTICE

For shafts running at low speeds (n<60 rpm), we recommend filling the entire bearing housing space with grease.

11.7 Description of inspection and maintenance work

NOTICE

For the operation and maintenance of the components as listed below, also follow the operating instructions listed in the order-specific appendix as provided.

NOTICE

Replace any bolts/screws rendered unusable by assembly or dismantling work. Always replace with bolts/screws of the same design and strength class.

Please note the following:

- Have inspection and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with inspection and maintenance work about the existing residual risks (see section 2: **Safety**)
- **Always take the gearbox out of service before attempting any work.**
- Switch off the drive unit when working on the gearbox.
- Secure the drive unit so it cannot be accidentally started up again and post up a sign informing personnel of this on the start-up console.

11.7.1 Cleaning the fan and gearbox

Heavy soiling on the fan or gearbox surface significantly reduces the cooling effects otherwise obtained. Regular cleaning of the fans and gearbox is therefore required.

Caution: Take the gearbox out of service before starting cleaning work.

- Remove any dirt deposits from the fan rotor, fan hood and the protective grille with a hard brush (for example).
- Carry out cleaning in the same way for the surface of the gearbox housing using a hand brush (for example).

TAKE CARE

Risk of damage

Risk of damage from the ingress of moisture!

Do not clean the gearbox with a pressure washer: this can cause moisture to penetrate inside the gearbox, where it can cause serious damage.

TAKE CARE

Risk of damage

Risk of damage to gearbox from incorrect assembly!

When reinstalling the fan, ensure that the fan does not touch the fan hood.

11.7.2 Checking the cooling coil (if present)

Proceed as follows:

- Disconnect the cooling water intake and drain lines.
- Check the inner wall of the cooling coil for deposits/limescale.
- If soiled, clean the cooling coil with a suitable cleaning agent or replace the cooling coil with a new part.
- Then reconnect the cooling water intake and drain lines.

11.7.3 Checking the air/oil cooler (if present)

- Remove any dirt on the cooling assembly.
- Check the condition of the screw connections and replace them if necessary.

TAKE CARE

Risk of damage

Risk of damage to gearbox from incorrect assembly!

Ensure that air can circulate freely around the cooler. If necessary, remove any objects in the way.

11.7.4 Checking the water/oil cooler (if present)

- Check that the pipes carrying water are leak-proof.
- Check the condition of the screw connections and replace them if necessary.

11.7.5 Checking the line filter (if present)

- Check the soiling indicator.
- If necessary, clean the line filter using a suitable cleaning agent.

11.7.6 Check the fixing screws

- Use a torque spanner to check that all fixing screws are seated firmly.
- Check the bolts for tightening torque according to table 11-4.
- Unusable bolts must be replaced with new ones of the same strength class.

Table 11-4 Tightening torques for headless steel screws

TIGHTENING TABLE FOR HEADLESS SCREWS				
	TIGHTENING TORQUE M_a [Nm] @ μ=0.14			
	SIZE	8.8	10.9	12.9
COARSE-PITCH THREAD	M6	10	15	18
	M8	25	37	43
	M10	51	75	87
	M12	87	130	150
	M16	215	310	370
	M20	430	620	720
	M24	740	1060	1240
	M30	1500	2100	2500
	M36	2450	3450	4150
	M42	3950	5550	6650
	M48	5950	8400	10100
FINE-PITCH THREAD	M8x1	27	40	47
	M10x1.25	54	79	93
	M12x1.25	96	140	165
	M12x1.5	92	135	155
	M16x1.5	230	340	390
	M20x1.5	480	690	800
	M24x2	810	1160	1350
	M30x2	1670	2370	2780

The table values for Ma take into account:

- Friction value μtot. = 0.14
- Utilisation of minimum yield point = 90%
- The torsional torque when tightening to the fiction value of μtot. = 0.14 applies to nuts and bolts without coating and lightly oiled.

TAKE CARE

Risk of damage

Risk of damage to gearbox from incorrect assembly!

Additional lubrication of the thread considerably changes the coefficient of friction and results in unspecified tightening conditions.

11.7.7 Full inspection of gearbox

You should request a complete inspection of the gearbox from the Pekrun Customer Service department. Our engineers and supervisors are best placed for assessing whether gearbox components need to be replaced – and if so, which components.

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12 Dismantling and disposal

12.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

Always observe the safety regulations that apply in the country of use. Environmental regulations for disposal.

NOTICE

Pay attention to the safety instructions in **section 2**, **Safety**

WARNING

Risk of injury during dismantling work

There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers).

Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts.

Personnel may slip or fall as a result of leaking oil or existing spills of oil.

– Clean up any oil spills or oil leaks with an oil binder.

– Wear PPE.

Have dismantling and disposal work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.

– Inform all personnel entrusted with dismantling and disposal work about the existing residual risks (see **section 2**, “Safety”)

Keep to safety clearance distances!

CAUTION

Risk of injury from toxic vapours or fluids!

When draining and disposing of oil, there is a risk of injury from breathing in and/or coming into contact with lubricants or other process media.

When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.

When working on parts filled with oil, such as piping and the interior of the gearbox, skin can be exposed to contact with aggressive media.

– Observe the safety data sheet for the media being used.

Wear suitable personal protective equipment (safety goggles, protective gloves) for oil-changing work.

– Have suitably-qualified personnel carry out the work.

– Clean up any oil spills that occur immediately (e.g. with oil binder).

12.2 Dismantling

Description of dismantling work:

- Have dismantling work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with dismantling work about the existing residual risks (see **section 2**, **Safety**)
- Take the gearbox out of service first. Follow the instructions in **section 9**, **Decommissioning**.

  To take the gearbox out of service, switch the drive unit off.
- Switch off the power supply to the accessory units.
- Secure the drive unit so it cannot be accidentally started up again. Attach an informative sign to the start-up console.
- Next, drain the oil into a suitable container. To do this, follow the instructions in **section 11, Servicing**.
- Disconnect the drive shaft from the drive unit (e.g. motor). Follow the operating instructions from the plant manufacturer.
- Disconnect the output shaft(s) from the machine. Follow the operating instructions from the plant manufacturer.
- Dismantle and remove any piping that may be present. Use a suitable oil binder to mop up and dispose of any oil leaks in accordance with environmental protection regulations.
- Disconnect all connecting lines present.
- Unscrew and remove all fixing screws.
- Clean and degrease the gearbox before disposal.
- You can now remove the gearbox using suitable load-handling equipment. Follow the safety instructions and details about in-house transportation given in **section 5**.

12.3 Disposal

Description of disposal work:

If disposal is carried out correctly, the gearbox can be recycled.

Dispose of electronic components at a special facility in accordance with applicable regulations.

We recommend commissioning a local specialist firm with the disposal of used oil according to the environmental protection regulations in the country of use.

[pekrun]

13 Supplementary documents

13.1 Declaration of Incorporation

Content and structure of the Declaration of Incorporation:

EU Declaration of Incorporation

According to EC- directive 2006/42/EC on machinery (Annex II B)

Name and address of manufacturer:

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany

We hereby declare that the partly completed machinery described below

PRODUCT DENOMINATION:	GEARBOX
Model / Type:	ASR… / BSR… / CSR… / ALG... / AGZ… / *AG* / *CH* / *GV* / *HS* / *KR* / *KS* / *KZ* / *LG* / *MK* / *PG* / *PL* / *SH* / *SO* / *SV* / *VG* / *VH* / *VN* / SN*../ SNU*../ SNO*../ SNV*../ SNC*../ SNA*../ SNAF*../ SW*../SHS*../ SDA*../ SVA*../.SZA*../ ZVA*../ SEO*.. / K*../KN*../ KNV*../ KNA*../ KS*../ / KW*../KZV*../ VKZ*../ SKV*.. / SSN *../ SSNV*../ SSW*../ KSN
Machinery / Serial number:	1**** / 1000****
Year of manufacture:	20**

meets the following essential requirements of the Machinery Directive 006/42/EC - including the changes which applied at the time of the declaration.

Completely satisfied essential safety and health protection requirements:
1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.4, 1.4.2.1, 1.5.1, 1.5.13, 1.5.15, 1.5.2, 1.5.3, 1.5.4, 1.5.6, 1.5.7, 1.5.9, 1.6.1, 1.6.2, 1.7.1.1, 1.7.2, 1.7.3, 1.7.4

Partially satisfied essential safety and health protection requirements:
1.2.6, 1.3.2, 1.3.3, 1.3.7, 1.3.8.1, 1.3.9, 1.4.1, 1.5.5, 1.5.8, 1.6.3

The following legislation have been applied:
Machinery Directive 2006/42/EC

It is forbidden to put this product into service until the machine or system in which this product is to be installed or of which it represents a component corresponds to the provisions of all relevant complies with the legislation

The special technical documents have been compiled for the product according to Annex VII, part B; these documents can be forwarded to a national authority on the basis of a reasoned request.

The person authorised to compile the relevant technical documentation (must be established within EU):

location:	Iserlohn	Wuppertal
	Beate Schröder Köbbingser Mühle 14 58640 Iserlohn Germany	Annette Lindemann Köbbingser Mühle 14 58640 Iserlohn Germany

NOTICE

The original Declaration of Incorporation is supplied separately. You will receive this together with the delivery. This will (where possible) be affixed to the outside of the gearbox.

13.2 Drawings and order-specific documents

The documents supplied will vary according to the requirements and use case.
These specify the intended use and point out order-specific peculiarities.

The following documents belong to this operating instructions:

- Technical data sheet (prepared per order)
- Pekrun recommended lubricants table (RLT)
- Original Declaration of Incorporation

The following additional documents are supplied in individual cases:

- Dimensional or section drawing
- Spare parts list
- Documentation for components
  (Operating instructions / safety-relevant data sheets)

All supplied documents are part of these OI (see pt. 1.5.2)

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Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

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Getriebeöle auf Mineralölbasis

Gear oil based on mineral oils
Huile à engrenages minérale
Óleos para engrenagens à base de óleos minerais
Aceite de base mineral
Tandwielolie op basis van minerale olie
Редукторные масла на минеральной основе

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION		ADDINOL	Chevron
CLP 32	Degol BG 32	Alpha EP 32 Alpha VT 32 Optigear EP 32	Mobil DTE 24	RENOLIN ZAF B 32 HT	RENOLIN ZAF B 32 HT	–	Shell Tegula V 32	–	GST EP 32
CLP 46	–	Alpha SP 46 Optigear BM 46 Opligear EP 46	Mobil DTE 25	RENOLIN ZAF B 46 HT	RENOLIN ZAF B 46 HT	Klüberoil GEM 1-46 N	Shell Tellus S2 MA 46	–	GST EP 46
CLP 68	Degol BG 68	Alpha EP 68 Alpha SP 68 Optigear BM 68 Optigear EP 68	Mobilgear 600 XP 68	RENOLIN CLP 68 RENOLIN CLP 68 Plus	GEARMASTER CLP 68	Klüberoil GEM 1-68 N	Shell Omala S2 GX 68	Eco Gear 68 M	Meropa 68
CLP100	Degol BG 100	Alpha EP 100 Alpha SP 100 Optigear BM 100 Optigear EP 100	Mobilgear 600 XP 100	RENOLIN CLP 100 RENOLIN CLP 100 Plus	GEARMASTER CLP 100	Klüberoil GEM 1-100 N	Shell Omala S2 GX 100	Eco Gear 100 M Gear Oil 100 F	Meropa 100 Meropa XL 100 Meropa MG 100
CLP 150	Degol BG 150	Alpha EP 150 Alpha SP 150 Optigear BM 150 Optigear EP 150	Mobilgear 600 XP 150	RENOLIN CLP 150 RENOLIN CLP 150 Plus	GEARMASTER CLP 150	Klüberoil GEM 1-150 N	Shell Omala S2 GX 150	Eco Gear 150 M Gear Oil 150 F	Meropa 150 Meropa XL 150 Meropa MG 150
CLP 220	Degol BG 220	Alpha EP 220 Alpha SP 220 Optigear BM 220 Optigear EP 220	Mobilgear 600 XP 220	RENOLIN CLP 220 RENOLIN CLP 220 Plus RENOLIN CLP 220 VCI	GEARMASTER CLP 220	Klüberoil GEM 1-220 N	Shell Omala S2 GX 220	Eco Gear 220 M Gear Oil 220 F	Meropa 220 Meropa XL 220 Meropa MG 220
CLP 320	Degol BG 320	Alpha EP 320 Alpha SP 320 Optigear BM 320 Optigear EP 320	Mobilgear 600 XP 320	RENOLIN CLP 320 RENOLIN CLP 320 Plus RENOLIN CLP 320 VCI	GEARMASTER CLP 320	Klüberoil GEM 1-320 N	Shell Omala S2 GX 320	Eco Gear 320 M Gear Oil 320 F	Meropa 320 Meropa XL 320
CLP 460	–	Alpha EP 460 Alpha SP 460 Optigear BM 460 Optigear EP 460	Mobilgear 600 XP 460	RENOLIN CLP 460 RENOLIN CLP 460 Plus	GEARMASTER CLP 460	Klüberoil GEM 1-460 N	Shell Omala S2 GX 460	Eco Gear 460 M Gear Oil 460 F	Meropa 460 Meropa XL 460
CLP 680	–	Alpha EP 680 Alpha SP 680 Optigear BM 680	Mobilgear 600 XP 680	RENOLIN CLP 680 RENOLIN CLP 680 Plus	GEARMASTER CLP 680	Klüberoil GEM 1-680 N	Shell Omala S2 GX 680	Eco Gear 680 M Gear Oil 680 F	Meropa 680 Meropa XL 680
CLP 1000	–	Alpha SP 1000 Optigear BM 1000	–	–	–	Klüberoil GEM 1-1000 N	–	–	Meropa 1000

Beratung durch technischen Dienst / please consult technical service:

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Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

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Synthetisches Getriebeöl auf Polyalphaolefinbasis

Synthetic gear oil based on polyalphaolefines
Huile à engrenages sur base de Poly-Alph-Oléfine
Óleo sintético de engrenagens à base de polialfaolefin
Aceite sintético con base polialfaolefinica
Synthetische reductiekast olie op Polyalpha basis
Синтетические редукторные масла на основе полиальфаолефина

DIN 51502	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION		ADDINOL	Chevron
CLP HC 32	Alphasyn T 32 (CL HC)	Mobil SHC 624	RENOLIN Unisyn OL 32	RENOLIN Unisyn OL 32	Klübersynth GEM 4-32 N	–	Foodproof UNI 32 S	–
CLP HC 46	Alphasyn T 46 (CL HC)	Mobile SHC 625	RENOLIN Unisyn OL 46	RENOLIN Unisyn OL 46	Klübersynth GEM 4-46 N	–	Foodproof UNI 46 S	–
CLP HC 68	Alphasyn HTX 68 Optigear Synthetic PD 68 ES	Mobil SHC 626	RENOLIN Unisyn CLP 68	GEARMASTER SYN 68	Klübersynth GEM 4-68 N	–	Eco Gear 68 S-T	–
CLP HC 100	Alphasyn T 100 (HL HC) Optigear Synthetic PD 100 ES	Mobil SHC 627	RENOLIN Unisyn CLP 100	GEARMASTER SYN 100	Klübersynth GEM 4-100 N	–	Eco Gear 100 S	–
CLP HC 150	Alphasyn EP 150 Alphasyn HTX 150 Optigear Synthetic PD 150 ES	Mobil SHC 629 Mobil SHC Gear 150 Mobil SHC Elite 150	RENOLIN Unisyn CLP 150 RENOLIN UNISYN XT 150	GEARMASTER SYN 150	Klübersynth GEM 4-150 N	Shell Omala S4 GXV 150	Eco Gear 150 S	Meropa Synthetic EP 150
CLP HC 220	Alphasyn EP 220 Alphasyn HTX 220 Optigear Synthetic PD 220 ES	Mobil SHC 630 Mobil SHC Gear 220 Mobil SHC Elite 220	RENOLIN Unisyn CLP 220 RENOLIN UNISYN XT 220	GEARMASTER SYN 220	Klübersynth GEM 4-220 N	Shell Omala S4 GXV 220	Eco Gear 220 S	Meropa Synthetic EP 220
CLP HC 320	Alphasyn EP 320 Alphasyn HTX 320 Optigear Synthetic PD 320 ES	Mobil SHC 632 Mobil SHC Gear 320 Mobil SHC Elite 320	RENOLIN Unisyn CLP 320 RENOLIN UNISYN XT 320	GEARMASTER SYN 320	Klübersynth GEM 4-320 N	Shell Omala S4 GXV 320	Eco Gear 320 S	Meropa Synthetic EP 320 Meropa EliteSyn WL 320
CLP HC 460	Alphasyn EP 460 Alphasyn HTX 460 Optigear Synthetic PD 460 ES	Mobil SHC 634 Mobil SHC Gear 460	RENOLIN Unisyn CLP 460 RENOLIN UNISYN XT 460	GEARMASTER SYN 460	Klübersynth GEM 4-460 N	Shell Omala S4 GXV 460	Eco Gear 460 S	Meropa Synthetic EP 460
CLP HC 680	Alphasyn EP 680 Optigear Synthetic PD 680 ES	Mobil SHC 636 Mobil SHC Gear 680	RENOLIN Unisyn CLP 680 RENOLIN UNISYN XT 680	GEARMASTER SYN 680	Klübersynth GEM 4-680 N	–	Eco Gear 680 S	Meropa Synthetic EP 680 Meropa EliteSyn WL 680
CLP HC 1000	Alphasyn HTX 1000	Mobil SHC 639	RENOLIN UNISYN XT 1000	GEARMASTER SYN 1000	Klübersynth GEM 4-1000 N	–	–	–

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Biologisch abbaubare vollsynthetische Getriebeöle auf Esterbasis

Biological degradeable fully synthetic gear oils based on ester
Huiles à engrenages synthétiques biodégradables base ester
Óleos de engrenagens totalmente sintéticos e biodegradáveis à base de éster
Aceite de reductores, sintético biológicamente desintegrable, con base de Ester
Biologisch afbreekbare volsynthetische reductiekastolie op Ester basis
Биологически расщепляемые синтетические редукторные масла на основе эфира

DIN 51502	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	
CLP E 32	-	-	PLANTOHYD 32 S PLANTOSYN 32 HVI	ECO-HYD 32 S	-	
CLP E 46	-	-	PLANTOHYD 46 S PLANTOSYN 46 HVI	ECO-HYD 46 S	-	
CLP E 68	-	Mobil SHC Aware 68	PLANTOSYN 68 HVI	GEARMASTER ECO 68	Klüberbio EG 2-68	
CLP E 100	-	Mobil SHC Aware 100	PLANTOGEAR 100 HVI	GEARMASTER ECO 100	Klüberbio EG 2-100	
CLP E 150	-	Mobil SHC Aware 150	PLANTOGEAR 150 HVI	GEARMASTER ECO 150	Klüberbio EG 2-150	
CLP E 220	Performance Bio GE 220 ESS	-	PLANTOGEAR 220 S	GEARMASTER ECO 220	Klübersynth GEM 2-220	
CLP E 320	Performance Bio GE 320 ESS	-	PLANTOGEAR 320 S	GEARMASTER ECO 320	Klüberbio EG 2-320	
CLP E 460	-	-	PLANTOGEAR 460 S	GEARMASTER ECO 460	Klüberbio CA 2-460	
CLP E 680	-	-	PLANTOGEAR 680 S	GEARMASTER ECO 680	-	
CLP E 1000	-	-	-	-	-	

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Schmierstoffempfehlung für Pekrun Getriebe
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Synthetisches Getriebeöl auf Polyglykolbasis

Synthetic gear oil based on polyglycols
Huile à engrenages sur base de Poly-Glycolle
Óleo sintético de engrenagens à base de poliglicol
Aceite sintético con base poliglicol
Synthetische reductiekast olie op Polyglycol basis
Синтетические редукторные масла на основе полиальфаолефина

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	Shell	ADDINOL	Chevron
CLP PG 32	-	-	-	RENOLIN PG 32	GEARMASTER PGP 32	Klübersynth GH 6-32	–	–	-
CLP PG 46	–	-	-	RENOLIN PG 46	RENOLIN PG 46	Klübersynth GH 6-46	–	–	-
CLP PG 68	-	-	-	RENOLIN PG 68	GEARMASTER PGP 68	Klübersynth GH 6-80	–	–	-
CLP PG 100	-	Optigear Synthetic 800/100	-	RENOLIN PG 100	GEARMASTER PGP 100	Klübersynth GH 6-100	–	Poly Gear PG 100	-
CLP PG 150	Degol GS 150	Alphasyn PG 150 Optigear Synthetic 800/150	Mobil Glygoyle 150	RENOLIN PG 150	GEARMASTER PGP 150	Klübersynth GH 6-150	Shell Omala S4 WE 150	Poly Gear PG 150	Meropa Synlube WS 150 Meropa EliteSyn WS 150
CLP PG 220	Degol GS 220	Alphasyn GS 220 Alphasyn PG 220 Optigear Synthetic 800/220 Optigear Synthetic 1300/220	Mobil Glygoyle 220	RENOLIN PG 220	GEARMASTER PGP 220	Klübersynth GH 6-220	Shell Omala S4 WE 220	Poly Gear PG 220	Meropa Synlube WS 220 Meropa EliteSyn WS 220
CLP PG 320	Degol GS 320	Alphasyn GS 320 Alphasyn PG 320 Optigear Synthetic 800/320	Mobil Glygoyle 320	RENOLIN PG 320	GEARMASTER PGP 320	Klübersynth GH 6-320	Shell Omala S4 WE 320	Poly Gear PG 320	Meropa Synlube WS 320 Meropa EliteSyn WS 320
CLP PG 460	Degol GS 460	Alphasyn GS 460 Alphasyn PG 460 Optigear Synthetic 800/460 Optigear Synthetic 1300/460	Mobil Glygoyle 460	RENOLIN PG 460	GEARMASTER PGP 460	Klübersynth GH 6-460	Shell Omala S4 WE 460	Poly Gear PG 460	Meropa Synlube WS 460 Meropa EliteSyn WS 460
CLP PG 680	Degol GS 680	Alphasyn GS 680 Optigear Synthetic 800/680 Optigear Synthetic 1300/680	Mobil Glygoyle 680	RENOLIN PG 680	GEARMASTER PGP 680	Klübersynth GH 6-680	Shell Omala S4 WE 680	Poly Gear PG 680	Meropa Synlube WS 680 Meropa EliteSyn WS 680
CLP PG 1000	–	Optigear Synthetic 800/1000	Mobil Glygoyle 1000	RENOLIN PG 1000	GEARMASTER PGP 1000	Klübersynth GH 6-1000	–	–	–

Beratung durch technischen Dienst / please consult technical service:

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WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -
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Getriebeöle für die Nahrungsmittelindustrie

Gear oils for the food industry
Huiles à engrenages pour industrie alimentaire
Óleo de engrenagens para a indústria alimentar
Aceite de reductores para industria alimenticia
Reductiekastolie voor de levensmiddelen industrie
Редукторные масла для пищевой промышленности

DIN 51502	Castrol	Mobil	bremer & leguil	FUCHS LUBRITECH	KLÜBER LUBRICATION	ADDINOL
CLP E 32	CASSIDA FLUID GL 150	-	Rivolta F.L. 50	CASSIDA FLUID HFS 32	-	Foodproof UNI 32 S
CLP E 46	Optileb HY 46 (HLP HC 46)	-	Rivolta F.L. 75	CASSIDA FLUID HFS 46	-	Foodproof UNI 46 S
CLP E 68	Optileb HY 68 (HLP HC 68)	-	Rivolta F.L. 100	CASSIDA FLUID HFS 68	Klüberoil 4 UH1-68 N	Foodproof UNI 68 S
CLP E 100	Optileb GT 100	Mobil SHC Cibus 100	Rivolta F.L. 125	CASSIDA FLUID HFS 100	Klüberoil 4 UH1-100 N Klübersynth UH1 6-100	Foodproof UNI 100 S
CLP E 150	Optileb GT 150	Mobil SHC Cibus150 Mobil Glygoyle 150	Rivolta F.L. 170	CASSIDA FLUID GL 150	Klüberoil 4 UH1-150 N Klübersynth UH1 6-150	Foodproof UNI 150 S
CLP E 220	Optileb GT 220 (HC) Optileb GT 1800/220 (PG)	Mobil SHC Cibus 220 Mobil Glygoyle 220	Rivolta F.L. 250	CASSIDA FLUID GL 220	Klüberoil 4 UH1-220 N Klübersynth UH1 6-220	Foodproof UNI 220 S (HC), Foodproof CLP 220 WX (min)
CLP E 320	Optileb GT 320 (HC)	Mobil SHC Cibus 320 Mobil Glygoyle 320	Rivolta F.L. 400	CASSIDA FLUID GL 320	Klüberoil 4 UH1-320 N Klübersynth UH1 6-320	Foodproof UNI 320 S (HC), Foodproof CLP 320 WX (min)
CLP E 460	Optileb GT 460 (HC) Optileb GT 1800/460 (PG)	Mobil SHC Cibus 460 Mobil Glygoyle 460	Rivolta F.L. 500	CASSIDA FLUID GL 460	Klüberoil 4 UH1-460 N Klübersynth UH1 6-460	Foodproof UNI 460 S
CLP E 680	Optileb GT 680 (HC) Optileb GT 1800/680 (PG)	Mobil Glygoyle 680	CASSIDA FLUID GL 680	CASSIDA FLUID GL 680	Klüberoil 4 UH1-680 N Klübersynth UH1 6-680	Foodproof UNI 680 S
CLP E 1000	-	Mobil Glygoyle 1000	-	-	Klübersynth UH1 6-1000	Foodproof UNI 1000 S

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Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -
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Sonstige Schmierstoffe

Other lubricants
D'autres lubrifiants
Otros lubricantes

Outros lubrificantes
Andere smeermiddelen
Другие смазочные материалы

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION		ADDINOL	Chevron
Lithiumverseifte Wälzlagerfette Lithiumgrease; Lithium saponifiés huiles pour roulements; Grasa de base lítica para rodamientos, Wentellagervetten verzeept met lithium; Massas de sabão de lítio para rolamentos de esferas de rolos; Литий мыльная основа смазки для подшипников									
KPSK-20	Aralub HLP 2	Spheerol EPL 2 Tribol GR 100-2 PD Optileb GR UF 1 (H1, NLGI 1)	Mobilux EP 2	RENOLIT LZR 2	LAGERMEISTER LP 2	CENTOPLEX 2 EP	Shell Gadus S2 V220 2	EP Mehrbereichsfett LM 2 EP	Multifak EP 2
Öl für Rücklaufsperren Oils for return flow safety device; Huiles pour cliquets de retour; Aceite para antiretornos; Olie voor terugloop-blokkades; Óleo para bloqueios de retorno; Масла для предохранительного устройства обратный поток									
HLP 32	Vitam GF 32	Hyspin AWS 32 Hyspin ZZ 32 Optileb HY 32 (H1)	Mobil DTE 24	RENOLIN B 10 VG 32 RENOLIN ZAF B 32 HT RENOLIN ZAF D 32 HT RENOLIN MR 32 MC	RENOLIN B 10 VG 32 RENOLIN ZAF B 32 HT RENOLIN ZAF D 32 HT RENOLIN MR 32 MC	LAMORA HLP 32	Shell Tellus S2 MX 32 Shell Tellus S3 M 32	Hydrauliköl HLP 32	Rando HD 32 Clarity Hydraulic Oil AW 32 (ashless)
Fließfette für fettgeschmierte Getriebe Fluid grease for grease lubricated gear units; Graisses pour réducteurs graissés; Grasa fluída para reductores lubricados con grasa; Vloiebare vetten voor met vet gesmeerde tandwielkasten; Massas lubrificantes fluídas para engrenagens lubrificadas por massa lubrificante; Смазка Жидкость для консистентной смазкой редукторов									
GP00K-20	–	Spheerol EPL 00 Tribol GR 100-00 PD Optileb GR UF 00 (H1)	Mobil Chassis Grease LBZ	RENOLIT GFW 00	GEARMASTER LXG 00	MICROLUBE GB 00 Klübersynth BEM 44-4600	–	Fliessfett SGR 4-00-9 P	Multifak EP 00

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Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -
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Korrosionsschutzinhibitor (VCI- Konzentrat)

Anti-corrosion inhibitor (VCI- concentrate)
Inhibiteur de corrosion (concentré de VCI)
Inhibidor de la corrosión (concentrado de VCI)
Inibidor anti-corrosão (concentrado de VCI)
Anti-corrosie remmer (VCI- concentraat)
антикоррозийный ингибитор (концентрат VCI)

	Castrol	FUCHS	
	CORROSION INHIBITOR N 213	ANTICORID VCI UNI O 40	
!	Anwendung nach Pekrun- Vorschrift: Konservierung mit VCI- Konzentrat + Hersteller: Produkt Information Application according to Pekrun instruction : Preservation with VCI- concentrate + Manufacturer: Product Information Application: Selon la réglementation Pekrun: Conservation avec concentrado de VCI + Fabricant: Informations sur le produit Aplicación: Según normativa Pekrun: Conservación con concentrado de VCI + Fabricante: Información del producto Aplicação: De acordo com o regulamento Pekrun: Preservação com concentrado de VCI + Fabricante: Informações do produto Toepassing volgens Pekrun-regelgeving: conservering met VCI-concentraat + Fabrikant: Productinformatie Применение: Согласно правилам Pekrun: Консервация ингибитором с концентратом VCI + Производитель: Информация о продукте		

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[pekrun]

Anhang zur Schmierstofftabelle für Pekrun Getriebe
Annex to the List of lubricants for Pekrun gears

PEKRUN-SET Dokument-Nr.: OFF-036743– Rev.: -
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Mischbarkeit von Ölen / Miscibility of oils:

DE Öle auf Polyglykolbasis sind nicht mit Ölen auf Kohlenwasserstoffbasis - d.h. mit Mineralölen oder Polyalphaolefinen mischbar.

EN Oils based on polyglycols are not mixable with oils based on hydrocarbons, that means with mineral oils or polyalphaolefine oils!

FR Des huiles sur base de Poly-Glycolle ne peuvent pas être mèlangées avec des huiles sur base de carbone, c.-à-d. des huiles minérales ou des huiles sur base de Poly-Alpha-Oléfine.

ES Los aceites con base poliglicol no se mezclaran con aceites de base hidrocarburo, es decir aceites minerales o polialfaolefinicos

NI Olien op basis polyglycol kunnen niet worden vermengd met olien op basis van koolwaterstof - dat will zeggen met minerale olien of olien op basis van polyalfaolefine!

RU Масла на основе полигликоля нельзя смешивать с маслами на основе углерода - т.е. с минеральными маслами или полиальфаолефинами

PT Óleos à base de poliglicol não são misturáveis com óleos à base de hidrocarboneto, isto é, com óleos minerais ou com óleos à base de polialfaolefin.

Schmiersicherheit / Lubrication safety:

DE Um optimale Schmiersicherheit zu gewährleisten, sollen Öle gleicher Art und Viskosität jedoch von unterschiedlichen Herstellern nicht gemischt werden. Gegebenenfalls ist mit den Lieferanten Rücksprache zu halten.
Bei Grundölen der hier aufgeführten Wälzlagerfette handelt es sich um Mineralöle. Werden Polyglykolöle verwendet, muss auch das Fett auf das Polyglykolöl abgestimmt sein.

EN In order to guarantee an optimal performance, oils of the same kind and viscosity, but of different manufacturers should not be mixed. When necessary please consult the supplier.
The base oils of the mentioned rolling bearing greases are mineral oils. If polyglycol oils are used, the grease has to correspond with the polyglycol oil.

FR Pour garantir une securité de graissage optimale on ne doit pas mélanger les huiles de la même sorte et de la même viscosité, mais de fabricants différents. Le cas échéant il faut consulter le fournisseur.
Les huiles de base des graisses de roulement ici mentionnées sont des huiles minérales. Quand on emploie des huiles sur base de Poly-Glycolle, l'huile de base de la graisse doit être accordée à l'huile sur base de Poly-Glycolle.

ES Con el fin de garantizar una correcta lubricación, se utilizarán siempre aceites del mismo tipo y viscosidad, no mezclando nunca aceites de distintos fabricantes. En caso de duda, consultar con el proveedor.
La grasa pra rodamientos tiene un aceite de base mineral. Si se utiliza aceite poliglicol, la grasa deberá se compatible con el aceite.

NI Om opitmale smeerveiligheid te kunnen garanderen mogen oliën van het gelijke type en met een gelijke viscositeit, die echter van verschillende producenten stammen, niet worden gemengd. Zo nodig dient contact op te worden genomen met de leverancier.
Bij de basisoliën van de hier genoemde wentellagervetten gaat het om minerale oliën. Wanneer oliën op basis van poliglycol worden gebruikt, moet ook het vet zijn afgestemd op olie op basis van poliglycol.

RU Для обеспечения оптимальной надежности смазки следует не мешать масла одного и того же типа и вязкости разных производителей. При необходимости, следует проконсультироваться с поставщиками. Масляными основами приведенных здесь смазок для подшипников качения являются минеральные масла.
Если будут использоваться масла на полигликольной основе, то необходимо будет подобрать консистентную смазку, подходящую к таким маслам.

PT De modo a garantir a maior segurança de lubrificação, os óleos do mesmo tipo e viscosidade mas de fabricantes diferentes não devem ser misturados. Eventualmente deverá consultar o fornecedor. Os óleos base para as massas dos rolamentos de esferas de rolos aqui mencionados são óleos minerais. Se forem utilizados óleos à base de poliglicol, a massa lubrificante deverá ser igualmente compatível com o óleo à base de poliglicol.

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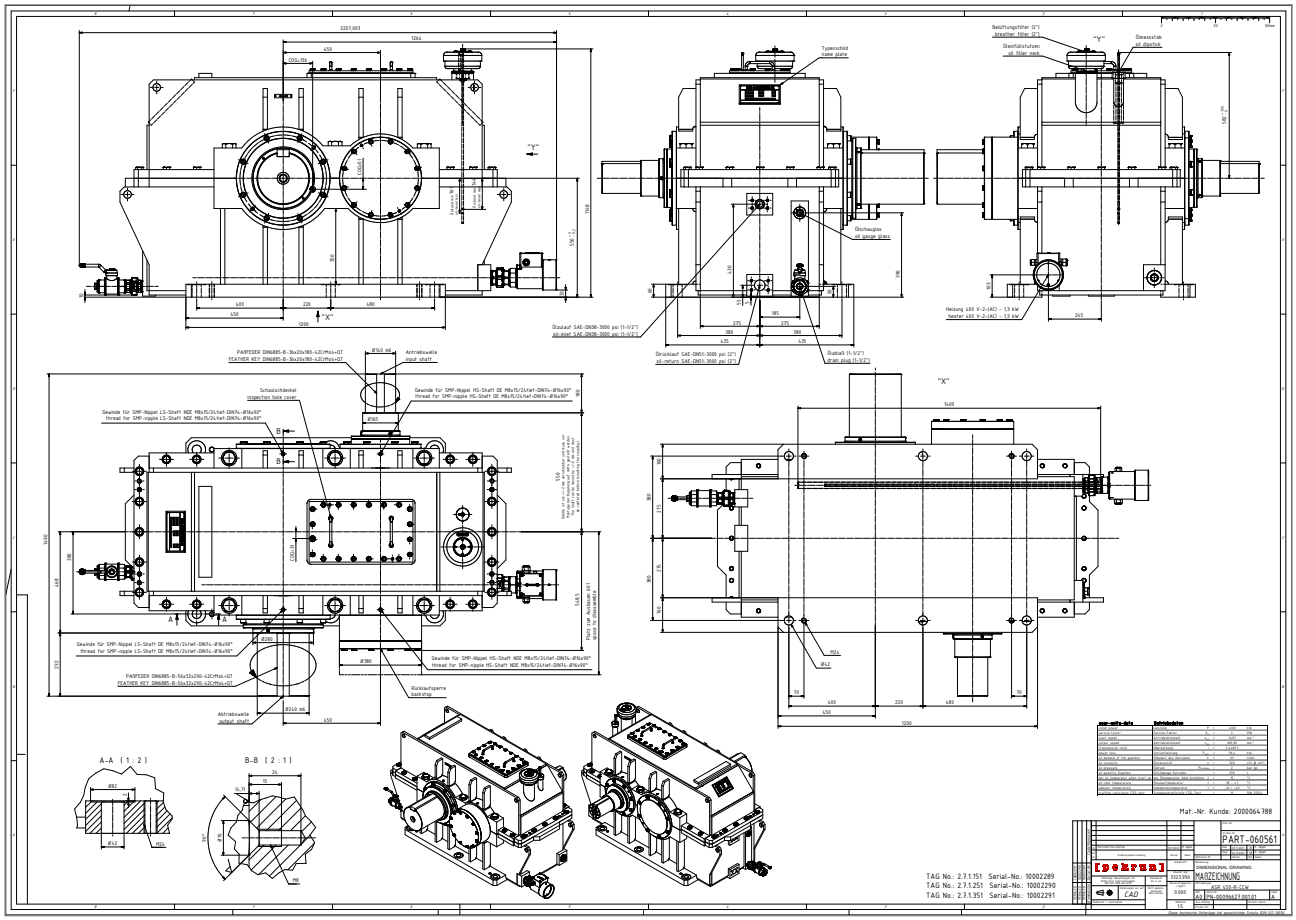
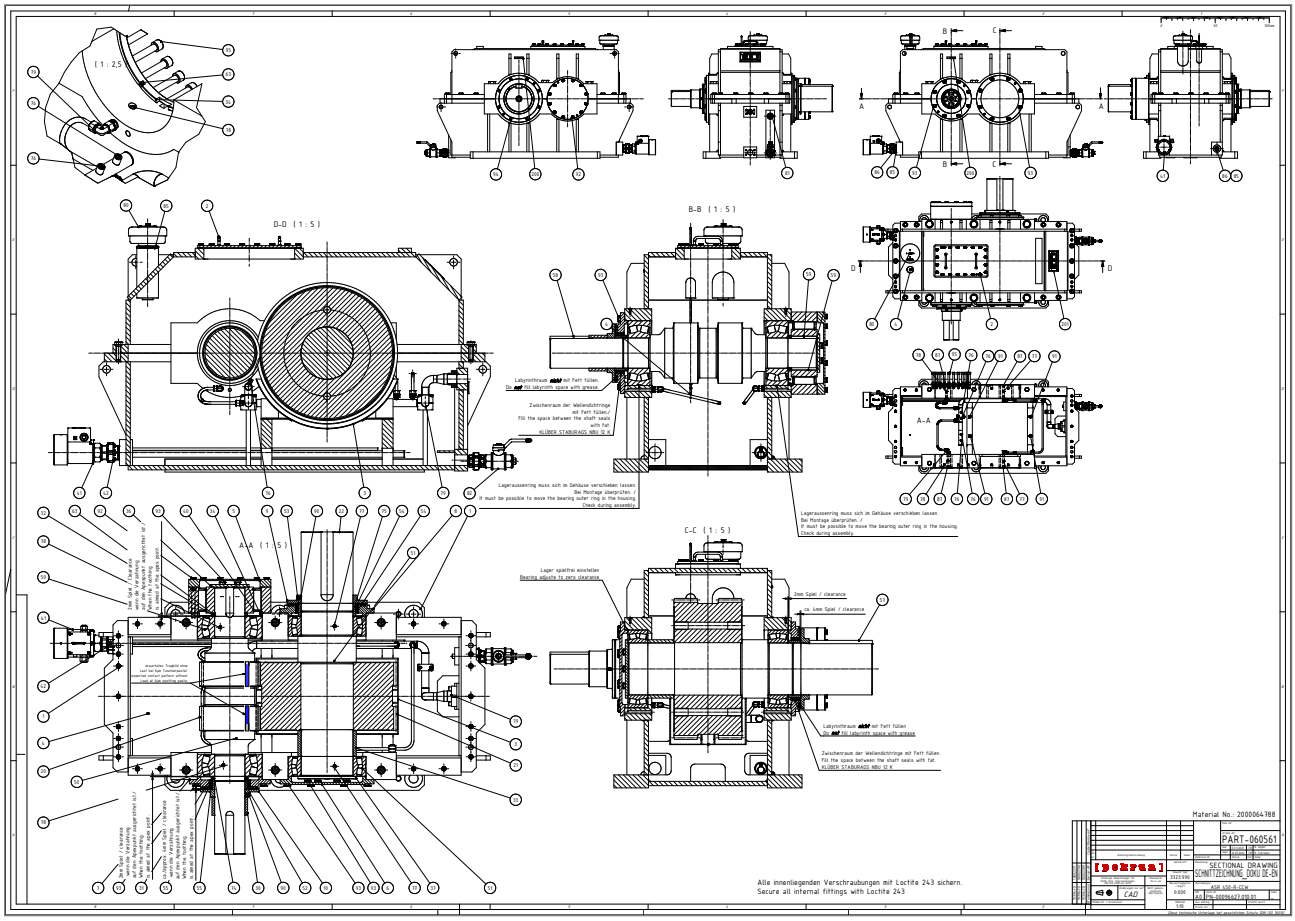

Typenschild
name plate
Belüftungsfilter (2")
breather filter (2")
Ölmeßstab
oil dipstick
Ölschauglas
oil gauge glass
Ölzulauf SAE-DN38-3000 psi (1-1/2")
oil-inlet SAE-DN38-3000 psi (1-1/2")
Ölrücklauf SAE-DN51-3000 psi (2")
oil-return SAE-DN51-3000 psi (2")
Ölablaß (1-1/2")
drain plug (1-1/2")
Heizung 400 V-2-(AC) - 13 kW
heater 400 V-2-(AC) - 13 kW
FAIRFEDER DIN6885-B-36x20x180-42CrMo4+QT
FEATHER KEY DIN6885-B-36x20x180-42CrMo4+QT
Antriebswelle
input shaft
Schauloschdeckel
inspection hole cover
Gewinde für SMP-Nippel LS-Shaft NDE M8x15/24tief-DIN74-Ø16x90°
thread for SMP-nipple LS-Shaft NDE M8x15/24tief-DIN74-Ø16x90°
Gewinde für SMP-Nippel HS-Shaft DE M8x15/24tief-DIN74-Ø16x90°
thread for SMP-nipple HS-Shaft DE M8x15/24tief-DIN74-Ø16x90°
Gewinde für SMP-Nippel LS-Shaft DE M8x15/24tief-DIN74-Ø16x90°
thread for SMP-nipple LS-Shaft DE M8x15/24tief-DIN74-Ø16x90°
Gewinde für SMP-Nippel HS-Shaft NDE M8x15/24tief-DIN74-Ø16x90°
thread for SMP-nipple HS-Shaft NDE M8x15/24tief-DIN74-Ø16x90°
FAIRFEDER DIN6885-B-56x32x290-42CrMo4+QT
FEATHER KEY DIN6885-B-56x32x290-42CrMo4+QT
Rücklaufsperre
backstop
Abtriebswelle
output shaft
Platz zum Ausbauen (4x)
space to disassemble (4x)
A-A (1 : 2)
B-B (2 : 1)
TAG No.: 2.7.1.151 Serial-No.: 10002289
TAG No.: 2.7.1.251 Serial-No.: 10002290
TAG No.: 2.7.1.351 Serial-No.: 10002291
Mat.-Nr. Kunde: 2000064788
PART-060561
MAERZEICHNUNG
AGB 450-B-CEK
CAD


1 : 2,5
D-D (1 : 5)
B-B (1 : 5)
A-A
C-C (1 : 5)
Lagerausserring muss sich im Gehäuse verschieben lassen
Bei Montage überprüfen. /
It must be possible to move the bearing outer ring in the housing.
Check during assembly.
Lager spielfrei einstellen
Bearing adjuste to zero clearance
Material No.: 200006488
PART-060561
SECTIONAL DRAWING
SCHNITTZEICHNUNG DOKU DE-EN
Alle innenliegenden Verschraubungen mit Loctite 243 sichern.
Secure all internal fittings with Loctite 243

[pekrun]	Commission:	2.0.19396-10.1	partlist-no.:	PART-060561	GEARBOX ASR 450-R-CCW		page	1
	Gearbox Type:	ASR 450 -R-CCW	dimension drawing-	PN-00096627.001.01				
	Ratio:	2,4348:1	sectional drawing-no.:	PN-00096627.010.01 -		translated (Name/Date)	of:	4
	Name/Date:	Appel/03.11.2021				A B.Schröder/19.05.2022		

Pos.	Qty.		Designation Specification	Article no. Document no.
1	1		HOUSING	PART-057677
				PN-00077526.005.01 -
2	1		INSPECTION COVER WITH HANDLE	PART-054719
				PN-00074215.005.01 -
3	1		OIL PAN	PART-057714
				PN-00077605.000.01 -
4	1		OIL DIPSTICK COMPLETE	PART-057347
				PN-00076785.005.01 -
5	1		COVER 290	PART-057243
				PN-00076539.000.01 -
6	1		COVER 360	PART-057228
				PN-00076520.000.01 -
7	1		LABYRINTH COVER 300	PART-057239
				PN-00076533.000.01 -
8	1		LABYRINTH COVER 360	PART-057234
				PN-00076524.000.01 -
9	1		LABYRINTH RING	PART-057235
				PN-00076526.000.01 -
10	1		LABYRINTH RING	PART-057238
				PN-00076532.000.01 -
20	1		PINION SHAFT 29	PART-057680
				PN-00077528.000.01 -
				PN-00077529.009.01 -
21	1		SPUR GEAR 71	PART-057679
				PN-00077527.000.01 -
22	1		WHEEL SHAFT	PART-057585
				PN-00077353.000.01 -
30	1		SPACER RING	PART-057236
				PN-00076528.000.01 -
31	1		SPACER RING	PART-057237
				PN-00076529.000.01 -
32	1		SPACER RING	PART-057240
				PN-00076535.000.01 -
33	1		SPACER RING	PART-057586

[pekrun]	Commission:	2.0.19396-10.1	partlist-no.:	PART-060561	GEARBOX ASR 450-R-CCW		page	2
	Gearbox Type:	ASR 450 -R-CCW	dimension drawing-	PN-00096627.001.01				
	Ratio:	2,4348:1	sectional drawing-no.:	PN-00096627.010.01 -		translated (Name/Date)	of:	4
	Name/Date:	Appel/03.11.2021				A B.Schröder/19.05.2022		

Pos.	Qty.	Designation / Specification	Article no. / Document no.
			PN-00077354.000.01 -
34	1	SPACER RING	PART-057352
			PN-00076799.000.01 -
36	1	END PLATE	PART-051274
			PN-00068494.000.01 -
37	1	END PLATE	PART-057227
			PN-00076519.000.01 -
40	1	ONE-WAY CLUTCH E-FC5045	PART-057433
			SC-00076947.009.01 -
41	1	HEATING CARTRIDGE-CSN EX R2"-EL=1400	PART-057342
42	1	PIPE FITTING	PART-057346
50	2	ROLLING BEARING DIN635	PART-057211
51	2	ROLLING BEARING DIN635	PART-057212
52	1	INNER RING	PART-001292
53	1	INNER RING	PART-001300
54	2	ROTARY SHAFT LIP TYPE SEAL	PART-019776
55	2	ROTARY SHAFT LIP TYPE SEAL	PART-014878
57	1	PARALLEL KEY	PART-057337
58	1	PARALLEL KEY	PART-057336
59	2	PARALLEL KEY	PART-057590
63	1	SPRING-TYPE STRAIGHT PIN	PART-028305
74	1	O-RING	PART-057513

[pekrun]	Commission:	2.0.19396-10.1	partlist-no.:	PART-060561	GEARBOX ASR 450-R-CCW		page	3
	Gearbox Type:	ASR 450 -R-CCW	dimension drawing-	PN-00096627.001.01				
	Ratio:	2,4348:1	sectional drawing-no.:	PN-00096627.010.01 -		translated (Name/Date)	of:	4
	Name/Date:	Appel/03.11.2021				A B.Schröder/19.05.2022		

Pos.	Qty.		Designation Specification	Article no. Document no.
75	1		O-RING	PART-018892
76	4		ORIFICE PLATE	PART-016279 PN-00034550.000.01 -
77	2		ORIFICE PLATE	PART-015292 PN-00033574.000.01 -
78	2		ORIFICE PLATE	PART-015291 PN-00033573.000.01 -
79	1		PIPING INSIDE COMPLETE	PART-057686 PN-00077549.005.01 -
80	1		AERATION FILTER	PART-033181
81	1		OIL LEVEL INDICATOR	PART-013240
82	1		OIL DRAIN	PART-057341 PN-00076762.005.01 -
85	2		SEALING RING	PART-001230
86	1		SCREW PLUG	PART-013869
87	4		SCREW PLUG	PART-001366
90	6		SET SCREW	PART-013278
91	4		SCREW	PART-013986
92	12		SCREW	PART-011927
93	26		SCREW	PART-003989
94	8		SCREW	PART-003973
95	24		SCREW	PART-010868

[pekrun]							
	Commission:	**2.0.19396-10.1**	*partlist-no.:*	PART-060561	**GEARBOX ASR 450-R-CCW**		*page* 4
	Gearbox Type:	ASR 450 -R-CCW	*dimension drawing-*	PN-00096627.001.01			
	Ratio:	2,4348:1	*sectional drawing-no.:*	PN-00096627.010.01 -		*translated (Name/Date)*	*of:* 4
	Name/Date:	Appel/03.11.2021				***A*** B.Schröder/19.05.2022	

Pos.	Qty.		Designation	Article no.
			Specification	Document no.
200	2		DIRECTION OF ROTATION INDICATOR	PART-002302
			BIG SIZE	PN-00020759.000.01 -
201	1		PEKRUN STANDARD TYPE PLATE	PART-028768
			BIG SIZE	PE-00045948.000.01 C

Translation
Created for the applicable standards in Germany

Only for use in a commercial environment!

Instruction manual

Article-Number: 2119931402134040605

Ex-Heater

Type		: 95F/HC-Exdet1,3T3/T200°C/RBE
Power	(KW)	: 1.3
Tolerance of power	(%)	: +5/-10
Voltage		: 400 V, 2~

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1 Product information

Name	: **Ex-Heater**
Type	: **95F/HC-Exdet1,3T3/T200°C/RBE**
EC type approval certificate	: **BVS 15 ATEX E 143 X**
	: **IECEx BVS 15.0117X**
Marking	: **Ⓔx II 2G Ex db eb IIC T3**
	Ⓔx II 2D Ex tb IIIC T200°C
	Flameproof enclosure (d)
	Increased safety (e)
	Protection by enclosure (t)
Temperature class	: **T3**
Mounting position	: **horizontal, sensor protection tube, above**
Design / approval	: **…**
Fields of application	: **zone 1 und zone 21**
Environment temperature at the header	: **- 40°C ... +50°C**
Protection category	: **IP 65**
Drawing number	: **hand sketch**

2 Intended use

Ex-device, type 95F/...- Ex det. T., according to EC-Type Examination Certificate BVS 15 ATEX E 143 X. Operating range: Zone 1 or Zone 21.

The Ex-device is used for heating the liquid specified under the operating data within the prescribed limits stated there. **Deviations from this are not allowed.**

For this purpose, the heating elements of the Ex-device are introduced into pipelines, containers or the like.

3 Safety

Observe the basic instructions in this Operation Manual for installation and operation.
The Operation Manual must be read and understood by the installation engineer and operating company responsible prior to assembly and commissioning.

Keep the Instruction Manual for later use.
Pass on the Instruction Manual to all subsequent owners and operating companies.

⚠ Surface temperatures of **up to 200°C** may occur on the ex-device in the area of the flange/cooling line due to the high media temperatures. There is a risk of burns. Suitable measures must be taken on site for protection against burns.

Do not make any modifications to the product.
Modifications can disable safety devices and cause personal injury and property damage.
Modifications lead to invalidation of conformity.

Respect any specified installation position and the flow direction of the medium to be heated.

The attention of operators is hereby drawn to the statutory requirements valid in every country for the operating of pressure vessel appliances.

Carry out periodic inspections in compliance with the national provisions.
Inspect safety-relevant components for proper function prior to commissioning.

Carry out an annual function inspection of the safety devices.
At shorter intervals depending on the level of use and ambient conditions.

4 Connection and performance data

A direct connection of aluminium conductors to the connection terminals is not allowed.
The site connection cable must have a minimum cross-section of 1.5 mm².
The cable must be suitable for high temperatures, insulation temperature min. 85°C.

Electrical data3

Power	(kW)	**: 1.3**
Tolerance of power	(%)	**: +5/-10**
Steps		**: 1**
Voltage		**: 400 V, 2~**
Connection		**: triangle**
Cable gland		**: 2x M20x1,5, -55…+160°C, IP66, stainless steel**
		5…9mm (sealing insert with Inlet)
		9…14mm (sealing insert without Inlet)
		..1x for connection Ex-device
		1x for limiter and controller

Heating element

Type		**: High performance cartridge compacted**
Diameter tube	(mm)	**: 32**
Material tube		**: 1.4571**
Immersion length of heat. elem.	(mm)	**: 1.400**
Unheated length	(mm)	**: 50**
Cooling line	(mm)	**: without**
Diameter tube bundle	(mm)	**: 50**

Process Data

Medium		**: gear-oil, resting**
Installation location		**: vessel**
Operating temperature	(°C)	**: 40**
Min. permissible Temperature	(°C)	**: 0**
Max. permissible Temperature	(°C)	**: 80**
Max permissible Pressure	(bar g)	**: 0.5**
Operating pressure	(bar g)	**: …**
Max. permissible pressure	(bar g)	**: …**

Flange

DIN	**: ISO228, G2” .1.4571**
Sealing	**: Vovapress universal**

Temperature Monitoring

Controller	**: 0-100°C, 230V, 16A**
Temperature Limiter	**: 0-150°C, 230V ~, 16A,**

The limiter is set to 80° C and sealed.
The manufacturer sets the limiter and it is not allowed to change.
The limiter and controller are directly interconnected.

Connection head	**: GGG40.3, coated**

A level monitor and an electrical controller are necessary for operation. These safety devices are not included in the delivery of the Ex-device. They have to be installed and adjusted by the constructor. Please note "mounting instructions" for safety devices in this operation manual.

5 Mounting notes

1. Installation location / installation conditions

The Ex-device must be installed in a suitable container / vessel in such a way that the heating elements and the heat can be dissipated unimpeded. The unheated length of the Ex-device and the installation conditions must be compatible. The heated length of the Ex device must be at least 50 mm in the medium. Heating within the container nozzle is not permitted. Deviations from this could lead to heat accumulation causing overheating/rendering the temperature limit ineffective.

The Ex unit must be installed in the vessel in such a way that the sensor protection tubes for regulator and limiter are above the cartridge tube in the medium.

A level monitor and an electrical controller are necessary for operation. These safety devices are not included in the delivery of the Ex device. They have to be installed and adjusted by the constructor. Please note "mounting instructions" for safety devices in this operation manual.

2. Temperature limiter

The temperature limiter has already been installed by the manufacturer. The trigger temperature has already been set and can not be changed.

3. Level monitor

The level monitor must be installed in such a way that minimum monitoring of the device with the heated medium of 50 mm is ensured. Triggering of the level monitor must result in switching off the device.

This measure must ensure that the device cannot run dry and/or a filling level that is too low offsets the reliable switch-on function of the limiter, e.g. due to the limiter sensor running dry.

4. **Electrical controller**
   The Ex-device must be operated with an electrical controller. When shutting down a safety device (temperature limiter, flow monitor or level monitor), the Ex-device must be disconnected from the mains supply by means of a separate shut-down method (contactor) of the controller. This separate shut-down method must work independently of operationally necessary measuring and/or control devices.

5. **Requirements for the safety devices**
   Monitoring devices (temperature limiters, level monitoring) must be functionally and reliably tested in accordance with the relevant regulations. Within the scope of Directive RL2014/34/EU they must either:
   - Be certified according to RL2014 / 34 / EU (Examination Basis DIN EN 50495 SIL 1)
   - In the framework of the assessment of the protection concept for the installation by the installer / operator, be assessed separately in accordance with RL2014 / 34 / EU.

6. **Arrangement connection head**
   The connection head of the Ex-device must not be arranged in the immediate vicinity (<2m) of charged flowing particles (e.g. high-voltage electrode, ionizer, product stream that is not conducted within a closed metallic tube).

7. **Ambient temperature range**
   During operation, the minimum or maximum ambient temperatures at the connection head specified in these instructions must not be exceeded or fallen short of. In the event of deviating ambient temperatures, the Ex-device must be switched off.

8. **Unimpeded heat dissipation connection head**
   The connection head must not be provided with thermal insulation, as this would cause the connection area to overheat.

9. An **overpressure safety valve** must be provided on-site.

10. **Subsequent painting**
    A subsequent coat of paint or powder coating of the Ex-device is forbidden.

11. **Requirements for the medium**
    No contamination or foreign objects may enter the device / system. The medium must be free from impurities. Deposits, abrasive wear or similar are not permitted. Install appropriate measures, e.g. Filter, etc.

12. **Emptying**
    Provide suitable facilities for emptying the container.

13. **Exchange cable entry**
    If the cable glands mounted by the manufacturer should be replaced, suitable cable glands with an additional gasket or sealant must be used.

6 Mounting instructions

Before using the Ex-device, a visual inspection for transport damage must be carried out. It is not permitted to use a damaged Ex-device.

The Ex-device must be permanently installed and operated according to the specified installation position.

The transportation equipment and lifting gear must selected in such a way that the heating elements cannot be bent or damaged during transportation and installation.
The Ex-device may only be attached to suitable structures designed to bear the weight of the Ex-device. For lifting and for the installation of the Ex-device only means of transport and tools, which are suitable for the load, may be used. For lifting may be used only lifting attachment which are sufficiently dimensioned and exhibit no damages.
Enough space must be allowed to ensure that any subsequent expansion of the Ex device is possible. Linear expansion during heating must be taken into account. The Ex- device must be brought to the final installation position slowly and while simultaneously aligning it.

Installation note:

- Use a suitable wrench.
- Put it only on the hexagon of the threaded flange on the wrench.

In any case, the force may be introduced via the connection head.

- The thread must be in perfect condition.
- Screw the threaded flange firmly.
- Tightening after the first heating (if necessary).

The Ex-device is to be screwed on firmly.

7 Electric Installation

An electrical engineer with the respective training may only execute the work described below.

The directive EN 60079-14 (VDE 0165/1) must be observed for the installation of the device. It must only be executed by persons who are familiar with **explosion protection**, i.e. by engineers with the respective training. The erecting engineer must write a respective installation certificate.

TT- and TN systems: A fault current protection device with a calculation value of the fault current of any more than 100 mA must be installed. Fault current protection device with a calculation value of the fault current of 30 mA are preferred.
IT system: An isolation control device has to be used, which interrupts the supply whenever the insulation resistance amounts to no more than 50 Ohm/V, related to the calculation tension.

- The supply voltage must be checked for compliance with the voltage indicated on the type plate.
- The temperature class required for the installation location must be checked for compliance with the temperature class indicated on the type plate.
- When choosing the cross sections for connection, the loads, fuse protection etc., the relevant regulations must be observed. (See a.o. VDE 0100, VDE 0298-4).

Electrical installation

A direct connection of aluminium conductors to the connection terminals is not allowed.
The site connection cable must have a minimum cross-section of 1.5 mm².
The cable must be suitable for high temperatures, insulation temperature min. 85°C.

1. Unscrew the 4 cover screws.
2. Take of the connection box.
3. Insert the cables through the cable glands into the connection box.
4. The nut of the cable gland must be drawn up to guarantee strain relief and protection category. (Cables and gable glands must be matched, so that the required protection category is guaranteed.)
5. Connect cable to the Ex conductor terminals according to the connection diagram
6. Connect the earth terminals.
7. Make earth conductor connection.
8. Generate external equipotential connection.
9. Check connections for tight fit.
10. Replace the cover of the connector box again.
11. Tighten the 4 cover screws. (About 2 Nm)

8 Commissioning

Important instructions:

The temperature class is defined by the manufacturer. The local and operating conditions are specified.
Commissioning is only permissible if the Ex-device has been installed according to the specifications stated in the chapter MOUNTING INSTRUCTIONS.

1. Guarantee before switching on, that the temperature monitoring is connected
2. Before use check the correct closeness of the connection hood.
3. Guarantee before switching on, that the device is filled with the medium, witch can be warmed up, and/or that it´s sufficiently flowed through by the medium.

9 Repair of malfunctions

Exclusively electrical engineers who are familiar with explosion protection must execute the work described below.

- Check fusing outside the Ex-area.
- An official confirmation, that no fire hazard exists must be asked for, whenever the terminal box must be opened for measurement purposes.

Malfunction: Ex-device does not heat up

Repair: Check fusing
Control the supply voltage
Check the control unit
The on-site temperature control is set to a low temperature.
→ Set temperature control to the correct temperature.
Ex-temperature-limiter switched off circuit.
→Check reason, remove fault, reset temperature limiter.

- Run the initial start-up procedure after each repair of malfunctions/ failures.

10 Repairs

Repairs may only be carried out after written approval by the Schniewindt GmbH & Co. KG.

Only spare parts approved by the manufacturer (Schniewindt GmbH & Co. KG) may be used.

A repair on the flameproof gaps may only be carried out by the manufacturer. The repair of flameproof gaps according to the values of table 3 of the IEC 60079-1:2014 is not permitted.

11 Maintenance and servicing

Inspect the safety device (temperature limiter, level monitor) to make sure that they function properly in compliance with the relevant provisions. **An annual inspection is recommended. At shorter intervals depending on the level of use and ambient conditions.** To satisfy the requirements of the EX-protection, the device must remain sealed.

- To fulfil the Ex-protection requirements, the Device must remain closed.

For perfect operation of the device the following aspects must be checked:

- ✓ measure the insulation values
- ✓ measure the resistance values (Ω)
- ✓ measure and check the thermostat and / or limiter function
- ✓ Visual inspection for damage
- ✓ Visual inspection for deposits or incrustations on the heating elements
- ✓ Visual inspection for leaks
- ✓ Visual inspection of the electrical connection compartment (Moisture, rust, .. reduce the insulation value and must be removed.)

Deposits or incrustations on the heating element can destroy the device and must be removed.
The cleaning must be do carefully, so that the surface is not damaged.

Carry out an annual functional test of the safety devices.
Depending on the application and environment in a shorter interval.

12 Dismantling

- Only dismantle the system if there is no danger of explosion. (fire permit)
- Switch off the system and secure to prevent unintentional restart.
- Allow the Ex-device to cool to room temperature.
- Uninstall and remove the connecting cable.

13 Storage

The store room must be dry and free of dust.
Make sure that the storing temperatures are between -40°C and +40°C.
Before storing, be sure that there is no humidity penetrated inside the terminal box during transport or interim storing.
All openings must be closely locked, in order to prevent a penetration from dust/moisture.
The terminal box shall be tightly closed if necessary the cable entries must be equipped with blinds.
Place a drying agent in the terminal box to absorb existing humidity.
Use only chemically indifferent drying agents (e.g., silica gel).
Change the drying agent at the specified intervals. Observe the instructions of the drying agent manufacturer.
During storage over a longer periods (several months), it is to be expected that the system-related insulation resistance reduces.
The device may be put into operation only when it is ensured that the insulation resistance is greater, in accordance with the standard DIN 44874, part 1, paragraph 5.3

$$R\ iso = \frac{2\ M\Omega}{\text{Number of installed tubular heating elements}}$$

Measured in the cold state with a voltage of 500V DC.

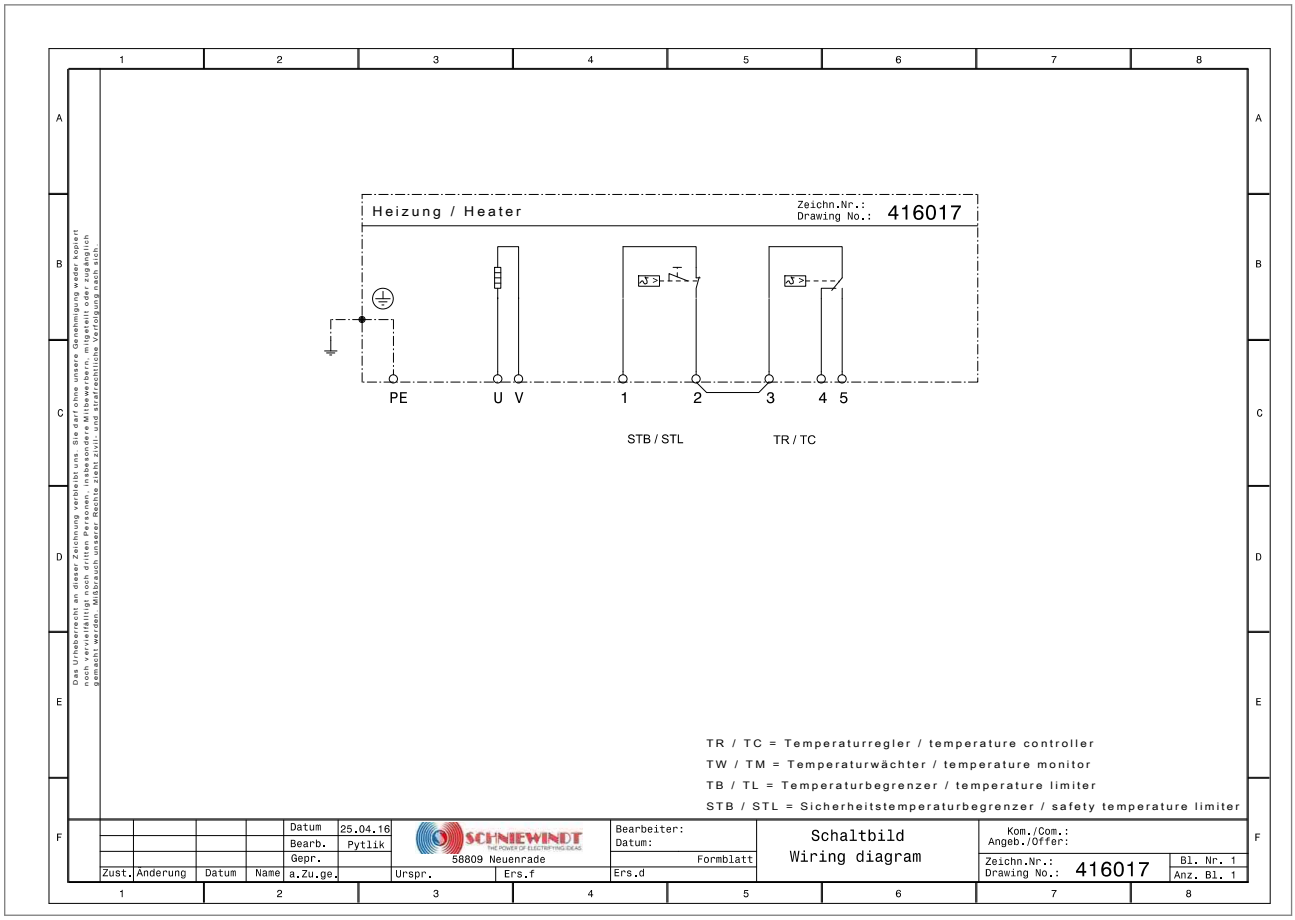
14 Disposal

- Remove any problematic deposits in accordance with local regulations.
- Dispose of the Ex-device in accordance with local regulations.
- Give metals and plastics sorted for recycling or scrapping.

15 Standards

The applied standards can be found in the enclosed EC declaration of conformity. The device is manufactured in compliance with the following international standards:

⇒	EN 60079-0	General requirements
⇒	EN 60079-1	Flameproof enclosure „d“
⇒	EN 60079-7	Increased safety „e“
⇒	EN 60079-31	Protection by Enclosure „t“



Das Urheberrecht an dieser Zeichnung verbleibt uns. Sie darf ohne unsere Genehmigung weder kopiert noch vervielfältigt noch dritten Personen, insbesondere Mitbewerbern, mitgeteilt oder zugänglich gemacht werden. Mißbrauch unserer Rechte zieht zivil- und strafrechtliche Verfolgung nach sich.

EU-Konformitätserklärung / EU declaration of conformity

Wir/ We **Schniewindt GmbH & Co. KG**
Schöntaler Weg 46, 58809 Neuenrade

erklären in alleiniger Verantwortung, dass das Produkt /
hereby declare in sole responsibility that the product

CSN® Ex Heizkörper / CSN® Ex Heater
95**/**-Exde* ***T*/T***°C

Kennzeichnung/ marking: II 2G Ex db eb IIC T. und / and optional
II 2D Ex tb IIIC T…°C

auf das sich diese Erklärung bezieht, den Bestimmungen der folgenden Richtlinie entspricht /
to which this declaration relates is in accordance with the provisions of the following directive

2014/34/EU **„ATEX- Richtlinie“ / „ATEX- Directive“**
2014/30/EU **„EMV- Richtlinie“ / „EMC- Directive“**

Angewandte harmonisierte Normen / Applied harmonised standards:

EN60079-0:2012+A11:2013	EN60079-1:2014
EN60079-7:2015	und / and optional EN60079-31:2014
EN61000-6-2:2005/AC:2005	EN61000-6-4:2007+A1:2011

EU-Baumusterprüfbescheinigung nach Anh. III/EC type examination certificate according to Ann. III
BVS 15 ATEX E 143 X der / from
DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Kennnummer / identification number: 0158

Produktionsüberwachung nach Anhang VII/Production surveillance according to Annex VII:
BVS 15 ATEX ZQS/E401 der / from
DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Kennnummer / identification number: 0158

Neuenrade, den 12.11.2018

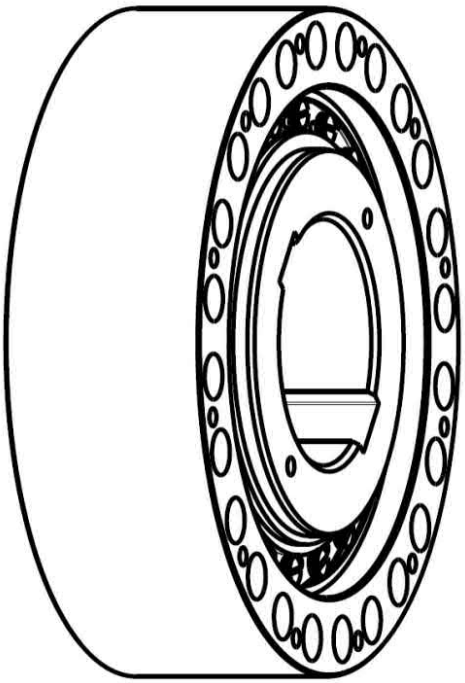
Dr. Karl Kaluza

Leiter des Qualitätsmanagements/
Head of Quality Management

9_KE95Exdet_I_EXAM

CE Erklärungen 26.10.2018.xlsm

Assembly and maintenance manual
Type FC5045



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General safety instructions

	WARNING!	**Risk of injury due to moving components!** Rotating driven components can cause the most severe injuries. Therefore, during operation: ➢ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➢ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: ➢ Switch off the power supply and secure it against being switched on again ➢ Wait for lagging components to come to a standstill

	DANGER!	**Danger due to improper operation!** ➢ Modifications to the one-way clutch are not permitted and may impair safety ➢ All tasks may only be performed by personnel with the requisite training and expertise ➢ Repairs and maintenance tasks may only be performed when the machine is at a standstill. To this end, the machine is to be secured against a restart

	WARNING!	**Risk of injury due to incorrect assembly!** Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

	WARNING!	**Risk of injury for insufficiently qualified personnel!** Improper handling can cause significant personal injury and property damage. Therefore: Only ever have tasks performed by those persons to whom the tasks have been assigned.

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1 Genaral

1.1 Information relating to the assembly and maintenance manual

This assembly and maintenance manual provides important information regarding the installation and commissioning of the one-way clutch.

Prerequisite for safe operation is compliance with all of the stated safety and handling instructions.

Moreover, the relevant local accident protection guidelines and general safety provisions for the field of application of the one-way clutch are to be complied with.

Read the assembly and maintenance manual carefully prior to installation and commissioning. It is a product component and must be kept in the immediate vicinity of the installation site and be accessible to personnel at all times. Furthermore, all safety instructions stated in the assembly and maintenance manual are to be observed.

1.2 Explanation of symbols

Warnings are marked throughout this assembly and maintenance manual by symbols. These warning symbols are introduced by signal words which indicate the extent of the danger. Comply with these warning symbols under all circumstances and act with due care and attention to avoid accidents, personal injury and property damage.

	DANGER!	...indicates an imminently dangerous situation which can be fatal or cause severe injuries if it is not averted.
	WARNING	...indicates a potentially dangerous situation which can be fatal or cause severe injuries if it is not averted.
	ATTENTION	...indicates a potentially dangerous situation which can cause minor or light injuries if it is not averted.
	CAUTION	...indicates a potentially dangerous situation which can cause property damage if it is not averted.
	NOTE	… highlights helpful tips and recommendations as well as information for efficient and fault-free operation.

1.3 Manufacturer

STIEBER GmbH, D-69126 Heidelberg, Hatschekstr. 36, Germany
Phone +49 (0) 6221 3047-0, Fax -31

1.4 Labeling

Front face of the outer race

- Manufacturer's name
- Type designation
- Date of manufacture (coded)

1.5 Environmental protection

Energy:	The one-way clutch does not use any electrical energy.
Materials:	Steel
Recycling:	Steel parts are up to 100% recyclable.

2 Safety

2.1 Intended use

One-way clutches of type FC5045 are directional clutches, engaged and disengaged automatically, depending on the relative direction of rotation.

The torque is transmitted by a force-locking connection. They can be used as overrunning clutches or backstops in machinery and equipment.

Driving operation of an overrunning clutch:

When operating in torque transmission mode the driving machine element and the driven member are connected in a force-looking manner. In this operating state, a torque will be transferred.

Overrunning operation of an overrunning clutch:

The overrunning clutch disengages automatically when the driven member rotates faster than the driving member.

The contact-free operation will be ensured, when the driven member connected with the inner race runs above a defined speed. From this speed up the wear-free operation of all function-relevant components is guaranteed.

Lockout mode of a one-way clutch:

When operating in the locking direction of the one-way clutch, the machine shaft and the torque bracing to the machine element are connected in a force-looking manner.

In this operating state, a torque will be transferred.

Overrunning mode of a one-way clutch:

The one-way clutch disengages automatically the force-locked connection between the machine shaft and the torque bracing to the machine element, when the machine shaft runs in freewheeling direction. The contact-free operation will be ensured, when the machine shaft is rotating above a defined speed. From this speed up the wear-free operation of all function-relevant components is guaranteed.

2.2 Responsibility of the operator

The operator of the machine, in which the one-way clutch is installed, is subject to the legal obligations concerning occupational safety.

The valid provisions for the site of operation as well as the safety and accident prevention regulations of the trade associations are to be observed. This, in particular, means that the operator:

- is aware of the valid occupational safety provisions
- implements the necessary behavioral requirements for operation of the machine, in which the one-way clutch is installed, at the site of operation
- clearly defines responsibilities for installation, operation, maintenance and cleaning of the machine in which the one-way clutch is installed
- ensures that all staff members, who work at or with the machine in which the one-way clutch is installed, are employed and have read and understood the operating manual. Moreover, he must, at regular intervals, provide training for personnel on how to handle the machine, in which the one-way clutch is installed, and inform them of the potential dangers. In addition, the operator is responsible for ensuring that the machine in which the one-way clutch is installed:
    - is always in perfect technical condition
    - is maintained in accordance with the specified maintenance intervals
    - has all its safety equipment checked regularly for completeness and functionality

2.3 Assembly and maintenance personnel

⚠	**WARNING**	**Risk of injury for insufficiently qualified personnel!** Improper handling can cause significant personal injury and property damage. Therefore: ➢ Only ever have tasks performed by those persons to whom the tasks have been assigned

Qualified personnel are those persons who, owing to their training, experience and instruction as well as their knowledge of relevant standards, provisions, accident prevention regulations and operating conditions, have been authorized by the person responsible for the safety of the plant to perform the requisite tasks and are able to recognize and avoid potential dangers in

doing so. Knowledge of first-aid measures and on-site emergency equipment must also be included.

2.4 Personal protective equipment

It is necessary to wear personal protective equipment when handling the machine, in which the one-way clutch is installed, to minimize health risks.

The necessary protective equipment such as work shoes, gloves, safety goggles etc. is to be put on prior to all tasks and kept on during the task.

2.5 Limitations of use

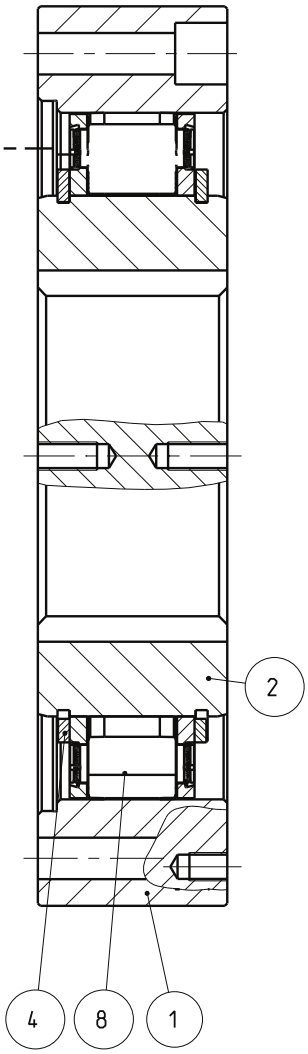
Typ FC5045	bore dia. [mm]	maximum torque [Nm]	Overrunning speeds [rpm]		admissible runout (T.I.R.) outer race to shaft [mm]	admissible axial run-out outer race to shaft [mm]	Number/ size fixing screws
			min.	max.			
	140	76000	330	1600	0,6	0,15	24xM16

*Torque limited by keyway, key

- Limits for ambient temperature: from –20°C to +80°C
- Maximum operating temperature: 90°C
- Overrunning: Machine shaft (inner race)
- Required machine shaft tolerance: d = h6 or j6
- Required tolerance outer race centering (inner diameter) : d = h7 or g7
- Oil lubrication: approved oils according Stieber catalogue / WN900
- Grease lubrication: approved greases according Stieber catalogue / WN900

3 Structure and function

3.1 Structure



Pos. 1	Outer race
Pos. 2	Inner race
Pos. 4	Circlip
Pos. 8	Cage

Fig. 1a Structure

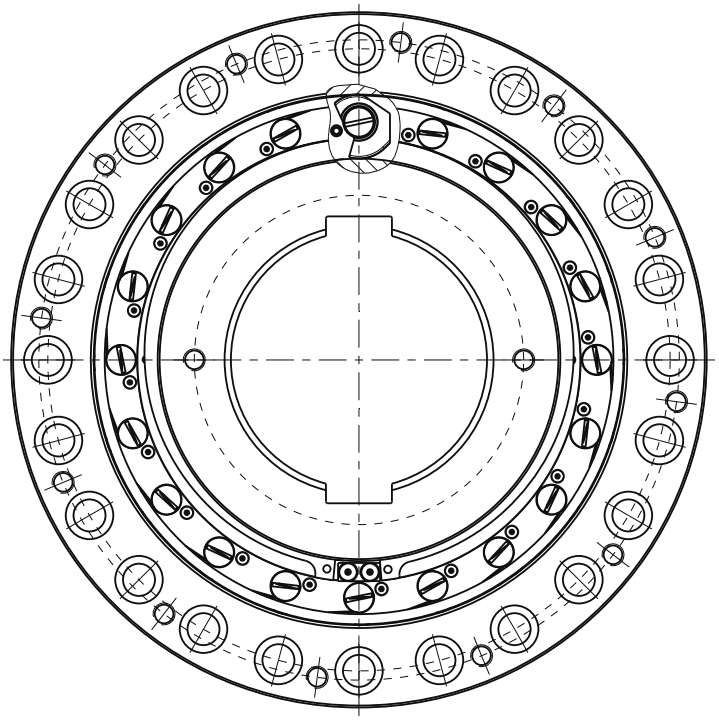


Fig. 1b Structure

3.2 Function

When the torque is transmitted through the one-way clutch, the outer race (1) and the inner race (2) are coupled in a force-locked manner (see Fig. 2). For this purpose, clamping elements are used, the outer contours of which generates the force-locked coupling. The clamping elements are integrated into a cage (8) and are energized by springs into contact with the outer and inner race. The springs ensure rapid responding behavior of the one-way clutch at the start of torque transmission.

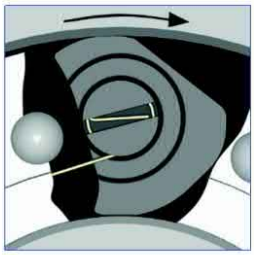


Fig.2 Torque transmission

In overrun operation, above the minimum permissible overrunning speed, the centrifugal force, in connection with the geometry of the clamping elements, generates a force which turns the clamping elements against the spring force (see Fig. 3). A contact-free position is brought about in this way so that wear-free operation of the one-way clutch can be achieved. The minimum permissible overrunning speed may only be lower for a short period during the start-up or shut-down stage otherwise the damage to the contact partner caused by wear and tear may lead to the failure of the one-way clutch.

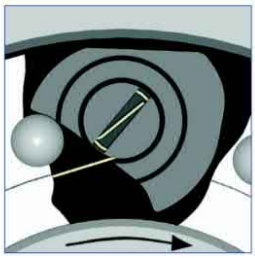


Fig.3 Contact-free position

4 Transport and packaging

⚠	**WARNING**	**Risk of injury due to the one-way clutch falling down or tipping over!** The weight of the one-way clutch can injure people and cause severe crushing. Therefore: ➢ Use a pallet on which the one-way clutch can be moved with a forklift ➢ Use suitable lifting gear for lifting (slings, etc.) which is able to support the weight of the one-way clutch

	NOTE	The local provisions regarding the disposal of transport and packaging materials are to be observed.

One-way clutches of Type FC5045 are packed in air cushion foils.

All components are sent in a box on a pallet.

To prevent the component from breaking or falling apart it is secured by a transportation lock (see Figure 4).

Transport damage to the packaging and / or the one-way clutch is to be reported to the respective transit company!

The one-way clutch must be unpacked in a clean and dry environment!

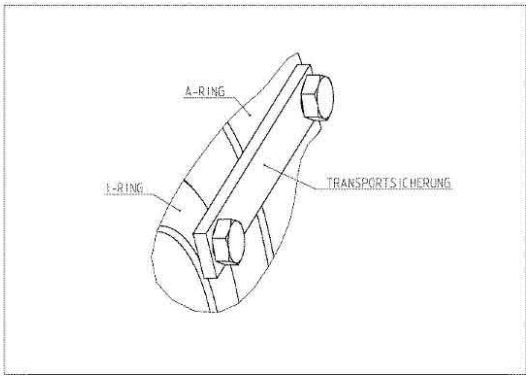


Fig. 4 Transportation lock

5 Storage

5.1 Short-term storage

The type FC5045 is packed in VCI bubble wrap. The VCI bubble wrap is to be checked at regular intervals. The frequency of these intervals is dependent on the environmental conditions (temperature, moisture, salt content of the air, etc.) at the storage site.

The maximum storage period (short-term storage) is 6 months. Moreover, the backstop must have long-term storage corrosion protection applied to it.

Store packages under the following conditions:

- Do not keep outdoors
- Keep dry and free from dust
- Do not expose to aggressive media

- Keep away from direct sunlight
- Avoid mechanical shocks and vibrations
- Storage temperature: −10 to +60°C
- Relative humidity: max. 95%, non-condensing

5.2 Long-term storage

For long-term storage, the one-way clutch must be shrink-wrapped with a desiccant and provided with a hygroscope. The corrosion protection must be checked after a period not exceeding one year or else depending on the environmental conditions (temperature, moisture, salt content of the air, etc.) at the storage site.

Store packages under the following conditions:

- Do not keep outdoors
- Keep dry and free from dust
- Do not expose to aggressive media
- Keep away from direct sunlight
- Avoid mechanical shocks and vibrations
- Storage temperature: −10 to +60°C
- Relative humidity: max. 95%, non-condensing

6 Installation

6.1 Checking the direction of rotation

⚠	**WARNING**	**Risk of injury due to incorrect assembly!** Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

⚠	**WARNING**	**Risk of injury due to moving components!** Rotating driven components can cause the most severe injuries. Therefore, during operation: ➢ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➢ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: ➢ Switch off the power supply and secure it against being switched on again ➢ Wait for lagging components to come to a standstill

M1260E_0	Assembly and maintenance manual	Stieber Altra Industrial Motion

!	CAUTION	**Risk of injury due to falling components!** The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.

The direction of rotation at idle speed is marked as FREE on the cage (8). The direction of rotation can be changed by turning the inner race (2) including cage (8).

Procedural steps:

- Place the one-way clutch facing upward the label "FREE" on an assembly table
- Remove the transportation lock
- Lift the inner race (2) including the cage (8) out of the outer race (1). Use appropriate lifting gear at the threaded hole of the inner race for this
- Place the inner race (2) including the cage (8) facing downwards the label "FREE" on an assembly table
- Secure (see Fig. 5 and 6) the clamp bodies in lift-off position (against the spring force) using an O-ring / cable connector as an assembly aid

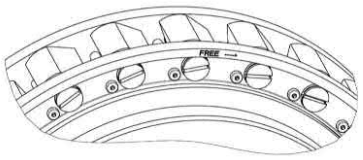


Figure 5: Clamp bodies “neutral position“

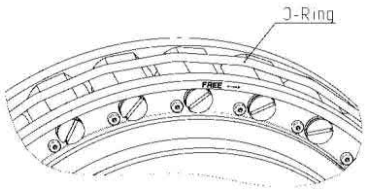


Figure 6: Clamp bodies “after lift-off”

- Insert the inner race (2) with cage (8) into the outer race (1) until half of the clamp body is covered

i	NOTE	The assembly aid (O-ring / cable connector) must be completely removed. Non-observance of this note can cause functional impairment and even failure.

- Remove the assembly aid (O-ring / cable connector) completely and lower the inner race and cage completely
- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation
- Install the transportation lock

6.2 Lubrication

One-way clutches of Type FC5045 do not require any lubrication in overrun operation above the lift-off speed as they operate without contact.

Similarly, no lubrication is required in lockout operation as only a minimal degree of rolling motion in the clamp bodies occurs.

Additional lubrication is required if the one-way clutch runs with frequently repeated or permanent working cycles below the lift-off speed. To this end, a lubricating film, which coats the clamp bodies and tracks of the outer race, is mandatory. The lifetime is limited under these operating conditions!

6.2.1 Operation with oil lubrication

An oil mist is sufficient for mounting inside a gear box.

If the one-way clutch runs with frequently repeated or permanent working cycles below the lift-off speed, splash lubrication or oil supply between the cage and the outer track is necessary. The lifetime is limited under these operating conditions!

The oil volume which is necessary for splash lubrication depends on the surrounding construction.

The level should be up to a maximum of 10 mm to an inside diameter of the outer race.

6.2.2 Operation with grease lubrication

	NOTE	Excessive lubrication may negatively affect the one-way clutch functionality! Note the required grease quantities!

	NOTE	Unsuitable lubricants can negatively affect the one-way clutch functionality! Only use greases approved by Stieber!

Select only lubricating greases complying with product catalogue/ Stieber WN900.

Procedural steps for greasing:

- Place the one-way clutch facing upward the label "FREE" on an assembly table
- Remove the transportation lock
- Lift the inner race (2) including the cage (8) out of the outer race (1). Use appropriate lifting gear at the threaded hole of the inner race for this
- Grease the outer track with a layer thickness of approx. 1 mm
    - Use grease of NLGI class 000 to 2 with a maximum base oil viscosity of 42 mm2/s

- Evenly spread the remaining grease quantity (see chapter 2.5) over the inner race surface and cage
- Secure (see Fig. 5 and 6) the clamp bodies in lift-off position (against the spring force) using an O-ring / cable connector as an assembly aid
- Insert the inner race (2) with cage (8) into the outer race (1) until half of the clamp body is covered
- Remove the assembly aid (O-ring / cable connector) completely and lower the inner race and cage completely.

	NOTE	The assembly aid (O-ring / cable connector) must be completely removed. Non-observance of this note can cause functional impairment and even failure.

.

- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation.
- Install the transportation lock

6.2.3 Protection against corrosion damage

One-way clutches must be protected against corrosion damage.

	Note	Treat unpainted surfaces with suitable anticorrosive agents. As a corrosion inhibitor use grease of NLGI class 000 to 2 with a maximum base oil viscosity of 42 mm2/s !

6.3 Assembly

	WARNING	**Risk of injury due to incorrect assembly!** Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

	WARNING	**Risk of injury due to moving components!** Rotating driven components can cause the most severe injuries. Therefore, during operation: ➢ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➢ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: ➢ Switch off the power supply and secure it against being switched on again ➢ Wait for lagging components to come to a standstill

!	**CAUTION**	**Risk of injury due to falling components!** The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.

Procedural steps :

- Lift up the one-way clutch using suitable lifting gear and push it onto the oiled machine shaft
- Remove the transportation lock
- Fasten the one-way clutch axially on the machine shaft
- Center the outer race in the torque-supporting machine element

i	**NOTE**	Screw qualities 12.9 must not be used!

- Secure the outer race in the torque-supporting machine element with the appropriate fixing screws (e.g. as per standard DIN EN ISO 4762) and with screw quality 10.9 or 8.8; tightening torque (see Table Tightening torque)

Tightening torque [Nm]		
Size	**8.8**	**10.9**
M16	206	290

Table: Tightening torque (according VDI 2230 Sheet1, μ=0.12 metric standard thread)

- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation

6.4 Mounting example

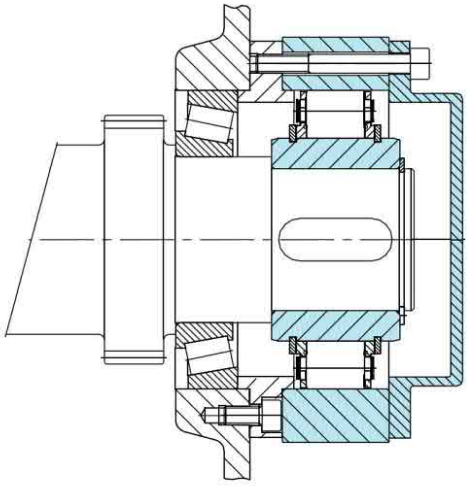


Figure 7: Mounting at the end of the shaft

7 Maintenance

⚠	WARNING	**Risk of injury due to incorrect assembly!** Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

⚠	WARNING	**Risk of injury due to moving components!** Rotating driven components can cause the most severe injuries. Therefore, during operation: ➢ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➢ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: ➢ Switch off the power supply and secure it against being switched on again ➢ Wait for lagging components to come to a standstill

!	**CAUTION**	**Risk of injury due to falling components!** The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.

One-way clutches of Type FC5045 must be checked for damage and serviced after an operating period not exceeding 5 years.

7.1 Disassembly in case of maintenance

Procedural steps:

- Loosen the fastening screws of the outer race (1)
- Remove the axial retention of the inner race
- Install the transportation lock

!	**CAUTION**	**Risk of injury due to falling components!** The outer race or inner race can fall down if the transportation lock has been removed. Therefore: ➢ Install the transportation lock!

- Pull the one-way clutch from the machine shaft. Use suitable lifting gear for this
- Place the one-way clutch facing upward the label "FREE" on an assembly table
- Remove the transportation lock
- Lift the inner race (2) including the cage (8) out of the outer race (1). Use appropriate lifting gear at the pull holes of the inner race for this
- Remove the circlip (4) of the inner race (2) and pull the cage (8) off the inner race (2)

7.2 Test criteria in case of maintenance

Procedural steps:

- Pre-clean the outer race (1) and cage (8) with a petroleum-based industrial cleaning agent and degrease with an acetone-based cleaning agent
- Check for damage, wear and cracks (see the testing criteria):
  - The outer race track must not exhibit any signs of damage / ruptures
  - Increased diameter due to wear in the outer race track maximum 0.1 mm compared to the area free from wear
  - Traces of deformation / indentations to the track diameters of the inner and outer race maximum 0.1 mm deep
  - Completeness of all spring elements (2 per clamp body)
  - Spring elements free of damage / deformation

- Smooth rotation of the clamp bodies from stop to stop
- Maximum width of the wear facet on the clamp bodies (see Figure 8)

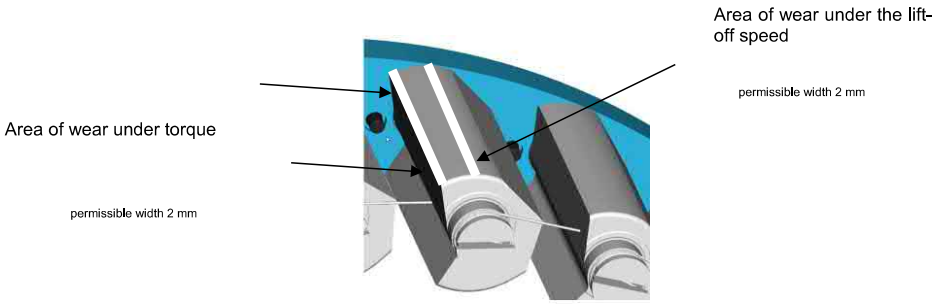


Figure 8: wear zones

- The one-way clutch can continue to be used only if all of the test criteria are met

7.3 Assembly in case of maintenance when using grease lubrication

Procedural steps:

- Mount the cage (8) on the inner race (2) and secure it axially using circlips (4)
- Grease the outer track with a layer thickness of approx. 1 mm
  - Use grease of NLGI class 000 to 2 with a maximum base oil viscosity of 42 mm2/s
- Evenly spread the remaining grease quantity (see chapter 2.5) over the inner race surface and cage
- Secure (see Fig. 5 and 6) the clamp bodies in lift-off position (against the spring force) using an O-ring / cable connector as an assembly aid
- Insert the inner race (2) with cage (8) into the outer race (1) until half of the clamp body is covered
- Remove the assembly aid (O-ring / cable connector) completely and lower the inner race and cage completely

	NOTE	The assembly aid (O-ring / cable connector) must be completely removed. Non-observance of this note can cause functional impairment and even failure.

- Install the transportation lock

- Lift up the one-way clutch using suitable lifting gear and push it onto the oiled machine shaft observing the overrun direction of rotation in the process
- Remove the transportation lock
- Fasten the one-way clutch axially on the machine shaft
- Center the outer race in the torque-supporting machine element

	NOTE	Screw qualities 12.9 must not be used!

- Secure the outer race in the torque-supporting machine element with the appropriate fixing screws (e.g. as per standard DIN EN ISO 4762) and with screw quality 10.9 or 8.8; tightening torque (see Table Tightening torque)

Tightening torque [Nm]		
Size	**8.8**	**10.9**
M16	206	290

Table: Tightening torque (according VDI 2230 Sheet1, μ=0.12 metric standard thread)

- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation

8 Disassembly

	WARNING	**Risk of injury due to incorrect assembly!** Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

	WARNING	**Risk of injury due to moving components!** Rotating driven components can cause the most severe injuries. Therefore, during operation: ➢ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➢ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: ➢ Switch off the power supply and secure it against being switched on again ➢ Wait for lagging components to come to a standstill

	CAUTION	**Risk of injury due to falling components!** The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.

Procedural steps:

- Loosen the fastening screws of the outer race (1)
- Remove the axial retention of the inner race
- Install the transportation lock
- Pull the one-way clutch from the machine shaft. Use suitable lifting gear for this

9 Disposal

	NOTE	The local provisions regarding the disposal of metallic components and any lubricants present are to be observed.

The one-way clutch is comprised of metallic materials which are coated with grease or oil. Metallic materials are fully recyclable. Lubricants and anticorrosive agents are to be disposed of separately. The local disposal provisions are to be observed in this regard.

10 Faults

The manufacturer is to be contacted immediately should any faults arise.

STIEBER GMBH, D-69126 Heidelberg, Hatschekstr. 36, Germany
Phone +49 (0) 6221 3047-0, Fax -31

11 Spare parts

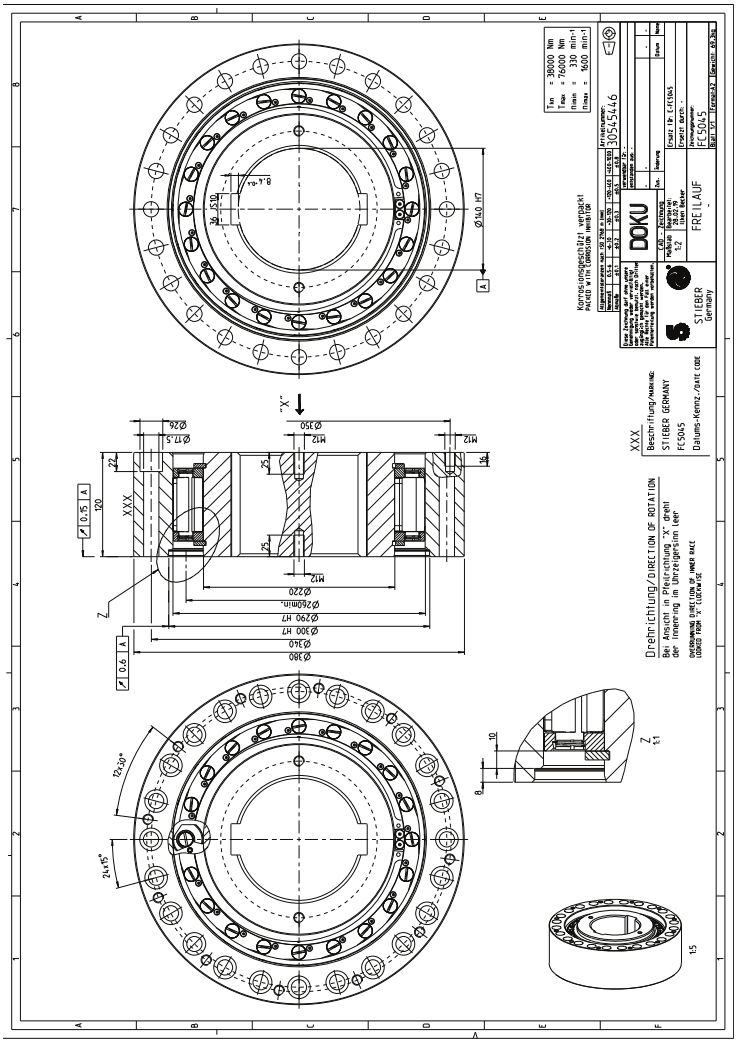
⚠	**WARNING**	**Risk of injury due to incorrect spare parts!** Incorrect or faulty spare parts can cause damage, malfunctions or total failure as well as impair safety. Therefore: ➢ Only use original spare parts from the manufacturer

Procure spare parts only from authorized dealers or from the manufacturer directly.

12 Appendix

M1260E_0	Assembly and maintenance manual	Stieber Ultra Industrial Motion

12.1 Drawing FC5045



Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Deutschland
www.pekrun.de

TECHNISCHE DOKUMENTATION

TECHNICAL DOCUMENTATION

ENGLISCH

ZUM AUFTRAG
TO THE ORDER

IHRE BESTELL NR. YOUR ORDER NO.	4500494756 Pos. 10		
WERKS NR. WORKS NO.	2000064788 4001310646, 4001308822		
KENNWORT CODE WORD	GLAUCH TOOBA		
TAG-No	2.7.1.151	2.7.1.251	2.7.1.351
PEKRUN SERIAL NR.	10002289	10002290	10002291
PEKRUN KOM. NO.	19396-10		
GETRIEBE TYP GEAR UNIT TYPE	ASR 450-R-CCW		
GEWICHT WEIGHT	3324 kg		
BAUJAHR YEAR OF MANUVACTURE	2022		

[pekrun]

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany

Technisches Datenblatt

Technical datasheet

zur Betriebsanleitung
to the Operating Instructions

DEUTSCH / ENGLISCH

Geltungsbereich / *Scope*:			
Pekrun – Auftrags Nr. *Pekrun – order no.*	19396-10		
Kunden – Referenz *Customers - Reference*	4500494756; 2000064788 4001310646, 4001308822		
Getriebe / Typ *Gearbox / type*	ASR 450-R-CCW		
Pekrun - Teile Nr. / Serial Nr. *Pekrun - Part no. / serial no.*	PART-060561 / 10002289 - 10002291		
Dokument-Nr. / *Document no*:	OFF-039791	Rev.:	-
erstellt am / *created by*:	19.05.2022	erstellt von / *created by*:	B. Schröder
Anhang zur *Annex to the*	**WERKNORM N9100** ***COMPANY STANDARD N9100***		

[pekrun]

Erstellt am/*created at*: 19.05.2022
Erstellt von/*created by*: B. Schröder

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Assembly instruction wear sleeve (inner ring) 5

[pekrun]

Erstellt am/*created at*: 19.05.2022
Erstellt von/*created by*: B. Schröder

1. Allgemeine technische Daten
General technical data

Maße: *dimensions:*	ca. L= 2207 mm. B=1490 mm, H=1148 mm
Gewicht: *weight:*	3324 kg
Leistung: *rated power:*	P = 4100 kW
Antriebsdrehzahl: *input speed:*	n_1 = 1493 min^{-1}
Antriebsdrehzahl: *input speed:*	n_2 = 609,82 min^{-1}
Übersetzung: *transmission ratio:*	i = 2,4483 : 1
Service-Faktor: *Service factor:*	K_a = 2 DIN

2. Umgebungsbedingungen
Environmental conditions

Umgebungstemperatur: -16…+45°C
ambient temperature:

3. Schmierung
Lubrication

Typ: *type:*	Ölumlaufschmierung *Oil circulation lubrication*	
Schmierstoff: *lubricant:*	Ölviskosität: *oil viscosity:*	ISO VG 320
Schadenskraftstufe: *Scuffing resistance:*	12 (FZG-Test DIN 51354)	
Ölfüllmenge: *oil filling quantity:*	ca. 270 l	
Ölbedarf: *oil demand:*	ca. 56 l/min.	
Öldruck: *oil pressure:*	2 bar(g)	
Ölzulauftemperatur: *oil inlet temperature:*	+38…+47°C	

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4. Grenz- und Einstellwerte zur Überwachung des Getriebes:
Limit and setting values for gearbox monitoring:

		Warnung *warning*	Abschaltung *shutdown*	Normal *normal*
Gehäuseschwingungen *Housing vibration*		[mm/s]	[mm/s]	[mm/s]
- horizontal *- Horizontal*	:	> 4,5	> 7,1	≤ 4,5
- vertikal *- Vertical*	:	> 4,5	> 7,1	≤ 4,5
Temperaturen *Temperatures*		[°C]	[°C]	[°C]
- Ölzulauf *- Oil inlet*	:	< 15… > 60	< 10…> 80	38 ... 47
Öldruck *Oil pressure*		[bar]	[bar]	[bar]
vor dem Getriebe *in front of the gearbox*	:	< 1,4	< 1,2	1,6…6

5. Wichtige zusätzliche Informationen:
Important additional information:

ACHTUNG / CAUTION

Sachschaden

Beschädigungen am Getriebe durch zu große Wellenverlagerung.

Die kundenseitig zu montierende Kupplung an der Antriebswelle muss im Betrieb eine Wellenverlagerung von bis zu 2 mm ausgleichen können!

Risk of property damage!

Risk of damage to the gearbox due to large shaft misalignment.!

The coupling to be mounted on the drive shaft by the customer must be able to compensate a shaft misalignment of up to 2 mm during operation!

HINWEIS / NOTE

Beachten Sie bei Montage von Kupplungen die speziellen Betriebsanleitungen des Herstellers.

When installing couplings, always follow the specific instructions from the manufacturer.

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Erstellt von/*created by*: B. Schröder

6. Montageanleitung Verschleißhülse (Innenring)
Assembly instruction wear sleeve (inner ring)

Abmaße / Dimensions:

- Wellendurchmesser / shaft diameter: ø140m6 (+0,040 / +0,015)
- Verschleißhülse / wear sleeve: ø140 (+0,00 / -0,025)

Vorbereitung / Preparation:

1. Reinigen Sie Welle und O-Ring- Nut mit geeigneten Mitteln von allen Rückständen.
Clean shaft and O-ring groove from all residues using suitable means.
2. Glätten Sie eventuell vorhandene Grate und Riefen.
Smooth out any burrs and grooves that may be present.

Hilfsmittel, Personal / Auxiliary means, personnel

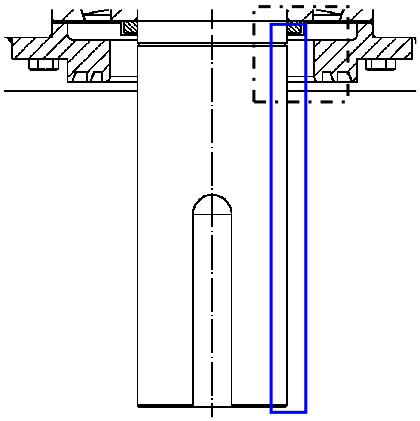
3. Fett / *grease* (z.B./*e.g.* Klüber Staburags NBU 12 K)
4. Induktionserwärmung / *induction heating*
5. Thermometer / *thermometer*
6. Hitzebeständige Handschuhe / *heat-resistant gloves*
7. Innenring / inner ring IR140x160x50 EGS PART-001292
(drallfrei geschliffen / *twist-free ground*)
8. 2x Wellendichtring / *shaft seal ring* DIN 3760-160x190x15-BAUMX7-FKM
9. 2x Schonhammer / *soft-face hammer*
10. 2x Messingdorn / *brass mandrel*
11. 2 Monteure / 2 fitters

Montage / Assembly

12. Die Temperatur der Welle muss kleiner 30°C sein.
Temperature of the shaft must be less than 30°C.

13. Fetten Sie das Wellenende leicht ein. (siehe blauer Bereich in Abbildung 1)
Lightly grease the shaft end. (see blue section in Figure 1)

Abbildung / Figure 1



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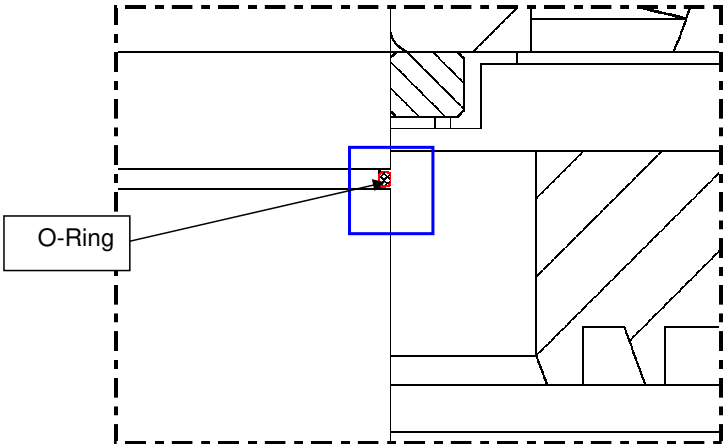
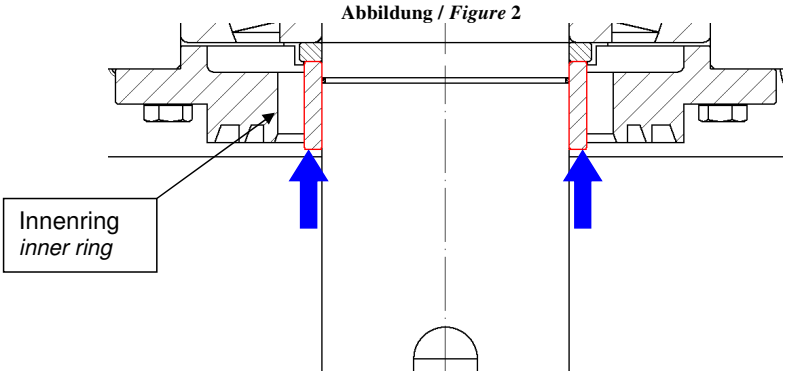
14. Fetten Sie den O-Ring ein.
    Grease the O-ring
15. Schieben Sie den O-Ring vorsichtig über die Welle bis in die Nut.
    Carefully push it over the shaft into the groove
16. Fetten Sie den O-Ring in der Nut noch einmal überall leicht ein.
    Lightly grease the O-ring in the groove once again

Ausschnitt aus Abbildung / Detail from figure 1



17. Erwärmen Sie den Innenring langsam auf 130°C.
    Slowly heat the inner ring to 130°C.
18. Nehmen Sie nun sofort den Innenring vom Erwärmungsgerät und schieben Ihn anschließend schnell über die Welle bis zum O-Ring.
    Immediately remove the inner ring from the heating device and then quickly slide it over the shaft to the O-ring.
19. Treiben Sie nun innerhalb von 15 Sekunden den Innenring gleichzeitig (auf 2 Seiten um 180° versetzt) mit den Messingdornen und Schonhammer axial über den O-Ring bis dieser am Anlagebund anliegt.
    Now, within 15 seconds, drive the inner ring simultaneously (offset by 180° on 2 sides) axially over the O-ring with the brass mandrels and soft-face hammer until the O-ring is in contact with the contact collar.

Abbildung / *Figure* 2



[pekrun]

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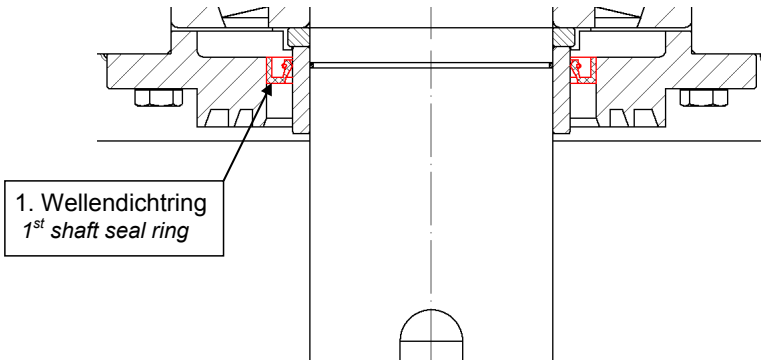
Erstellt von/*created by*: B. Schröder

20. Lassen Sie den Innenring abkühlen und montieren anschließend den ersten Wellendichtring.
Allow the inner ring to cool down and subsequently install the first shaft seal ring.

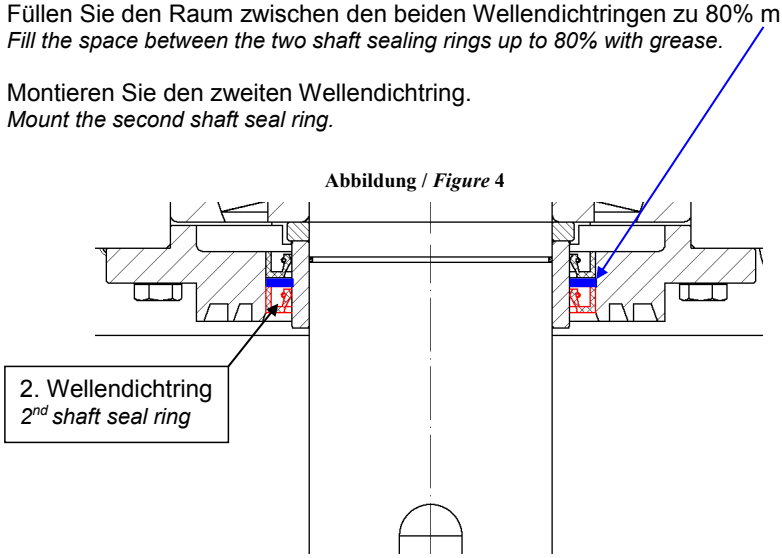
Abbildung / *Figure* 3



21. Füllen Sie den Raum zwischen den beiden Wellendichtringen zu 80% mit Fett.
Fill the space between the two shaft sealing rings up to 80% with grease.

22. Montieren Sie den zweiten Wellendichtring.
Mount the second shaft seal ring.

Abbildung / *Figure* 4



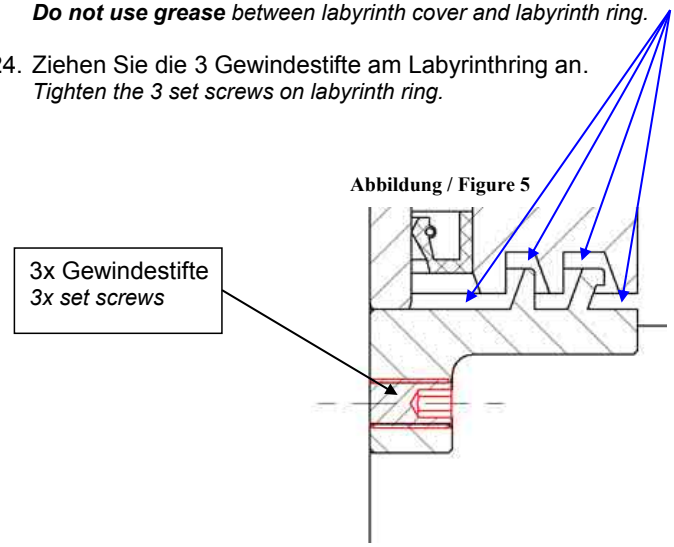
[pekrun]

Erstellt am/*created at*: 19.05.2022
Erstellt von/*created by*: B. Schröder

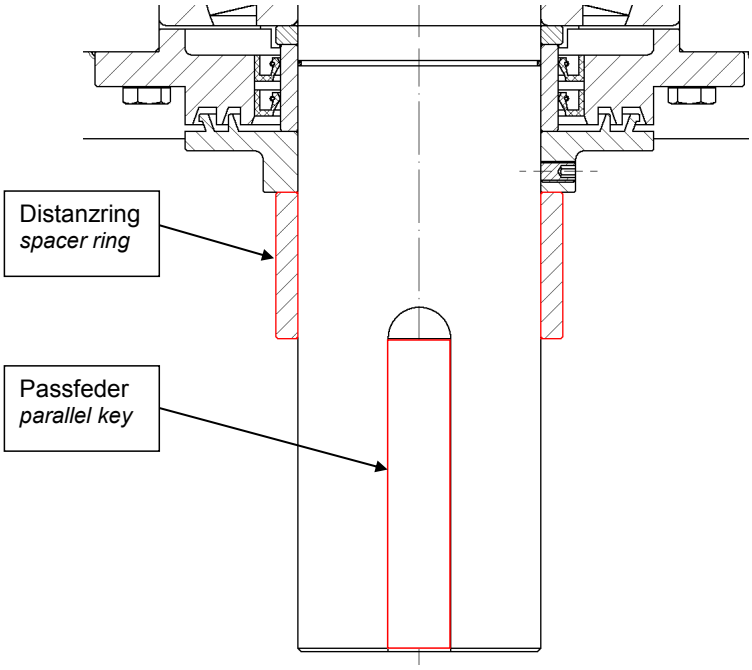
23. Montieren Sie den Labyrinthring.
    Mount the labyrinth ring.
    Verwenden Sie **kein Fett** zwischen Labyrinthdeckel und Labyrinthring.
    Do not use grease *between labyrinth cover and labyrinth ring.*

24. Ziehen Sie die 3 Gewindestifte am Labyrinthring an.
    Tighten the 3 set screws on labyrinth ring.

Abbildung / Figure 5



25. Montieren Sie Distanzring und Passfeder.
    Install the spacer ring and parallel key.



Dokument-Nr.: OFF-039791 Rev.: - 8 / 8

[pekrun]

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany

Translation of the original

Operating instructions

(including assembly instructions according to EU Machinery Directive 2006/42/EC, Annex VI for partly completed machinery)

for

Pekrun gearboxes

Scope :	Worm gearboxes, Cylindrical gearboxes (except turbo gearboxes), Bevel gearboxes(except mill gearboxes), Planetary gearboxes, Combinations of these / special-purpose gearboxes
Type :	…ALG... / ..AGZ… / ..AG… /..PG… / ..GV… / ..LG… / ..HS… ASR… / BSR… / CSR… / DSR… /..SR… / ..SH… / ..VN… / ..VG… / ..VH… AKR… / BKR… / ..KR… / ..KS.. / ...PL… …SO… / ..KZ… / ..MK…/ ..SV… / ..VH… / ..VH… / ..VN… SN*../ SNU*../ SNO*../ SNV*../ SNC*../ SNA*../ SNAF*.. SW*../SHS*../ SDA*../ SVA*../.SZA*../ ZVA*../ SEO*.. K*../KN*../ KNV*../ KNA*../ KS*../ KW*../ KZV*../ VKZ*../ SKV*.. SSN *../ SSNV*../ SSW*../ KSN*..

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CE	**COMPANY STANDARD N9100-EN**

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[pekrun]

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1 Important background information

1.1 Scope of supply

- Gearbox
(for delivery quantity and gearbox type, see confirmation of order and service spec/delivery agreement)
- Operating instructions incl. declaration of incorporation

1.2 Responsibilities

1.2.1 Responsibilities of the manufacturer

Pekrun Getriebebau GmbH completes assembly of the gearbox.

All instrumentation and all required monitoring devices are mounted on the gearbox. (If included in the scope of supply or provided by the customer.)

1.2.2 Responsibilities of the manufacturer of the completed machinery

The machine manufacturer or end customer is responsible for the execution of the foundation and its stability.

Further assembly of the machine is the responsibility of the machine manufacturer or end customer. The same applies to the electrical installation of the instruments and all required monitoring devices on the gearbox.

The assembly and provisioning of the required supply connections/lines is the responsibility of the machine manufacturer/operator.

The manufacturer of the completed machine must integrate all information relevant for operation (such as safety instructions, regulations and descriptions) from these operating instructions into the operating instructions for the completed machinery and keep these up to date over the entire lifetime of the gearbox.

1.2.3 Responsibilities of the operator

The operator or end customer is responsible for commissioning.

The operating instructions form part of the delivery. These instructions must be available at all times to persons tasked with carrying out assembly, operation, repairs, cleaning and maintenance.

	NOTICE
	The operator must ensure that the abovementioned persons have read and understood the operating instructions. The owner must ensure these instructions are followed to the letter, in order to: – prevent hazards to the life and limb of users and third parties; – ensure the operational safety/reliability of the gearbox; and – rule out failures and environmental hazards resulting from incorrect handling.

1.3 External interfaces

For existing and/or relevant interfaces, please see the order-specific dimensional or section drawing and the technical data sheet in the appendix to these instructions.

Gearbox – machine:

The gearbox is connected to the rest of the machine by one or more drive shafts or by one or more gear output shafts.

Gearbox – energy supply:

The electrical energy supply for the instrumentation and monitoring devices (if included in the scope of supply or provided by the customer) is connected and provided by the operator or end customer.

The hydraulic energy supply for switching cylinders (if included in the scope of supply) is connected and provided by the operator or end customer.

Gearbox – process media supply:

When connected to an external oil supply system:

- the relevant oil inlet and outlet connections are connected and provided by the operator or machine manufacturer.

When connected to a coolant supply system (water/oil cooler or cooling coil):

- the relevant cooling water inlet and outlet connections are connected and provided by the operator or machine manufacturer.

Gearbox – housing:

The gearbox is connected with fixing screws to the foundation or the steel structure provided by the operator or end customer. End stops intended for levelling the gearbox precisely on the foundation are provided by the machine manufacturer, operator or end customer.

1.4 Legal information

The copyright to these operating instructions is retained by:

Pekrun Getriebebau GmbH

The present operating instructions are an integral part of the delivery and must always be kept close to the gearbox.

Pekrun Getriebebau GmbH accepts no liability for damage or operational disruption resulting from a failure to follow the operating instructions.

The gearbox must not be opened during the warranty period except by Pekrun employees. If this is not possible, obtain written approval from Pekrun before having the gearbox opened by other personnel – failure to do this will void the warranty! This does not include the opening of inspection covers or oil feed inlets.

1.5 Documentation

1.5.1 Background information about content and structure

These operating instructions provide you with important information about your gearbox.

They are intended to help you to handle the gearbox safely.

1.5.2 Content and structure

These operating instructions provide you with important safety information for all of the gearbox's lifecycle phases.

The order-specific appendix includes the following documentation: handling instructions and technical data, as well as drawings and spare parts lists (as applicable).

User information provided by other suppliers (also included in the appendix) also forms an integral part of these operating instructions.

1.5.3 Conventions

General terms used

Dimensional drawing/data sheet: *

An assembly schematic for the gearbox, which includes the most important dimensions for installation into the overall plant as well as basic data for the intended use. These instructions use the term "dimensional drawing".

Section drawing/MRP drawing:*

Assembly schematic for the gearbox, which includes the gearbox structure and the positioning of all of the parts as a sectional view. These instructions use the term "section drawing".

Spare parts list/bill of materials:*

List of all parts in the gearbox that are required for repairs or when purchasing spare parts. These instructions use the term "spare parts list".

Technical data sheet (per order):*

Data sheet created for each order and which includes other important items of data (as needed) relevant for the intended use. This information must be followed in addition to the operating instructions and dimensional drawing.

* The documents supplied will vary according to the requirements and use case.

Abbreviations:

OI = Operating instructions

PPE = Personal protective equipment

EM = Electric motor

OSS = Oil supply system

Special technical terms:

Skilled personnel, qualified personnel:

A person whose appropriate training and experience enables them to detect risks, and to avoid possible hazards that can be caused by operating or servicing a product.

User:

A person or organisation capable of commissioning a product and/or using it to carry out a required function, including activities that range from cleaning to decommissioning at the end of the product's lifetime.

Guard:

A physical barrier that is designed to offer protection as an integral part of the machine.

1.6 Service address

If you have any technical queries, please contact our factory:

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24h Customer Service hotline: +49 (0)2371 945-116

2 Safety

2.1 Conventions for safety instructions

2.1.1 Formatting

Certain kinds of information are emphasised and highlighted by means of appropriate formatting:

Table 2-1

Convention	Type of information
Bold type	Especially important components, as well as headings
Red type	Important warning notices

2.1.2 Symbols

The following symbols are used throughout the operating instructions:

Table 2-2

Symbol	Description
	Risk of **personal injury** A failure to observe this safety instruction can lead to serious injury or death
	Warning, general
	Warning about a potential hazard Entanglement hazard
	Warning about a potential hazard (hot surfaces) Risk of burn injuries
	Warning about a potential hazard Suspended loads
	Operating instructions (general) Follow operating instructions and other relevant documents
	General mandatory sign Risk of damage
	Mandatory sign for lashing point/crane transportation Use the lashing points provided

2.1.3 Explanation of safety information provided

These operating instructions use the following signal words and symbols for warnings. If multiple hazards apply, the warning notice is used for the next-higher level in each case.

	DANGER Indicates an immediate hazard. A failure to follow this safety warning can lead to death or serious injury.

	WARNING Indicates a potential hazard with a moderate risk. A failure to follow this safety warning can lead to death or serious injury.

	CAUTION Indicates a hazard with a low risk. A failure to follow this safety warning can lead to minor or moderate injury.

	TAKE CARE Provides important advice about avoiding damage to property. A failure to follow such safety instructions can lead to damage to the gearbox or the overall machine, and to the environment.

	NOTICE Used to provide information about general handling and operation. Should be followed at all times.

	NOTICE Provides important advice about the operating instructions and order-specific documents.

2.2 Emergency procedures

DANGER

Danger to life from faulty gearbox or overall machine

Switch off the drive unit immediately in an emergency!

The drive unit must be taken out of service immediately if you identify any changes to the gearbox during operation, such as an elevated operating temperature or changes in the noises made by the gearbox.

TAKE CARE

Risk of damage

A failure of the gearbox can cause consequential damage.

Take appropriate action to avoid further damage to the gearbox.

2.3 Intended use

2.3.1 Area of application

The gearbox is intended exclusively for use in an industrial environment.

The gearbox is intended for installation in a machine.

The gearbox must be deployed and operated within the operating conditions and performance limits specified by the service spec/delivery agreement.

NOTICE

For important information about the intended use and the application area, also see the type plate and the dimensional drawing as well as the order-specific technical data sheet.

2.3.2 Requirements for personnel

The operating instructions form part of the delivery. These instructions must be available at all times to persons tasked with carrying out assembly, operation and maintenance.

NOTICE

Steps must be taken to ensure that all abovementioned persons have read and understood the operating instructions. It is advisable to assign the tasks listed above to people who have received appropriate professional training in these areas.

(Skilled personnel/qualified personnel)

The following persons are authorised to handle the product:

- Hauliers: personnel with basic training
- Fitters: Skilled personnel, qualified personnel
- Installers: Skilled personnel, qualified personnel
- Users: trained personnel
- Servicing personnel: Skilled personnel, qualified personnel

NOTICE

All work must be carried out with the greatest of care and due attention to **safety**. Observe the minimum requirements for safety and health protection when using work equipment, in accordance with the respective regulations of the country of use.

2.3.3 Safety-relevant ambient conditions

DANGER

Danger to life when operated in a potentially explosive atmosphere!

The gearbox must be deployed and operated within the ambient conditions specified by the service spec/delivery agreement.

NOTICE

For important safety-relevant information about ambient conditions, see the dimensional drawing and the order-specific technical data sheet.

2.3.4 Safety-relevant information for specific lifecycle phases

Set-up conditions:

Set up the gearbox on a foundation or steel structure that is as level, safe and inelastic as possible. The flatness tolerance of the set-up area is 0.1 mm per 1 m.

Connection conditions:

The connection to the drive unit and the working machine must be installed by the machine manufacturer/operator, using the respective gear shafts and with the help of a suitable coupling. This work also includes the guards to be installed in accordance with DIN EN ISO 12100-1 for all shafts and moving parts.

The connection from an external oil supply system to the gearbox must be provided and assembled by the machine manufacturer/operator by using suitable connections/lines. (If applicable.) To avoid overpressure or leaking oil lines, the machine manufacturer/operator should install a pressure monitoring system or pressure relief valve.

The connection from the hydraulic or pneumatic supply unit to the switching cylinders must be provided and appropriately assembled by the machine manufacturer/operator by using suitable connections/lines. (if applicable)

The electrical installation of the instrumentation and monitoring devices on the gearbox must be completed by the machine manufacturer/operator using qualified personnel (electricians). (if applicable)

Assembly

During set-up of the gearbox, there is a risk of injury to limbs due to crush and shear injuries. Damage to the musculoskeletal system can also occur, as can fatigue and discomfort as a result of incorrect posture.

If guards are not installed properly, this can lead to hazards from touching the machine accidentally.

During dismantling work, there is a risk of slip/fall injuries from pools of oil formed by leaking lines or flanged connections.

During installation work, there is a risk of injury during assembly on live parts. All live parts must be de-energised before carrying out assembly work.

Avoid placing the assembly personnel at any risk. Keep to safety clearance distances.

Operation

The rotation of the shafts presents a risk of entrapment injuries.

Due to the movement of external parts (such as switching cylinders for switching operations), there is a risk of crush/shear injuries to limbs.

Mount a guard that complies with DIN EN ISO 12100-1.

Depending on the operating conditions, the surface temperature of the gearbox can be very high. Contact with the housing can cause burn injuries to the skin.

Switch gearbox gears only when it is at a standstill and without any applied torque. (if applicable)

Maintenance and servicing

If guards are not installed properly, this can lead to hazards from touching the machine accidentally.

Maintenance and servicing must be performed when the gearbox is at a standstill.

During maintenance work, there is a risk of injury during assembly on live parts. All live parts must be de-energised before carrying out assembly work.

During servicing and maintenance work, there is a risk of slip/fall injuries from pools of oil formed by leaking lines or flanged connections.

When changing the oil, escaping hot oil can cause scald injuries on the skin.

Depending on the operating conditions, the surface temperature of the gearbox can be very high. Even after having been at a standstill for a while, contact with the housing can cause burn injuries to the skin.

Dismantling

Dismantle the gearbox only when it is at a standstill.

When draining the oil, escaping hot oil can cause scald injuries on the skin.

Depending on the operating conditions, the surface temperature of the gearbox can be very high. Even after having been at a standstill for a while, contact with the housing can cause burn injuries to the skin.

During dismantling work, there is a risk of slip/fall injuries from pools of oil formed by leaking lines or flanged connections.

During removal of the gearbox from the machine, there is a risk of crush, shear and amputation injuries to limbs.

Disposal

During disposal work, skin may come into contact with dirty oil. Use suitable personal protective equipment (PPE).

Always observe the environmental protection regulations in the country of use.

2.4 Possible misuse

Operation of the gearbox in a potentially explosive atmosphere
⇨ Consequence: Explosion hazard.

Operating the gearbox in the opposite direction of rotation or at too high a speed. This presents the risk of damage to the gearbox. Gearing parts and bearings may also be destroyed.
⇨ Consequence: Risk of breakage during operation

Operating the gearbox with the inspection cover open.
Dirt can enter the housing, and oil or other particles can be ejected out of the housing.
⇨ Risk of injury resulting from ejected parts and fluids
Personnel can reach into the housing during operation and their limbs can be caught between rotating shafts inside the gearbox.
⇨ Risk of shear and crush injury

Operating the gearbox without a functional oil supply or with the wrong grade or quantity of oil. This presents a risk of damage to the gearbox. Gearing parts and bearings may also be destroyed.
⇨ Possible risk of breakage during operation

Switching gearbox gears during operation. This presents a risk of damage to the gearbox. Gearing parts and bearings may also be destroyed.
⇨ Possible risk of breakage during operation

Performing welding work on the gearbox. Using the gearbox as a return during welding work. Gearing parts and bearings can be destroyed.
⇨ Possible risk of breakage during operation

Personnel who are **not** qualified are assigned assembly, commissioning and maintenance work. All personnel assigned assembly, commissioning and maintenance work must have read and understand the operating and maintenance instructions for the gearbox. It is advisable to assign the tasks listed above to people who have received appropriate professional training in these areas.
⇨ Danger arising from incorrect assembly

2.5 Following the operating instructions

These operating instructions are an integral part of the gearbox delivery.

Always keep these operating instructions close to the gearbox.

Retain the operating instructions for the entire lifetime of the gearbox.

If necessary, pass the operating instructions on to the next owner or user of the gearbox.

2.6 Residual risks and protective measures

2.6.1 Residual risks and protective measures for certain lifecycle phases

⚠ Hazard area: Transportation (manufacturer, haulier, operator)	
Residual risks:	Protective measures:
During transportation and loading/unloading of the gearbox, the gearbox may slip, fall or drop from a height onto personnel because loads have been secured and/or anchored incorrectly, or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if operators are trapped between obstacles and the load.	- Inform all personnel entrusted with the transportation and setup of the gearbox about the existing residual risks, and especially about the selection of suitable load-handling equipment and proper securing of loads. - Always commission properly trained personnel with the transportation and loading/unloading of the gearbox. - Keep the speed of travel as low as possible. - Avoid rapid changes between moving and stopping the load, and the oscillations that this causes. - Avoid any endangerment to personnel. - Take care to ensure that personnel do not become trapped between obstacles and the load. - Keep to safety clearance distances. Wear PPE. - Transport the gearbox slowly and carefully, and especially when in a raised position. - Ensure the gearbox is anchored safely and correctly - Note the centre of gravity (which may be off-centre), weight and dimensions of the gearbox. Follow instructions about load distribution on the packaging or dimensional drawing. - Use suitable vehicles and loading platforms for transportation (load-bearing capacity, dimensions) - Secure the gearbox safely to the loading platform. - Choose ancillary equipment providing an adequate means to fix and lift the unit, with appropriate dimensions. (See section 5.)

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Safety

Hazard area:Assembly and installation (operator)	
Residual risks:	Protective measures:
General	- Only entrust the assembly and installation of the gearbox to properly qualified personnel, preferably those with relevant professional training. - Wear suitable PPE. - Inform all personnel entrusted with the assembly and installation of the gearbox about the existing residual risks. (See sections 5, 6, 7 and 8.)
During setup of the gearbox on the base frame, the unit may slip, fall or drop from a height onto personnel because loads have been anchored incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if operators are trapped between obstacles and the load.	- Keep the speed of travel as low as possible. - Avoid rapid changes between moving and stopping the load, and the oscillations that this causes. - Avoid any endangerment to personnel. - Take care to ensure that personnel do not become trapped between obstacles and the load. - Keep to safety clearance distances. Wear PPE. - Transport the gearbox slowly and carefully, and especially when in a raised position. - Ensure the gearbox is anchored safely and correctly - Note the centre of gravity (which may be off-centre), weight and dimensions of the gearbox. Follow instructions about load distribution on the packaging or dimensional drawing. - Ensure personnel have physical aptitude for the task
Damage to the musculoskeletal system can occur, as can fatigue and discomfort as a result of incorrect posture.	
When assembling the couplings on the shaft or during assembly of the remaining machine, there is a risk of injury to limbs due to crush and shear injuries	
If guards are missing or not installed properly, this can lead to hazards from touching the machine accidentally.	- Instruct personnel entrusted with assembly and installation about the importance of machine guards
During installation work, there is a risk of injury during assembly on live parts.	- All live parts must be de-energised before carrying out assembly work.
When removing the anticorrosion protection with solvents or when opening the inspection cover, there is a risk of injury from escaping toxic or combustible gases.	- The handling of hazardous substances (solvents or spills of corrosion inhibitor oils) should be entrusted only to qualified personnel, ideally with appropriate professional training. - These regulations must be followed: the German Ordinance on Hazardous Substances, EU Regulation 1907/2006, and EU Directives 2010/75/EU and 89/656/EEC
When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.	- Observe the safety data sheet for the media being used. - Wear suitable PPE (safety goggles and gloves). - Have suitably-qualified personnel carry out the work. - Remove any oil spills that occur immediately (e.g. with oil binder).
When working on parts filled with oil, such as pipelines and the interior of the gearbox, skin can be exposed to contact with aggressive media.	

During assembly and installation work, personnel may slip or fall as a result of leaking oil or existing spills of oil.	- Clean up any oil spills or oil leaks with an oil binder. - Seal any leakage points as soon as possible.

Hazard area: First use (operator)	
Residual risks:	Protective measures:
General	- Only entrust the first use to properly qualified personnel, preferably those with relevant professional training - Wear suitable PPE. - Inform all personnel entrusted with the first use of the gearbox about the existing residual risks. (See section 8 and 9.)
During the first use, leaky lines or flanged joints may spray out oil as a result of overpressure in the oil supply system or when pressurising the hydraulic lines in the switching unit. As a result, this oil may come into contact with personnel (e.g. get into eyes).	- Before the first use, check all oil supply lines and flanged joints to and on the gearbox, and check that these are connected/seated tightly. - Before the first use, check all hydraulic connecting lines and hoses for correct seating as well as any leaks - Use suitable PPE (eye protection)
During the first use, personnel may slip or fall as a result of leaking oil or existing spills of oil.	- Clean up any oil spills or oil leaks with an oil binder. - Seal any leakage points as soon as possible.
If guards are missing or not installed properly, this can lead to hazards from touching the machine accidentally.	- Inform all personnel entrusted with the first use of the gearbox about the existing residual risks
During operation, foreign objects such as sand and dust can land on the rotating parts and then be ejected forcefully by these parts. When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit. This creates a risk of eye injuries from objects being ejected with force from the unit, as well as sprays of pressurised oil escaping from the unit.	- The operator/customer must set up guards to prevent access to the danger zone involving rotating machine shafts. - Before the first use, all oil supply lines and flanged joints to and on the gearbox should be checked for leaks and proper seating. (If applicable.) - All hydraulic connecting lines and hoses must be checked for leaks and correct seating. (If applicable.) - Observing correct maintenance intervals (checking for leaks at/on connection points/parts that are pressurised) - Ensure that all work on pipelines is carried out with due care and attention. - Wear appropriate protective clothing and suitable eye protection.

[pekrun]

Hazard area: troubleshooting, servicing, maintenance and cleaning (operator)	
Residual risks:	Protective measures:
General	- Only entrust troubleshooting, maintenance and cleaning work to properly qualified personnel, preferably those with relevant professional training - Wear PPE. - Only perform work on the gearbox when it is at a standstill. - Inform all personnel entrusted with troubleshooting, servicing, maintenance and cleaning work on the gearbox about the existing residual risks. (See section 10 and 11.)
There is a risk of crush injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers)	- Always wear PPE (gloves and shoes).
Personnel may come into contact with the hot surface of the gearbox housing (even after a while at a standstill) and can suffer burn injuries by then touching it.	- Check the temperatures at the gearbox and on the gearbox surface, and avoid starting any work before the surface has cooled down to a safe temperature.
When changing the oil, escaping hot oil can cause scald injuries on the skin.	
During troubleshooting work, leaky lines or flanged joints may spray out oil as a result of overpressure in the oil supply system or when pressurising the hydraulic lines in the switching unit. As a result, this oil may come into contact with personnel (e.g. get into eyes).	- Before the first use, check all oil supply lines and flanged joints to and on the gearbox, and check that these are connected/seated tightly. - Before the first use, check all hydraulic connecting lines and hoses for correct seating as well as any leaks
When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.	- Observe the safety data sheet for the media being used. - Wear suitable PPE (safety goggles and gloves). - Have suitably-qualified personnel carry out the work. - Remove any oil spills that occur immediately (e.g. with oil binder).
When working on parts filled with oil, such as pipelines and the interior of the gearbox, skin can be exposed to contact with aggressive media.	
Personnel may slip or fall as a result of leaking oil or existing spills of oil.	- Clean up any oil spills or oil leaks with an oil binder. - Seal any leakage points as soon as possible.
During this work, there is a risk of injury during assembly on live parts.	- All live parts must be de-energised before carrying out assembly work.

Hazard area: decommissioning and dismantling (operator)	
Residual risks:	Protective measures:
General	- Only entrust decommissioning and dismantling work to properly qualified personnel, preferably those with relevant professional training - Wear PPE. - Only perform work on the gearbox when it is at a standstill. - Inform all personnel entrusted with the decommissioning and dismantling of the gearbox about the existing residual risks. (See section 12.)
There is a risk of crush injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers)	- Always wear PPE (gloves and shoes).
During removal of the gearbox from the machine or base frame, the unit may slip, fall or drop from a height onto personnel because loads have been anchored incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if operators are trapped between obstacles and the load.	- Keep the speed of travel as low as possible. - Avoid rapid changes between moving and stopping the load, and the oscillations that this causes. - Avoid any endangerment to personnel. - Take care to ensure that personnel do not become trapped between obstacles and the load. - Keep to safety clearance distances. Wear PPE. - Transport the gearbox slowly and carefully, and especially when in a raised position. - Ensure the gearbox is anchored safely and correctly - Note the centre of gravity (which may be off-centre), weight and dimensions of the gearbox. Follow instructions about load distribution on the packaging or dimensional drawing. - Ensure personnel have physical aptitude for the task
Damage to the musculoskeletal system can occur, as can fatigue and discomfort as a result of incorrect posture.	
When removing the couplings from the shaft or other parts of the machine, there is a risk of injury to limbs due to crush and shear injuries	
Personnel may come into contact with the hot surface of the gearbox housing (even after a while at a standstill) and can suffer burn injuries by then touching it.	- Check the temperatures at the gearbox and on the gearbox surface, and avoid starting any work before the surface has cooled down to a safe temperature.
When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.	- Observe the safety data sheet for the media being used. - Wear suitable PPE (safety goggles and gloves). - Have suitably-qualified personnel carry out the work. - Remove any oil spills that occur immediately (e.g. with oil binder).
When working on parts filled with oil, such as pipelines and the interior of the gearbox, skin can be exposed to contact with aggressive media.	
Personnel may slip or fall as a result of leaking oil or existing spills of oil.	- Clean up any oil spills or oil leaks with an oil binder.
During removal work, there is a risk of injury during assembly involving live parts.	- All live parts must be de-energised before carrying out assembly work.

When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit. This creates a risk of eye injuries from objects being ejected with force from the unit, as well as sprays of pressurised oil escaping from the unit.	- During dismantling work, oil supply lines and flanged joints to and on the gearbox should be checked. (If applicable.) - All hydraulic connecting lines and hoses must be checked for leaks. (If applicable.) - Ensure that dismantling work on pipelines is carried out with due care and attention. - Wear appropriate protective clothing and suitable eye protection.

2.6.2 General protective measures

	DANGER
	Danger to life when working on a switched-on machine **As a general rule, always shut down the gearbox and all parts of an installed and connected oil supply system.** **Ensure that the entire machine is de-energised and depressurised.** Secure the drive unit against accidental switch-on (e.g. by locking the key switch or removing the fuse from the power supply unit). Secure the gearbox's start-up console by posting up a sign indicating that work is in progress on the gearbox.

Only perform work on the gearbox when it is at a standstill.

	DANGER
	Danger to life from rotating and/or moving parts **Risk of injury from being trapped and pulled in by rotating and/or moving parts!** Secure all rotating drive parts such as couplings, gears/sprockets or belt drives so they cannot be touched. All external moving parts such as switching cylinders must be shielded so they cannot be touched. Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

Secure rotating and/or moving parts with guards so that they cannot be touched.

DANGER

Danger to life from dangerous electrical voltage

During installation work on the gearbox, there is a risk of injury during assembly on live parts.

Ensure that all work on electrical parts is carried out only by suitably qualified electricians.

Always observe the 5 safety rules according to DIN EN 50110-1:
Before starting work:

- Disconnect from the mains (isolate all power lines, including any ancillary circuits)
- Secure against re-connection
- Verify that the system is dead
- Carry out earthing and short-circuiting
- Provide protection from adjacent live parts

All live parts must be de-energised before carrying out work on the gearbox.

WARNING

Risk of eye injuries from objects being ejected with force from the unit, as well as escaping sprays of pressurised fluids!

During operation, foreign objects such as sand and dust can land on the rotating parts and then be ejected forcefully by these parts.

Wear appropriate eye protection.

When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.

Wear appropriate protective clothing and eye protection.

For all work, always use suitable PPE. This includes hand protection (protective gloves), eye protection (safety goggles), head protection (hard hat), foot protection (safety boots) and hearing protection (ear muffs or ear plugs).

Only use PPE that complies with the safety requirements from the EU PPE Regulation 2016/425.

WARNING

Risk of burn injury from touching the gearbox!

This may cause serious burn injuries.

During operation and for a period of time after standstill, serious burn injuries can be caused by touching hot surfaces (>55 °C).

– Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

– Let the gearbox cool down to a safe temperature before you touch it.

– Wear suitable protective gloves and protective clothing.

WARNING

Risk of burn injuries from escaping hot working fluid!

This may cause serious scald injuries.

During maintenance and repair work as well as oil changing work directly following operation – and for a period of time after standstill – there is a risk of serious injury from escaping hot working fluid (>55 °C).

– Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.) Keep protection in place while temperatures are not safe.

– Let the working fluid cool down to a safe temperature before performing any work.

– Wear suitable protective gloves and protective clothing.

WARNING

Risk of injury from direct contact!

Contact with cold surfaces carries a risk of serious injury.

While the machine is at a standstill (if this has cooled down to the ambient temperature), potentially serious injuries can be caused by extreme cold (pain, numbness, frostbite) if cold surfaces (<0 °C) touch exposed skin.

– Check the temperatures of the gear unit and/or gearbox surface before touching it/them.
- Wear suitable protective gloves and protective clothing.

CAUTION

Risk of injury from incorrect posture!

Incorrect or unhealthy bodily posture during assembly work can lead to ergonomic hazards in the form of disorders of the musculoskeletal system, fatigue and discomfort.

– All persons tasked with the installation must be informed of the residual risks associated with assembly work.
– Entrust all assembly work to qualified personnel, ideally with appropriate professional training.

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Safety

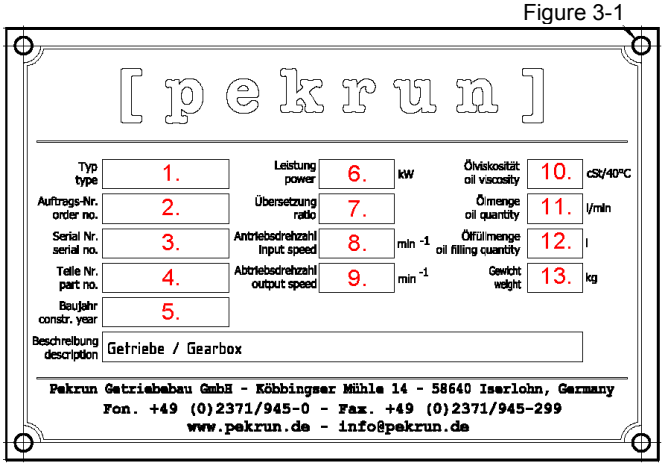
	TAKE CARE
	Risk of damage **Risk of damage from the ingress of moisture!** **Do not** clean the gearbox with a pressure washer: this can cause moisture to penetrate inside the gearbox, where it can cause serious damage.
	Risk of damage to gearbox by switching during operation! **Switch gearbox gears only when it is at a standstill.** **Also ensure that the gearbox is de-energised. The input and output sides must be able to rotate freely.** It must not be possible to actuate the switching cylinders unless the shafts are not rotating at all and there is no torque acting on the shafts. **An interlock must therefore be used.** If necessary, alter the position of the gear selectors using jog mode on the drive unit, so as to make it easier for the gear selectors to engage. The drive unit must not be released for normal operation until the gear has been fully engaged in its final position on the gearbox.
	Risk of damage from changes affecting the gearbox! The drive unit must be taken out of service immediately if you identify any changes to the gearbox during operation, such as an elevated operating temperature or changes in the noises made by the gearbox.
	Risk of damage from welding work! Do not carry out any welding work on the gearbox. Do not use the gearbox as a grounding point for welding work. This could damage gearing parts and bearings.

	NOTICE
	Replace any bolts/screws rendered unusable by assembly or dismantling work. Always replace with bolts/screws of the same design and strength class (screw lock, tightening torque, etc.).
	Help to protect the environment! – When changing the oil, collect used oil in appropriate containers – Clean up any oil spills immediately – Store corrosion inhibitors separately from used oil – Dispose of used oil, corrosion inhibitors, oil binders and cleaning rags soaked in oil according to the applicable local environmental regulations
	Follow signs affixed to the gearbox, such as the type plate, arrow indicating the direction of rotation, etc. These must be free from dirt and paint. Replace any missing signs.

3 Technical data

The technical data and the agreements specified in the contract between the ordering party and Pekrun set the limits within which the product is intended to be used. For the most important items of technical data, please see the type plate that is permanently affixed to each Pekrun gearbox.

Figure 3-1



1. Type: Serial/type designation is made up of the model no. and size

2. Order no.: Pekrun order number, e.g. 12345

3. Serial no.: Sequential serial number, e.g. 10000123

4. Part no.: Material/article number, e.g. PART-012345

5. Year of construction: Year of production

6. Power rating: Nominal power rating in kW

7. Gear ratio: i, e.g. 1: 2.345

8. Input speed: n_1 in rpm

9. Output speed: n_2 in rpm

10. Oil viscosity: ISO VG XXX in c/St/40 °C

11. Oil quantity: Oil quantity for recirculating lubrication in l/min.

12. Oil fill quantity: For gearbox with minimum oil fill level, e.g. for splash lubrication

13. Weight: Total weight in kg

	NOTICE
	For other technical specifications, please see the dimensional drawing and the technical data sheet, which is prepared according to the order. (See appendix.)
	Type plates or other information on the device must not be removed, made illegible or otherwise rendered unrecognisable. If this rule is not complied with, it will void all guarantees and manufacturer liability. Also observe all type plates on attachment parts.

4 Structure and function

4.1 Structure

These operating instructions apply for Pekrun gearboxes comprising cylindrical gearboxes, bevel gearboxes, planetary gearboxes, worm gearboxes or combinations of these types. The gearboxes may incorporate 2-stage or multi-stage designs.

For the gearbox structure and layout, consult the supplied dimensional or section drawing.

Torque transmission parts (excepting the input/output shafts) are completely enclosed by the housing. The shaft ends protruding from the housing are intended for connection to the overall machine.

	TAKE CARE
!	**Risk of damage** **Risk of irreparable damage to the gearbox or parts from incorrect direction of rotation!** For the direction of rotation, see the direction of rotation arrow on the gearbox, or the enclosed and authoritative dimensional drawing or order-specific technical data sheet. If no direction of rotation if specified in the supplied technical documents, then the gearbox can be operated in both directions.

4.1.1 Housing

The gearbox housing is made from either cast iron or structural steel (welded housing designs). The design is torsion-resistant.

To check gearing, inspection windows are provided in the form of inspection covers or inspection holes.

Where applicable, oil fill levels can be checked by an oil level window located on the side, or an oil sight glass, oil dipstick or oil level indicator.

Options for oil filling include drilled holes (e.g. for the aeration filter) as well as other holes or inspection covers.

An oil drain plug (flange connection or attached ball valve with oil supply system) is provided to drain oil for an oil change.

The housing is equipped with appropriately sized transportation lugs or transportation eyes.

For the exact design, please see the order-specific dimensional or section drawing.

4.1.2 Gearing and shafts

Depending on requirements and use case, different types of gearings or combinations of gearings are provided in the gearbox. These may consist of cylindrical and bevel gear pairs or planetary and worm gear pairs.

For the exact design, please see the order-specific dimensional or section drawing.

The gearwheels are joined to the shafts (also including hollow shafts) with parallel key connections, interference fits, etc.

Parts that transmit torque are manufactured from steel (as well as non-ferrous metals for

worm gear pairs). The exact materials used are specified as part of the engineering design in accordance with the intended use.

The high quality of the gearing as well as the worm gear pairs guarantees reliable running and minimises noise levels.

4.1.3 Shaft bearing

Gearbox shafts are typically mounted in anti-friction bearings. Depending on requirements and use case, the bearing arrangement can also use slide bearings or bearing bushes.

For the exact design, please see the order-specific dimensional or section drawing.

4.1.4 Lubrication

The type of lubrication (oil or grease lubrication, splash or pressure lubrication), oil viscosity and oil volume are all determined as part of the engineering design.

TAKE CARE

Risk of damage

Risk of damage to the gearbox if operated without lubrication!

Ensure that lubrication is performed regularly and correctly. Use appropriate lubricants. This approach achieves the highest levels of operational reliability for the gearbox and a long lifetime.

- Attach parts supplied separately or which were removed for transportation, such as pressure gauges, thermometers, piping, etc.
- **Always ensure the gearbox is filled with oil.**
  (Exception: for gearboxes lubricated with grease, check the fill level.)
- Proceed with commissioning as described in **section 8**.

Splash lubrication

If no particular kind of lubrication is described in the supplied technical documents, adequate lubrication of the gear pairs and bearings is ensured with the gearing and splash lubrication. This makes the gearboxes especially low-maintenance.

Pressure lubrication

Pressure lubrication using oil pumps is needed in the following cases:

a) Providing lubrication to gearing and bearings at high circumferential speeds
b) Cooling by an oil cooler
c) Roller bearing lubrication for higher speeds of larger bearings
d) Slide bearing lubrication
e) Special installation setups and for gearboxes where splash lubrication is not possible.

Pressure lubrication is provided as follows:

- By a flange-mounted oil pump directly to a gear shaft

or

- By a motor oil pump attached to the gearbox housing
- By a separate oil supply system
- By a centralised, customer oil supply system

The piping and connecting lines are laid onto/in the gearbox and fixed in place.

Monitoring of the lubrication system

Monitor the following operational states to ensure error-free operation of the oil circuit:

a) Oil pressure => Pressure gauge/pressure switch, etc.

b) Oil temperature => Dial-type thermometer/resistance thermometer, etc.

c) Oil flow rate => Flow indicator/flow sensor, etc.

TAKE CARE

Risk of damage

Risk of damage to the gearbox if operated without lubrication!

For gearboxes with an attached oil supply system, ensure that the instrumentation provided is properly functional before commissioning.

NOTICE

For operation and maintenance of the pump, filters and monitoring instruments, follow the operating instructions listed in the order-specific appendix as provided.

4.1.5 Sealing

Depending on requirements, rotary shaft seals or labyrinth seals (depending on the use case) on the extended shaft ends prevent oil from leaking out of the gears as well as impurities from entering the gearbox.

4.2 Functional description

Pekrun gearboxes consist of one or more gear pairs (either interlocking pairs or worm gear pairs) that are completely enclosed by the housing. The housing does not enclose the shaft ends on the input and output shafts. These shaft ends extend out the housing and are intended for connection to the overall machine.

The gear or worm wheels are used for the direct transmission of the smallest to the largest forces and speeds between parallel, skewed or intersecting shafts.

5 Inbound delivery, in-house transportation

5.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

NOTICE

Pay attention to the safety instructions in **section 2**: Safety

DANGER

Danger to life, risk of crush/shear injuries!

Risk of serious injury from suspended loads!

During transportation and loading/unloading of the gearbox, the gearbox may slip, fall or drop from a height onto personnel because loads have been lashed incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if users are trapped between obstacles and the load.

Comply with the following protective measures:

– Inform all personnel entrusted with the transportation and set-up of the gearbox about the existing residual risks, and especially about the selection of suitable load-handling equipment and proper load lashing.

– Avoid any endangerment to personnel:
  Take care to ensure that personnel do not become trapped between obstacles and the load. Keep to safety clearance distances. Wear PPE.
  Transport the gearbox slowly and carefully, and especially when in a raised position.

– Ensure the gearbox load is lashed safely and correctly:
  Do not exceed the load limits of the lifting gear
  Distribute the load evenly when using multiple slings for load lashing (take care: centre of gravity may be off-centre) Follow instructions about load distribution on the packaging or dimensional drawing.

– Always commission properly trained personnel with the transportation and loading/unloading of the gearbox:
  Keep the speed of travel as low as possible.
  Avoid rapid changes between moving and stopping the load, and the oscillations that this causes.

TAKE CARE

Risk of damage

Risk of damage to gearbox if incorrect lashing points are used!

Never use the shaft journals to lift the gearbox. Do not lift by the threads on the end face!

Do not use piping as a support during transportation.

All load lashing must use only the transportation lugs or eyes provided on the housing.

These are marked on the gearbox with the corresponding symbol.

5.2 Delivery

	TAKE CARE
	Risk of damage **Risk of damage to gearbox from corrosion!** Do not open the packaging at any time. This will reduce the durability of the gearbox anti-corrosion protection. If the packaging has been opened, please read **section 6** of these operating instructions. *Please contact Pekrun in case of doubt.*

The contents of the delivery are listed in the shipping documents. On receipt, check whether the consignment has been damaged in transit and ensure that it is complete.

Immediately report to us in writing any deviations from the shipping documents and/or damage in transit.

The gearbox is supplied assembled and ready for operation but without its oil filling. Additional equipment (e.g. piping, oil cooler, valves and fittings, and monitoring instruments) may be delivered packed separately.

5.3 In-house transportation

The gearbox must be transported so that injuries to personnel and damage to the gearbox are avoided.

Transportation of the gear unit depends on the local conditions at the place of use.

When transporting on pallets using a forklift truck, pay particular attention to the load-bearing capacity of the forklift truck. For safe transportation, ensure the load is balanced on the forks.

	NOTICE
	When transporting using a crane, always use the lashing points provided on the gearbox housing. These are marked on the gearbox with the corresponding symbol.
	The gearbox must be transported only with load-handling equipment and lifting gear according to EU directive 2006/42/EC**.**
	For the gearbox weight, refer to the technical data sheet in the appendix or the gearbox type plate. To ensure safe transportation, observe the centre of gravity (which may be off-centre) and gearbox dimensions. See the dimensional drawing in the appendix to these operating instructions.

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	NOTICE
	When lashing the load, ensure that the lifting gear has adequate load-bearing capacity. Do not exceed the load-bearing capacity of the lifting gear being used. If load lashing uses several ropes, only 2 of these should be assumed to be load-bearing. In the case of ropes, chains and lifting slings, do not exceed an angle of inclination of ß=60°.

Wrong –
The angle of inclination is >60°

Correct –
The angle of inclination is <60°

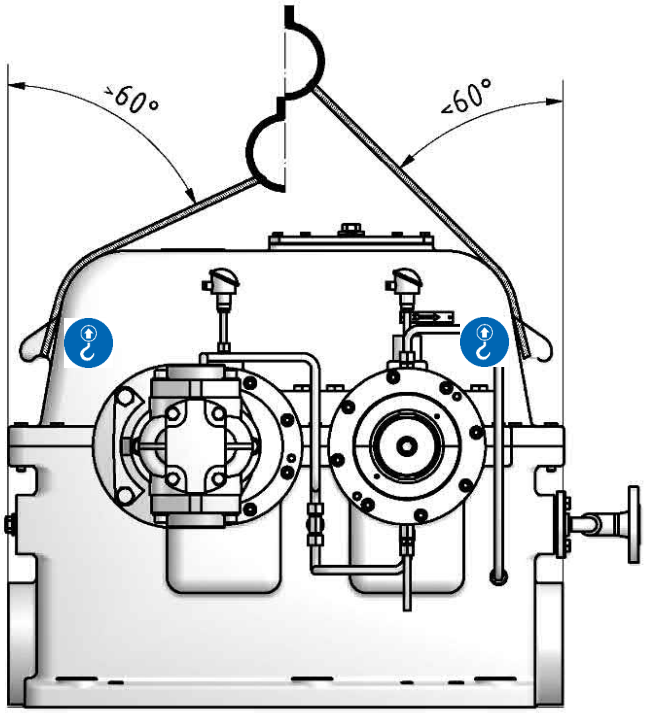

Figure 5-1

[pekrun]

Inbound delivery, in-house transportation

	TAKE CARE
!	**Risk of damage** **Risk of damage to gearbox from shocks/impact!** Avoid exposing the gearbox to shocks when setting it down. This could damage component parts or bearings.
	Risk of damage to attached piping and/or instruments! When transporting the gearbox, take care not to damage the attached instruments and piping.
	Environmental damage **The gearbox should not be transported when filled with oil.**

6 Storage conditions

6.1 Safety

DANGER

Danger to life from tipping/falling gearbox!

Risk of fatal injury from being struck or crushed by a tipping/falling gearbox! Risk of amputation injuries if persons become trapped between obstacles and the load.

Do not stack gearboxes on top of one another.

NOTICE

Pay attention to the safety instructions in **section 2**: Safety

6.2 Condition as delivered

Where possible, a test run is performed at our facilities before delivering the gearbox. This involves the use of running-in/corrosion protection oil.

The gearbox is supplied ready for operation:

Condition as delivered:

– Without oil filling (for safety reasons during transportation)

– Grease lubrication points are filled with grease (if applicable/check before commissioning)

– Shaft ends and hollow shaft holes are coated with anti-corrosion protection

– This outer coating is resistant to weak acids and alkalis, oils and solvents, and the effects of weathering. The coating is also resistant to seawater and tropical conditions, and thermally stable up to 120 °C (briefly up to 140 °C).

6.3 Gearbox storage

TAKE CARE

Risk of damage

Risk of damage to gearbox from vibration at storage location!

Do not expose the gearbox to vibrations during storage.

If this is not possible, all shafts should be occasionally (monthly) rotated in order to avoid marks due to shutdown. This procedure depends on the gearbox structure and the circumstances at the place of use.

For gearboxes with labyrinth seals on the exposed shaft exits, close the gap to the housing immediately so it is air-tight.

(Contact Pekrun for details.)

TAKE CARE

Risk of damage

Risk of damage to gearbox from corrosion!

Do not open the packaging at any time. This will reduce the durability of the gearbox anti-corrosion protection.

The corrosion protection applied must be maintained during storage. To avoid a risk of corrosion, this protective coat must not be damaged.

– Take care to ensure that the coating is not damaged. Damage to the coating leads to corrosion and causes the external protection to fail.

– The gearbox must remain sealed airtight during its storage period. This makes long periods of storage possible with internal anti-corrosion protection using a VCI concentrate without loss of this protection.

– During longer periods of temporary storage, check the internal/external anti-corrosion protection and refresh it as necessary. (See **section 6.4**, “Anti-corrosion protection”.)

Store the gearbox level on a dry, soft substructure (e.g. wood). Use a suitable cover to protect the gearbox.

Do not stack gearboxes on top of one another.

When storing outdoors, take particular care to cover the gearbox well. When doing this, make sure that it is not possible for damp or foreign materials to settle on the gearbox. *(Seek advice from Pekrun.)*

The temperature in the immediate vicinity of the gearbox must not drop below 0 °C and must not exceed 20 °C. Consult Pekrun if this temperature range cannot be maintained due to the environmental circumstances on site.

6.4 Anti-corrosion protection

Gearboxes require special *internal anti-corrosion protection* when stored for prolonged periods or for export, including intermediate storage. In extreme conditions, it is not sufficient to *only apply external anti-corrosion protection* to especially corrosion-sensitive, unpainted outer areas such as shaft stubs, flanges or similar parts.

As a rule, internal anti-corrosion protection is provided for the gearbox as a result of the running-in or corrosion protection oil applied during the test run. A VCI concentrate is added to this oil.

The corrosion protection is provided by the inhibitor’s vapour phase. This type of internal anti-corrosion protection offers the major advantage that, during the test run, oil can access and take effect in hard-to-reach cavities or otherwise inaccessible parts of the gearbox.

The high proportion of VCI concentrate in the remaining residual oil together with airtight packaging before shipping means that corrosion protection is ensured during normal freight conditions and typical haulage/storage periods. No cleaning/flushing is normally required before commissioning. (See also **section 6.4.1**.)

In special cases, where the main components are not completely enclosed by the housing – and therefore making airtight packaging inadvisable or impossible – a shorter period of storage applies (see **table 6-1**). If a longer period of storage is in fact required here, this must be specified in the delivery agreement and a solution found to the problem. (*Consult Pekrun for details*.)

CAUTION

The handling of corrosion inhibitors is subject to the provisions of the German Ordinance on Hazardous Substances, EU Regulation 1907/2006, and EU Directives 2010/75/EU and 89/656/EEC.

– Wear suitable PPE (safety goggles, protective gloves, respiratory protection) while working with anticorrosion agents.

– Have experienced specialists carry out anticorrosion application work.

– Clean up any oil spills that occur immediately (e.g. with oil binder).

NOTICE

If you have any questions about anticorrosion protection, contact us at the Customer Service address given in **section 1.6** of these operating instructions.

6.4.1 Internal anti-corrosion protection with VCI concentrate

WARNING

Risk of injury, environmental hazard

Risk of injury from escaping vapours

Highly flammable vapours can escape when opening a gearbox protected with a corrosion inhibitor (VCI).

– Keep hot objects, open flames, fire and sparks away from the gearbox.

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil!

Avoid incompatibilities with the lubricating oil used later on:

Use only mineral oils and oils based on PAOs or esters. This typically avoids any need for flushing before commissioning. (See **section 6.6**.)

When using a polyglycol-based gear oil (if approved):

The corrosion protection oil cannot be mixed with the lubricating oil!

– Drain off all of the corrosion protection oil.

– Flush the gearbox thoroughly with the lubricating oil to be used later. (See **section 6.6**.)

– Fill with the lubricating oil (see **section 8**)

(Contact Pekrun for details.)

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Storage conditions

A test run is performed at our facilities before delivering the gearbox.

Unless otherwise agreed, this involves the use of a running-in/corrosion protection oil

ISO VG 220 or ISO VG 320 with a VCI concentrate additive.

For details of the durability of this anti-corrosion protection and storage periods, see **section 6.5**.

To extend the durability of the internal anti-corrosion protection, proceed as follows:

- The oil remaining in the gearbox does not need to be drained.
- Check the gearbox temperature: it should be ≥5 °C.
- Working outside the gearbox, mix the VCI concentrate with gear oil (later lubricating oil) at the recommended ratio. (As specified by the manufacturer.)

	NOTICE
!	Follow the manufacturer's usage instructions (see current data sheet) For a Pekrun recommendation for the correct concentrate selection, see the lubricant table enclosed with these operating instructions. (See **section 8.4**.) Depending on the manufacturer, the VCI concentrate can (but does not have to) be used mixed with gear oil (ideally, the later lubricating oil). For the mixing ratio, please see the data sheet for the VCI concentrate. **You can use the gearbox dimensions (LxWxH) to achieve an approximation of the unit's available inner volume.**

- Clean the area around the oil filler neck, inspection cover, aeration filter and all other openings that will be used for filling.
- Ideally, you should open the gearbox at multiple places spread over the unit (e.g. at the oil filler neck, aeration filter, inspection cover).
- Check the interior of the gearbox for signs of moisture and corrosion. If signs of moisture can be identified, resolve the problem and ensure you discover the cause. Initial signs of corrosion must be removed before any corrosion inhibitor is re-applied. *(Consult Pekrun for details.)*
- Fill the VCI concentrate or the VCI concentrate/gear oil mixture at various points on the gearbox to achieve an even distribution throughout the interior.
- Close the oil filler neck and all other openings present and seal them off.
- Replace all aeration filters with screw plugs. (Store the original components safely for future use.)
- Seal off all air gaps (e.g. in labyrinth seals) with suitable materials (e.g. adhesive tape).

TAKE CARE

Risk of damage

Risk of damage to gearbox from corrosion!

Since corrosion protection is based on the agent in its vapour phase, it can only become fully effective when the gearbox is sealed airtight.

The period of time between opening the gearbox and then sealing it airtight again should not exceed 1 hour.

This has now extended the durability of the internal anti-corrosion protection in the gearbox.

This can be up to 24 months. (See **section 6.5**, “Storage periods”.)

This process can be repeated as often as required.

Before commissioning, the following points must also be observed:

- Install the aeration filters removed before adding the anti-corrosion protection at the required locations. (See cross-sectional/section drawing.)

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil!

Do not use the corrosion protection oil as a lubricating oil in the following circumstances:

– If the proportion of VCI concentrate in the oil is higher than 5%

– If pumps, filters or electronic equipment is/are being used

(Check first with the component manufacturer.)

– If polyglycol-based lubricating oils are being used

In this case, the gearbox must be flushed before commissioning. (See **section 6.6**.)

6.4.2 External anti-corrosion protection

If additional packaging work is not required or planned, apply external anti-corrosion protection to the gearbox as follows:

Unpainted external surfaces:

- Coat surfaces such as gearbox stub shafts, flange surfaces, shaft ends, etc. with a scuff-resistant wax coat, e.g. Tectyl 846, Tectyl 502 C or similar (for indoor storage, a soft film of corrosion inhibitor is sufficient).

If outdoor packaging is needed but was not planned or for longer storage periods, also complete the following steps:

- Also seal the gearbox from the outside (exposed shaft exits, oil ports, venting filters, and so on).

We also recommend the following precautions:

- Apply internal anti-corrosion protection with a VCI concentrate. (See **section 6.4.1**.)

6.5 Storage periods

6.5.1 Without additional packaging

Storage periods apply for outdoor storage and for roofed storage without additional packaging.

	NOTICE
!	**Measures to ensure safe storage:** **Gearbox interior not sealed so it is airtight:** During storage, gearbox vents and other openings/ports should always be covered to prevent the ingress of water into the gearbox interior due to weathering (rain, etc.). **Gearbox interior sealed so it is airtight:** – Seal off all openings on the gearbox. (This includes labyrinth seals at exposed shaft exits.) – Replace all air filters with threaded sealing plugs or tape these carefully to seal them. (The air filter must be put back into place before commissioning.)

Standard internal anti-corrosion protection with VCI concentrate

Table 6-1

Gearbox sealing	Time of anti-corrosion protection application	Storage period Indoors	Storage period Outdoors
Gearbox interior **not** sealed so it is **airtight**:	Delivery to commissioning:	4 months	2 months
Gearbox interior sealed so it is **airtight**:	Delivery to commissioning:	24 months	12 months
	Delivery to re-application:	20 months	8 months
	Re-application to re-application:	20 months	8 months
	Re-application to commissioning:	24 months	12 months

The storage period can be extended by the re-application of the VCI concentrate. (See **section 6.4.1**.)

6.5.2 With additional packaging

If storage periods longer than those given in the table are required, then the following kinds of measures should be taken:

- Seal off the gearbox with internal anti-corrosion protection at shaft grommets and other openings, so it is water vapour-tight.

NOTICE

Sealing off the gearbox is meant to imply that all shaft grommets and all other openings are sealed so they are tight against water vapour.

- Apply a sufficient quantity of desiccant (ideally with an indicator) outside the gearbox and then shrink-wrap the gearbox in a water vapour-tight film.

or

- Pack the gearbox with internal anti-corrosion protection as if for export (without desiccant).

TAKE CARE

Risk of damage

Risk of damage to gearbox from incorrect storage

If packaging is hermetically sealed, temperature fluctuations will cause condensation to form. This presents a risk of rust formation.

- Apply a desiccant inside the packaging space.

Desiccants should be used to keep the relative humidity as low as possible. Indicators or moisture sensors used with desiccants can provide information about climatic conditions/moisture levels inside the packaging.

For longer storage periods, suitable anti-corrosion protection and additional packaging is to be provided for unpainted parts as appropriate for the total storage period.

Risk of damage to gearbox from excessively long storage periods!

Long-term storage is also associated with other factors such as material deformation and similar kinds of outward changes. These can affect the total storage period possible. Appropriate measures should therefore be taken.

(Contact Pekrun for details.)

NOTICE

Anti-corrosion protection and packaging work goes hand in hand. Sealing work should therefore also be seen as part of packaging activities.

Consult with specialist firms or the Seaworthy Packaging Office in Hamburg (Germany), for example, about which additional packaging measures and packaging materials are suitable.

6.6 Flushing before commissioning

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil!

Do not use the corrosion protection oil as a lubricating oil in the following circumstances:

– If the proportion of VCI concentrate in the oil is higher than 5%

– If pumps, filters or electronic equipment is/are being used

(Check first with the manufacturer.)

– If polyglycol-based lubricating oils are being used

In this case, the gearbox must be flushed before commissioning.

The oil grade used for normal operation is used here. For the correct choice of oil, see **section 8.4** in these operating instructions.

Before commissioning (as described in **section 8**), the gearbox must be flushed with oil to remove residues of the corrosion inhibitor. These could cause the formation of oil foam.

Proceed as follows:

- Fill the gear oil (75–100% of the normal oil quantity) into the gearbox via the inspection cover openings or oil feed inlet points.
- Clean up any oil spills with an oil binder.
- a) For gearboxes with splash lubrication or a directly attached oil pump:

  Flush the gearbox by rotating the gearbox or operating it briefly

  Duration of flush procedure: 15…30 minutes

  b) For gearboxes with oil lubrication recirculated by an oil pump:

  Flush the gearbox by operating the oil pump

  Duration of flush procedure: 1 hour (approx.)
- Drain the oil carefully from the gearbox **as soon as possible after the flush procedure**.

NOTICE

Check to ensure complete drainage of the housing bottom part and all housing interiors, and the devices in the oil supply system (if present).

- For commissioning, fill in **fresh, new** oil of the same grade and the same brand that was used for flushing the gearbox.
- Continue by completing the commissioning steps in **section 8**.

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	TAKE CARE
!	**Risk of damage** **Risk of damage to gearbox from unsuitable lubricating oil!** – Use only unused oils that are free from all impurities. Use a filling filter when filling. (Filter grade max. 25 µm.) – Do not fill oil directly out of drums into the gearbox. Ensure that the proportion of water in the oil is not too high. This can lead to the oil foaming during operation. Normal value for fresh oil: <250 ppm H_2O. *In case of doubt, check with oil manufacturer/Pekrun.* **Risk of damage to gearbox from dirt in oil!** Always use oil that meets the purity class recommended by Pekrun as a minimum requirement. (See **section 8.4**.) **Do not re-use flushing oil as normal lubricating oil!**

7 Set-up conditions

7.1 Safety

	NOTICE
	Pay attention to the safety instructions in **section 2**: Safety

7.2 Installation plan

	NOTICE
	During setup, take into account the enclosed order-specific dimensional drawing, and the piping and hydraulic diagrams or junction box layout (if present and/or applicable).

7.3 Total space requirements

Ensure that there is enough space around the gearbox for assembly, and for carrying out future maintenance and cleaning work.

Ensure that the oil can be drained and that there is an adequate supply of air.

Keep all inspection windows easily accessible, to enable the inspection of internal parts.

	NOTICE
	If connecting pipes for an oil supply system are part of the Pekrun scope of supply, consult the piping plan included in these operating instructions.

7.4 Dimensions and weights

	NOTICE
	For information about weights and other technical data, refer to **section 3** (or the order-specific **technical data sheet** as well as the enclosed **dimensional drawing**). (in the appendix)

7.5 Foundations and floor

Ensure that the set-up area is horizontal and level.

We recommend basing the maximum deviation of the flatness/evenness of the base plate (gearbox supporting surface) on tolerance class IT 7 (DIN EN ISO 286-1). The maximum deviation must not exceed 0.1 mm per 1 m.

When tightening the fixing screws, avoid placing any strain on the gearbox.

Complete the foundations so that no resonance vibrations can be generated. The machine

manufacturer or end customer is responsible for the stability of the foundations.

Ensure neighbouring foundations cannot transmit any shocks or vibrations.

If the gearbox is mounted on a steel structure, this structure must be torsion-resistant. The structure must be rated for the corresponding forces acting on the gearbox.

Tighten fixing screws and nuts using the prescribed amount of tightening torque. Use bolts with a minimum strength class of 8.8 or the specified strength class. The specifications for anchor bolts are the responsibility of the machine manufacturer.

7.6 Ambient conditions

When setting up the gearbox out of doors, protect it from the damaging effects of weathering.

Always maintain the ambient conditions as set out in the service spec and delivery agreement. Talk to us if these conditions change (including individual parameters such as setup height or ambient temperature). We will check and confirm that the supplied gearbox (or gear unit) can meet these conditions.

We offer no warranties for a gearbox that is operated in ambient conditions other than those explicitly specified.

7.7 Supply connections

The following supply connections must be provided:

(If applicable/included in the Pekrun scope of supply.)

- *For the lubricating oil supply*: supply lines to an external oil supply unit and connecting lines to the gearbox
- *For the gearbox cooling*: lines to the coolant supply system and connecting lines to the water/oil cooler
- *For the energy supply to the switching cylinders*: hydraulic supply lines to an external hydraulic unit and connections to the switching cylinders
- *For the energy supply to the electrical components*: provisioning of the energy supply parameters as specified in the service spec/delivery agreement and connections to the same.
- *For an oil supply system*: all supply lines and connections in accordance with the enclosed piping, junction box layout and hydraulic plan.

	NOTICE
	Observe the special operating instructions, plans, drawings and layouts for the various components and assemblies. These are enclosed in the appendix to these operating instructions (if included in scope of supply).

7.8 Safety precautions to be taken by the customer

DANGER

Danger to life, risk of crush/shear injuries!

Risk of serious injury from suspended loads!

During transportation and loading/unloading of the gearbox, the gearbox may slip, fall or drop from a height onto personnel because loads have been lashed incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if users are trapped between obstacles and the load.

Comply with the following protective measures:

– Inform all personnel entrusted with the transportation and setup of the gearbox about the existing residual risks, and especially about the selection of suitable load-handling equipment and proper load lashing.

– Avoid any endangerment to personnel:
Take care to ensure that personnel do not become trapped between obstacles and the load. Keep to safety clearance distances. Wear PPE.
Transport the gearbox slowly and carefully, and especially when in a raised position.

– Ensure the gearbox load is lashed safely and correctly:
Do not exceed the load limits of the lifting gear
Distribute the load evenly when using multiple slings for load lashing (take care: centre of gravity may be off-centre) Follow instructions about load distribution on the packaging or dimensional drawing.

– Always commission properly trained personnel with the transportation and loading/unloading of the gearbox:
Keep the speed of travel as low as possible.
Avoid rapid changes between moving and stopping the load, and the oscillations that this causes.

DANGER

Danger to life from rotating and/or moving parts

Risk of injury from being trapped and pulled in by rotating and/or moving parts!

– Secure all rotating drive parts such as couplings, gears/sprockets or belt drives so they cannot be touched.

– All external moving parts such as switching cylinders must be shielded so they cannot be touched.

– Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

WARNING

Risk of burn injury from touching the gearbox!

This may cause serious burn injuries.

During operation and for a period of time after standstill, serious burn injuries can be caused by touching hot surfaces (>55 °C).
– Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)
– Let the gearbox cool down to a safe temperature before you touch it.
– Wear suitable protective gloves and protective clothing.

7.9 Local requirements for the delivery

For transportation, provide a crane of adequate size with adequate load-handling equipment.

Have suitably-qualified personnel carry out the transportation work.

NOTICE

Follow the instructions given in **section 5**: Delivery, in-house transport.

8 Assembly and installation, initial commissioning

8.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

	NOTICE
	Pay attention to the safety instructions in **section 2**: Safety

	WARNING
	Risk of injury during assembly, installation and initial commissioning There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers). Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts during assembly work. Personnel may slip or fall as a result of leaking oil or existing spills of oil. – Clean up any oil spills or oil leaks with an oil binder. – Wear PPE. – Have assembly, installation and commissioning work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with assembly, installation and commissioning work about the existing residual risks (see **section 2**, “Safety”) **Keep to safety clearance distances!**

	WARNING
	Risk of injury, environmental hazard **Risk of injury from escaping vapours** Highly flammable vapours can escape when opening a gearbox protected with a corrosion inhibitor (VCI). – Keep hot objects, open flames, fire and sparks away from the gearbox.

⚠	**CAUTION** **Risk of injury from toxic vapours or fluids!** When filling oil, there is a risk of injury from breathing in and/or coming into contact with lubricants or other process media. When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants. When working on parts filled with oil, such as piping and the interior of the gearbox, skin can be exposed to contact with aggressive media. – Observe the safety data sheet for the media being used. Wear suitable personal protective equipment (safety goggles, protective gloves) for oil-changing work. – Have suitably-qualified personnel carry out the work. – Clean up any oil spills that occur immediately (e.g. with oil binder).

⚠	**CAUTION** **Risk of injury from hazardous vapours or fluids!** When removing external anti-corrosion protection, there is a risk of injury from breathing in and/or coming into contact with hazardous substances. The handling of solvents is subject to the provisions of the German Ordinance on Hazardous Substances, EU Regulation 1907/2006, and EU Directives 2010/75/EU and 89/656/EEC. – Wear suitable PPE (safety goggles, protective gloves, respiratory protection) while working with solvents. – Have suitably-qualified personnel carry out the work. – Clean up any oil spills that occur immediately (e.g. with oil binder).

8.2 Assembly and installation

NOTICE

At the start of assembly work, ensure enough load-handling equipment is available as well as lifting gear, etc. The load-bearing capacity of the load handling gear must at least match the weight of the gearbox.

For information about transportation, please refer to **section 5**.

Assembly must be carried out with the greatest of care and by skilled personnel.

1. Remove any packaging materials present (such as adhesive tape and protective caps) before installing the gearbox.
2. Remove the external anti-corrosion protection with a suitable solvent.

TAKE CARE

Risk of damage

Risk of damage to shaft ends when removing anti-corrosion protection!

Never remove the anti-corrosion protection by sanding it off.

Sanding off will irreparably damage the surface of the shaft ends, which can lead to connection problems in the overall machine.

3. After prolonged storage of the gearbox before commissioning, remove the inspection covers and seals by undoing the fixing screws, and store these in a safe place for subsequent re-use.
4. Perform a visual inspection of the internal parts for corrosion.

TAKE CARE

Risk of damage

If corrosion damage is present, contact Pekrun at the Customer Service address (see **section 1.6** in these operating instructions).

To avoid further damage, do not operate the gearbox.

5. Seal the inspection holes again with the available covers, seals and plugs. The seal surfaces must be clean and undamaged.
6. Remove the internal anti-corrosion protection (if present).

NOTICE

In general, internal anti-corrosion protection is provided by the use of a corrosion protection oil with VCI concentrate during the test run at our factory.

No cleaning/flushing is normally required before commissioning. (See **section 6.4.1**.)

Check whether the gearbox must be flushed before commissioning:
– Which corrosion inhibitor was used?
– Are residues of this corrosion inhibitor present inside the gearbox?
Also read and follow **section 6.6**.

In case of doubt, please contact Pekrun.
*(See **section 1.6** for Customer Service address.)*

8.2.1 Setting up the gearbox

NOTICE

Set up the gearbox on a foundation that is as level, safe and inelastic as possible.

We recommend basing the maximum deviation of the flatness/evenness of the base plate (gearbox supporting surface) on tolerance class IT 7 (DIN EN ISO 286-1). The maximum deviation must not exceed 0.1 mm per 1 m. This prevents deformation in the shaft train.

For secure mounting, ensure that bolts are only used if their number and size corresponds to the screw holes specified on the dimensional drawing.

Observe the set-up conditions as set out in **section 7**.

TAKE CARE

Risk of damage

Risk of damage from inaccurate levelling work!

Incorrect levelling can cause the following problems with the gearbox:

– Jamming of the bearings
– Inadequate tooth flank contact
– Reduced lifetime
– High levels of vibration

Ensure that all the shafts on the gearbox and the working machine are exactly flush with one another under operating conditions.

Even if elastic couplings are used, levelling and alignment is still necessary.

With rigid gearbox mounting, mounting flanges must conform to true running and axial runout accuracy according to DIN SPEC 42955.

Drive and output sides should be levelled to correct alignment problems, although transmission parts may be able to compensate to an extent.

Proceed as follows:

- Before setting up the gearbox, clean the seating surfaces on the gearbox and on the foundation.
- Use metal shims to compensate for any unevenness of the foundation, so as to ensure that warping of the housing is not possible in any circumstances.
- After levelling the gearbox, fit the pins specified on the dimensional drawing.
- If necessary, fit side stops to prevent the gearbox from shifting about.

8.2.2 Assembling couplings and other accessories

TAKE CARE

Risk of damage

Risk of damage to the gearbox from shocks and impacts!

Driving fixings on with heavy blows or impacts must be avoided: this would have the effect of damaging bearings, retaining rings, etc.

– When fitting couplings, washers, gearwheels, sprockets or similar, pull these on using the threaded centring at the shaft ends.

– In the case of other types of fixings, comply with procedures agreed during ordering, e.g. joining together by heating the coupling, for example.

Coupling:

Clean the shaft ends and coupling components carefully before starting assembly.

Secure couplings so they cannot shift about axially.

NOTICE

When assembling couplings, always follow the specific operating instructions from the manufacturer.

Gearbox with hollow shaft design:

For *gearboxes with hollow shafts*, conditions for joining are the same as for the installation of couplings.

Drive unit or drive motor alignment:

Align the *drive unit* as accurately as possible along the centre line of the input shaft of the gearbox and then secure in place. The lifetime of the shafts, bearings and couplings depends on the accuracy of alignment between the shafts.

	NOTICE
	The maximum values allowed during alignment for axial, radial and angular displacement depend on the coupling dimensions, coupling type and the speed. These are given in the coupling manufacturer's operating instructions.
	For motor assembly, always follow the specific operating instructions from the manufacturer.
	If permissible lateral forces are shown on the dimensional drawing, forces must remain within these permissible limits.

8.2.3 Installing piping

For gearboxes designed for use with an external oil supply system, any piping removed earlier must be attached using the enclosed piping plan.

Proceed as follows:

- Remove all the plugs and blind flanges. (if present)
- Check the inside of the piping for cleanliness. If necessary, clean this thoroughly before assembly.
- Fit the piping in accordance with the enclosed piping plan.
- When setting up the gearbox, the flange bolts must be tightened with the appropriate torque.
- Use rubber expansion joints to compensate for minimal alignment errors in oil lines.
- **Piping must not be subjected to tension during installation.**
- If necessary, support piping using appropriate pipe supports.

	TAKE CARE
	Risk of damage **Risk of damage from soiling present in piping.** Bearings and gearing can become damaged as a result of dirt in piping. Acid clean all piping thoroughly that was modified by welding work on the construction site. **Ensure that no dirt enters the gearbox when assembling the connection piping.**

8.2.4 Final checklist

Proceed as follows:

- After setting up the gearbox, check that all threaded connections are firmly seated.
- Ensure that the alignment has not been disturbed by tightening the fasteners.
- Use the device list and drawings to check that all instruments removed for transportation have been fitted again.
- Check to confirm the correct and safe installation of external supply lines (e.g. hydraulic lines to the switching cylinder/water supply lines to the cooler/connecting lines to an oil supply system) (as applicable). (To be provided by operator.)
- Check the installation of all monitoring equipment. (Interlocks – if present.)
- Check that machine guards are correctly fitted and firmly seated.

8.3 Initial commissioning

8.3.1 Measures before initial commissioning

	TAKE CARE
	Risk of damage to property/environment! **Risk of damage from leaks of oil!** In the case of non-standard installation positions where the oil filler neck is above the inspection opening, the cover and plug can be sealed with a single sealant. In this case, however, do not remove the inspection cover until the oil level has sunk below the inspection opening – otherwise oil will leak out. **Each time the inspection cover is removed, it must be sealed with a new sealant**. (This is not necessary when seals or O-rings are used.)
	Risk of damage **Risk of damage to gearbox from unsuitable lubricating oil!** For the oil viscosity, refer to the type plate or the enclosed dimensional drawing. A lubrication table is enclosed with these operating instructions, providing Pekrun's recommendations for the correct lubricant (see also **section 8.4**). – Only use lubricants of proven equivalence for the lubrication of the gearboxes. – Use only unused oils that are free from all impurities. – Do not fill oil directly out of drums into the gearbox. – Ensure that the proportion of water in the oil is not too high. This can lead to the oil foaming during operation. Normal value for fresh oil: <250 ppm H_2O. *In case of doubt, check with oil manufacturer/Pekrun*. **Risk of damage to gearbox from dirt in oil!** Always use oil that meets the purity class recommended by Pekrun as a minimum requirement. (See **section 8.4**.) Ensure that no dirt enters the gearbox when filling or when assembling the connection piping. Use a filling filter when filling. (Filter grade max. 25 µm.)
	Risk of damage **Risk of damage to the gearbox from internal overpressure!** If the gearbox is operated without a aeration filter fitted, this can lead to damage on the shaft sealing rings. Ensure the aeration filter is fitted correctly during commissioning. Also follow the supplied dimensional drawing.

Proceed as follows:

1. Unscrew the oil drain plug or open the oil drain valve to drain residues of the running-in oil from the gearbox into a suitable vessel. Dispose of this used oil. (If applicable.)
2. Clean up any oil spills with an oil binder. Comply with applicable legal requirements regarding disposal.

For gearboxes with splash lubrication/integrated oil supply system:

3. a)

- Undo and remove the aeration filter or drain plug on the oil feed inlet or the inspection cover opening (as applicable).
- Lay the screws, cover and seals, etc. to one side in a safe place for re-use later.
- Fill the gearbox with oil in accordance with the specified viscosity either through the inspection opening or oil filling holes on the gearbox and on the piping. When doing so, follow the details provided on the order-specific dimensional drawing (if applicable

NOTICE

If oil dipstick fitted: The attached oil dipstick has 2 markings – the oil level must be between these at all times. Fill oil up to the upper marking.

If oil sight glass or sight glass fitted: Fill oil up to the middle of the sight glass.

Wait awhile when filling the oil:

the oil should have enough time to distribute itself evenly and the final oil level can then be read off.

Take time to ensure that oil is distributed evenly – especially in the case of multi-stage gearboxes having interconnected oil chambers – otherwise not enough oil will be filled.

TAKE CARE

Risk of damage

Risk of damage to oil pump by running dry

During initial commissioning as well as during re-commissioning following a prolonged standstill, damage to the equipment may be caused by dry running if the oil pump is above the oil level in the gearbox or lubricating oil is not being applied in sufficient quantities.

Fill the pump with lubricating oil. Monitor the oil pressure.

Also follow the supplied operating instructions for the oil pump.

Also fill all oil feed inlets in the piping. (if present)
(see dimensional drawing)

	TAKE CARE
!	**Risk of damage** **Risk of damage to gearbox from incorrect oil level!** The oil level (if applicable) must be checked via the oil level monitoring function. *If oil dipstick fitted:* The oil level should reach at least the lower marking on the dipstick or the oil sight glass. *If oil sight glass or sight glass fitted:* The oil level should be visible at least at the bottom edge of the oil sight glass. The oil quantity on the type plate, the dimensional drawing, the technical data or in other printed materials is offered as a **guide value**. **The quantity of oil to be filled is always determined only by the oil level marking on the oil sight glass or oil dipstick, or the oil overflow opening on the gearbox.** When using an auxiliary oil tank, use the oil sight glass or oil dipstick in the tank to gauge the oil quantity. Check the oil level from time to time when the gearbox is at a standstill and the oil has cooled down. **Never allow the oil level to fall below the lower marking on the oil dipstick or the bottom edge of the oil sight glass.**

Or

For gearboxes connected to an external oil supply system:

3. b)

- Undo and remove the blind flanges and seals and/or remove the blanking plugs attached for shipping from the gearbox piping connections.
- Fit the connection piping to the external oil supply system and, before commissioning, ensure that the existing external oil supply system to be used is fully functional, connected and operational. (if applicable)

4. Clean up any oil spills that are present with an oil binder.

8.3.2 Gearbox with attached backstop or flange-mounted oil pump

NOTICE

Observe the special operating instructions, plans, drawings and layouts for the various components and assemblies. These are enclosed with these operating instructions (if included in scope of supply).

For backstops and oil pumps connected in the installation space, lubrication is via the gearbox.

For backstops whose installation space is separate from the gearbox, fill oil to the middle of the oil sight glass before commissioning. Follow the manufacturer's specifications about lubrication.

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil or incorrect oil level!

The backstop is lubricated with oil according to manufacturer specifications.

Check the oil level from time to time when the gearbox is at a standstill and the oil has cooled down.

Never allow the level to fall below the lower marking.

TAKE CARE

Risk of damage

Risk of irreparable damage to the gearbox or parts from incorrect direction of rotation!

Only a single direction of rotation is possible for the backstop and flange-mounted oil pumps (except universal pumps) fixed to the gearbox. These can suffer irreparable damage if the direction of rotation is wrong.

When setting up the gearbox, check that directions of rotation match up before connecting up the motor and the backstop or oil pump.

For the direction of rotation, consult the technical data in **section 3**, the direction of rotation arrow on the gearbox or the enclosed (and authoritative) dimensional drawing.

If no direction of rotation if specified in the supplied technical documents, then the gearbox can be operated in both directions.

The direction of rotation arrow on the gearbox input shaft must match the direction of rotation of the motor.

8.3.3 Gearbox with cooling coil/water-oil cooler

NOTICE

Observe the special operating instructions, plans, drawings and layouts for the various components and assemblies. These are enclosed in the appendix to these operating instructions (if included in scope of supply).

NOTICE

For gearboxes with an integrated cooling coil and with oil coolers, the operator must prepare and provide the required water supply connections.

Ideally, you should use soft water; also check the specification for the respective order.

Water can flow through the cooling coils in either direction.

TAKE CARE

Risk of damage

Risk of breakage from overpressure!

Excessively high water pressure in the lines can cause damage to the water cooler.

Water overpressure must not exceed 10 bar (or as otherwise specified in the order documents).

Proceed as follows:

- Remove the connecting sleeves of the cooling coil prior to connecting the coil.
- Flush out possible impurities.
- Install a cooling water intake and drain line.

NOTICE

Refer to the enclosed dimensional drawing and the piping plan for the location of the connections.

- The shut-off valves for the coolant supply and drain must be opened fully for commissioning.

NOTICE

The direction of water flow for separately installed oil coolers must be matched to the information on the coolers.

TAKE CARE

Risk of damage

Risk of damage from frozen cooling water!

Cooling water must be drained if there is a risk of frost or in the event of a prolonged gearbox shutdown; residual water must be blown out with compressed air.

8.3.4 Gearboxes with ventilation using a cooling vane

Cooling vanes and a protective hood are fixed permanently to the gearbox. The protective hood prevents accidental contact with the cooling vane and also serves to guide the cooling air along the surface of the gearbox.

DANGER

Danger to life from rotating and/or moving parts

Risk of injury from being trapped and pulled in by rotating parts!

– Secure all rotating drive parts such as cooling vanes so they cannot be touched.

– Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

TAKE CARE

Risk of damage

Risk of damage to gearbox from overheating!

Care must be taken during operation that both the air intake openings and the outlet openings are always clear; cooling may otherwise be impaired.

8.3.5 Gearbox with oil heater

TAKE CARE

Risk of damage

Risk of damage to gearbox from lubricating oil that is too cold!

For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold (= oil cooling in the shutdown period to temperatures close to the pour point).

Accordingly, the gear oil and, if applicable, the oil in the auxiliary tank, must be heated to approx. +10 °C before commissioning.

Preferably, you should heat the oil with an electric heater.

Oil heater with electric heating element:

To keep the oil filling at a certain temperature, monitor the heating temperature as follows:

- Contact thermometer

  The heater is activated or deactivated by the “min. and max.” contacts via a relay.

or

- Resistance thermometer (Pt100)
- Thermostats
- Heaters with direct thermostatic control function

DANGER

Danger to life when operated in a potentially explosive atmosphere!

The standard version of the devices is not suitable for use in machines exposed to explosion hazards.

For use in a potentially explosive atmosphere, conversion work will be required – please talk to the manufacturer.

TAKE CARE

Risk of damage

Risk of damage to gearbox from overheating of the heater!

During operation, ensure that the heating element is covered completely with oil, since overheating may otherwise result.

Preferably, limit the max. temperature with a thermostat or resistance/contact thermometer:

Heater must shut down at >40 °C

NOTICE

All electrical devices are rated as at least IP54 according to DIN EN 60529:2000-09

	NOTICE
	The electrical wiring of the heater and temperature monitoring device must be completed according to the operating instructions for these instruments. These are enclosed in the appendix to these operating instructions (if included in scope of supply).

8.3.6 Gearbox with other add-on parts

Refer to the order-specific device list/data sheets for the technical data for the add-on parts.

	NOTICE
	Wire up the control and instrumentation devices according to the instructions as provided by the device suppliers. Please refer to the suppliers' enclosed operating instructions for the operation and maintenance of these components.

8.3.7 Gearbox with switching mechanism

DANGER

Danger to life from rotating and/or moving parts

Risk of injury from being trapped and pulled in by moving parts!

– All external moving parts such as switching cylinders must be shielded so they cannot be touched. Connecting lines must be routed safely and not placed inside the machine's danger zone or near rotating and/or moving components.

– Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

WARNING

Risk of eye injuries from escaping sprays of pressurised fluids!

When operating a gearbox with hydraulically operated switching mechanism, leaks can occur at connection points, resulting in oil being sprayed out into the air.

- Wear appropriate protective clothing and eye protection.

TAKE CARE

Risk of damage

Risk of damage to gearbox by switching during operation!

Switch gearbox gears only when it is at a standstill.

Also ensure that the gearbox is de-energised. The input and output sides must be able to rotate freely.

It must not be possible to actuate the switching cylinders unless the shafts are not rotating at all and there is no torque acting on the shafts.

An interlock must therefore be used.

Cylinder pressure must remain constant during the entire switching procedure until the target switching position is reached.

If necessary, alter the position of the gear selectors using jog mode on the drive unit, so as to make it easier for the gear selectors to engage.

The drive unit must not be released for normal operation until the gear has been fully engaged in its final position on the gearbox.

To ensure continuous trouble-free and reliable switching, complete the following measures before commissioning:

For all switchable Pekrun gearboxes:

- Ensure that an interlock is provided that stops the gearbox from starting up during the switching procedure.

For Pekrun gearboxes with manual switching:

Gearboxes with manual switching have a switching lever that is secured with a locking knob.

For a switching operation, proceed as follows:

– Release the locking knob

– Move the switching lever to the new position

– Slide the locking knob back into the hole provided until it locks into place

	TAKE CARE
	Risk of damage **Risk of damage to gearbox if excessive force is used during switching!** When the gearbox comes at a standstill, the teeth may be exactly opposite and no switching operation may be possible. Do not exert excessive force on the switching lever under any circumstances: this can cause damage both to the switching mechanism and to the gearing. Change the tooth positions by rotating the drive shaft by hand. This will make it easier to switch into the next gear.

For Pekrun manual gearboxes with switching cylinders:

- Fit the required hydraulic/pneumatic lines to the switching cylinders, and ensure that these lines are laid securely and safely. (Responsibility of the operator.)

End stop monitoring for the switching cylinders is generally provided by contactless limit switches. If included in the scope of supply, these are fitted to the gearbox by Pekrun.

- Connect the limit switches to the electrical supply and integrate them with the control system.

	NOTICE
	Wire up the control and instrumentation devices according to the instructions as provided by the device suppliers. Please refer to the suppliers' enclosed operating instructions for the operation and maintenance of these components.

8.3.8 Advice for the starting phase of drive motors for gearboxes

	NOTICE
	Always follow the specific operating instructions from the motor manufacturer.

Drive system using variable-speed motors:

	TAKE CARE
	Risk of damage **Risk of damage to gearbox from uneven start-up or resonances**! A sudden increase in speed can result in steps being lost within the gearbox. The speed control becomes involved in turn, with the result that entire frequency ranges can become critical (in terms of resonances). This can result in undesirable resonance effects from the system. Accordingly, highly accurate adjustment of parameters – e.g. in the frequency inverter – to the process is needed.

Simultaneous drive system using 2 motors:

	TAKE CARE
	Risk of damage **Risk of damage to gearbox from drive motors starting up asynchronously!** If a gearbox is being driven simultaneously by 2 or more motors, damage to the gearing can occur if the motors start up asynchronously. Take appropriate precautions to ensure that drive motor start-up is synchronised.

8.3.9 First run for gearboxes with grease lubrication

Gearboxes are provided with grease lubrication for special operating conditions. The gearboxes are filled with grease at the acceptance test bench and are also delivered in this condition.

Commissioning such a gearbox can take place as soon as the grease filling has been confirmed by checking the filling level check bolt.

In special cases, the unit may also be supplied without a grease filling. In this case, the operator must complete the grease filling before the first run.

The drive unit can be started directly once all measures in section 8.3.1 have been completed and complied with (as applicable).

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable grease!

The type of lubrication (oil or grease lubrication, splash or pressure lubrication), oil viscosity and oil volume are all determined early on at the design stage.

If the gearbox is being used for a different use case, some modifications may be needed – e.g. changes in grease quality.

Consult with the grease manufacturer or Pekrun if deviations from the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement) are seen during operation.

The grease lubrication is intended to last for the gearbox's lifetime.

Consult with the manufacturer before changing prior to this date

NOTICE

For important technical specifications, see the type plate, the dimensional drawing and the technical data sheet, which is prepared according to the order. (See appendix.)

8.3.10 First run for gearboxes with splash lubrication

The drive unit can be started directly once all steps in section 8.3.1 have been completed and complied with.

TAKE CARE

Risk of damage

Risk of damage to gearbox from lubricating oil that is too cold!

Do not start the drive unit if the gearbox oil is too cold.

For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold.

The gear oil should normally have a minimum temperature of 10 °C (50 °F).

Accordingly, the gear oil and, if applicable, the oil in the auxiliary tank, must be heated to approx. 10 °C (50 °F) before commissioning.

For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

8.3.11 First run for gearboxes with pressure lubrication

This applies both for gearboxes with an attached motor oil pump and for gearboxes that are connected to an external oil supply system (provided by the end customer).

WARNING

Risk of eye injuries from pressurised fluids!

When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.

– Follow the assembly instructions provided in **section 8.2.3**.
– Wear appropriate protective clothing and eye protection.

NOTICE

For required operating parameters (minimum lubricant pressure, required oil flow rate), please see **section 3** of these operating instructions, the dimensional drawing or the order-specific technical data sheet (in the appendix).

TAKE CARE

Risk of damage

Risk of damage to gearbox from lubricating oil that is too cold!

Do not start the drive unit if the gearbox oil is too cold.

For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold.

The gear oil must have a minimum temperature of 10 °C (50 °F).

For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

Oil temperature ≥10 °C (50 °F)

Proceed as follows:

- Complete all steps from section 8.3.1 onwards.
- Apply lubricating oil to the gearbox via the oil inlet connections from the external oil supply system.

  or

  Start the motor oil pump. (Follow the operating instructions from the pump manufacturer in the appendix.)
- Check to confirm all necessary operating parameters are OK.
- After a warm-up time of at least 10 minutes, then start the drive motor.

TAKE CARE

Risk of damage

Risk of damage to gearbox from inadequate lubrication!

Do not start the drive unit until all specified operating parameters (lubricant pressure, oil feed quantity, oil temperature) are OK. This ensures an even supply of lubricant, especially during the start-up procedure.

The minimum lubricant pressure, P min, is 0.5 bar.

The pre-lubrication phase has the effect of safely supplying all the bearings and gearing with oil.

For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the operating parameters agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

NOTICE

For operation and maintenance of the pump, filters and monitoring instruments, follow the operating instructions listed in the order-specific appendix as provided.

8.3.12 First run for gearboxes with oil supply system

This applies to gearboxes with an oil supply system provided separately. If this oil supply system is also set up outdoors, this can expose it to extreme ambient temperatures.

WARNING

Risk of eye injuries from pressurised fluids!

When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.

– Follow the assembly instructions provided in **section 8.2.3**.

– Wear appropriate protective clothing and eye protection.

NOTICE

For required operating parameters (minimum lubricant pressure, required oil flow rate), please see **section 3** of these operating instructions, the dimensional drawing or the order-specific technical data sheet (in the appendix).

TAKE CARE

Risk of damage

Risk of damage to gearbox from lubricating oil that is too cold!

Do not start the drive unit if the gearbox oil is too cold.

For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold.

The gear oil must have a minimum temperature of 15 °C (59 °F).

For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

– Oil temperature <5 °C (41 °F)

TAKE CARE

Risk of damage

Risk of damage to pump from lubricating oil that is too cold!

Do not start the motor pump unit if the gear oil is too cold.

The gear oil must have a minimum temperature of 5 °C (41 °F).

At temperatures below 5 °C (<41 °F), ensure secondary heating equipment is in place before starting the oil pump: the pump cannot otherwise pump oil reliably in these temperature ranges and damage is therefore a possibility.

An interlock must be provided that makes it impossible to switch on the oil pump until a temperature greater than 5 °C (>41 °F) has been reached.

- Use secondary heating equipment (e.g. fan heaters) to ensure the uniform heating of the gearbox, parts used to feed oil and the oil reservoir tank (as needed).
- Check the oil temperatures at various places in the system.

Oil temperature ≥5 °C (41 °F) <15 °C (59 °F)

- Start the oil pump once the minimum temperature of ≥5 °C (≥41 °F) has been reached.
- Switch on the heater provided as described in section 8.3.5.

!	**NOTICE**
	Oil circulation ensures heating is uniform.

Oil temperature ≥15 °C (59 °F)

Proceed as follows:

- First start the oil pump and let it run for at least 30 minutes before you start the drive motor.
- Check to confirm all necessary operating parameters are OK.
- After this, you can start the drive unit.

!	**TAKE CARE**
	Risk of damage Risk of damage to gearbox from inadequate lubrication! Do not start the drive unit until all specified operating parameters (lubricant pressure, oil feed quantity, oil temperature) are OK. This ensures an even supply of lubricant, especially during the start-up procedure. **The minimum lubricant pressure, P min, is 0.5 bar.** The pre-lubrication phase has the effect of safely supplying all the bearings and gearing with oil. For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the operating parameters agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

8.3.13 Measures after the first run

TAKE CARE

Risk of damage

Risk of damage to the gearbox!

Shut down the gearbox immediately if the bearing temperature rises above the permitted limit value and you notice excessive vibrations or abnormal noises – this will avoid any damage to the gearbox.

During the first 12 h of operation under load, we recommend checking bearing temperatures once an hour. Bearing temperatures when idle should not exceed 75 °C and should not exceed 85 °C under load (or as otherwise specified in the service spec/delivery agreement).

In the start-up phase, the gearbox should ideally be run for 12 hours but **not** at full load. If this run produces no faults, the load can then be increased to full load. Continuous monitoring of the gearbox is required at all times.

Proceed as follows:

1. **During the first 6 hours: 50% of load**
2. **During next 6 to 12 hours: 75% of load**

After the first gearbox run of approx. 12 operating hours, perform some initial visual inspections:

- Check the oil level. (if applicable)
- Check the gearbox and the oil supply system (if present) for leak-tightness.
- Check all supply lines (hydraulics and water) and connections for leak-tightness.
- Check that the shaft seal is leak-tight.
- Check that rotating parts (shafts, couplings) do not come into contact with one another.
- Check that moving parts (e.g. switching cylinders) do not come into contact with one another.
- Check all machine guards to ensure they are functional.

3. **After 12 hours and after performing inspections: 100%, full load**

8.4 Recommended lubricants for Pekrun gearboxes

8.4.1 Area of application

The recommendations in this lubricant table apply only to Pekrun gearboxes in the type series as listed below:

Cylindrical gearboxes (except turbo gearboxes)

Bevel gearboxes (except mill gearboxes)

Worm gearboxes

Planetary gearboxes or combinations of these

8.4.2 Recommended lubricants

The lubricant selection table lists a number of different lubricants corresponding to the recommendations of the oil companies.

The recommended oils traverse the 12th load stage in the back-to-back test rig according to DIN ISO 14635-1 without jumping to severe wear.

The listed oils are inhibited mineral oils with additives to increase resistance to aging and corrosion protection, and to improve the mixed friction response in accordance with CLP identification according to DIN 51502.

For Pekrun gearboxes, always use only the oils that fulfil the abovementioned quality criteria.

NOTICE

Always comply with the specifications about oil group and oil viscosity on type plates, the dimensional drawing and the order-specific technical data sheet.

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable lubricating oil!

Always select oils based on the viscosity of the oil that is indicated on the gearbox type plate.

– Only use lubricants of proven equivalence for the lubrication of the gearboxes. Use only unused oils that are free from all impurities.

– Do not fill oil directly out of drums into the gearbox. Ensure that the proportion of water in the oil is not too high. This can lead to the oil foaming during operation.

Normal value for fresh oil: <250 ppm H_2O.

(In case of doubt, check with the lubricant manufacturer/supplier or Pekrun.)

If oils other than the abovementioned oils are to be used, always obtain written approval from Pekrun Getriebebau GmbH. We do not offer any guarantees for the suitability of specific oil grades selected.

	NOTICE
!	Always check with Pekrun if you forget to mention when ordering that ambient temperatures below 10 °C (50 °F) or above 50 °C (122 °F) can occur, or if there are extreme temperature variations or external heating of the gearbox can occur. In these cases, you must use oil with a different viscosity or use special measures like providing oil heating or oil cooling. If the conditions of use change at a later date, always obtain written approval from Pekrun for the use of the lubricant in question.

8.4.3 Lubricating oil purity class

We recommend purity classes of -/18/14 according to ISO 4406/1999 (equivalent to SAE-AS4059 purity class 9) for operating Pekrun gearboxes.

8.4.4 Lubricant table

The Pekrun lubricant table is provided to you along with these operating instructions.

	NOTICE
	The latest version of the Pekrun lubricant table can be requested at any time by writing to the Customer Service address given in **section 1.6**.

8.4.5 Important usage information for the lubricant table

	TAKE CARE
!	**Risk of damage** **Risk of damage to gearbox from unsuitable lubricating oil!** To ensure optimum reliability for lubrication, oils of the same type and viscosity should be used, but should not be mixed from different manufacturers. *Check first with the lubricant manufacturer/supplier.* The base oils used for the anti-friction bearing greases listed here are mineral oils. If polyglycol oils are used, then the grease must also be suitable for use with the polyglycol oil. **Polyglycol-based oils must not be mixed with hydrocarbon-based oils, i.e. with mineral oils or polyalphaolefins (PAOs).**

9 Operation

9.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

	NOTICE
	Pay attention to the safety instructions in **section 2**: Safety

9.2 Operating modes

- Idling

  For set-up and test runs.

- Production

  Operation for the product's intended use.

9.3 Special tools and operating materials

For *transportation*, you will need load-handling equipment, e.g. chains, ropes or lifting slings, which have a minimum load-bearing capacity that at least matches the weight of the gearbox. All load handling gear must comply with Machinery Directive 2006/42/EC.

For *assembly*, you will need standard hand tools such as ring spanners, torque spanners, etc. that match the sizes of the bolts that are used in the product.

For *levelling and measuring*, you will need straight edges, a spirit level, a dial gauge and a thickness gauge.

For *gearbox lubrication*, you will need a suitable oil that corresponds to the enclosed Pekrun lubricant table. Refer to the type plate on the gearbox for the oil quantity.

You will need foundation/anchor bolts matching the size of the anchor holes in the gearbox foot.

9.4 Commissioning

9.4.1 Commissioning after a planned shutdown

Gearbox with splash lubrication:

If the gearbox was shut down only temporarily **(<1 week)**, the drive unit can be started up again immediately.

Gearbox with oil supply system:

For a gearbox shut down only briefly **(<30 min)**, proceed as follows:

- First start the oil pump, to lubricate all bearings and gearwheels.
- You can start the drive unit after the pump has been running for **about 10 minutes**.

9.4.2 Commissioning after a planned shutdown

TAKE CARE

Risk of damage

Risk of gearbox damage from shutting down the oil supply system!

For **short stoppages**, keep the oil supply system running.

For **a longer shutdown**, also keep the oil supply system running for about 60 minutes at first. This avoids a heat build-up.

Risk of damage to gearbox from corrosion!

With **longer stoppages (>1 week to <6 months)**, run the gearbox for a short time once a week to ensure all internal components are wetted with oil. This keeps the gearbox protected from corrosion for a short time.

In the case of **decommissioning** for over **6 months**, provide the gearbox with anti-corrosion protection as described in **section 6, Storage conditions**.

Gearbox with splash lubrication:

After a planned shutdown **(>1 week to <6 months)** for the gearbox, proceed as follows:

– Run the gearbox for a short time once a week to ensure all internal components are wetted with oil.

– The drive unit can then be started again directly.

Gearbox with oil supply system:

After a planned shutdown **(>30 min to <6 months)** for the gearbox, proceed as follows:

- First start the oil pump, to lubricate all bearings and gearwheels.
- You can start the drive unit after the pump has been running for **about 10 minutes**.
- For a shutdown lasting **<6 months**, proceed as described in **section 9.6**.

9.4.3 Recommissioning after an Emergency Stop

TAKE CARE

Risk of damage

You must ensure that there is no damage to the gearbox, the oil supply system or any other attached components.

You must repair any damage before carrying out recommissioning.

Before recommissioning, check the following:

- Levelling/alignment of gearbox and motor (see **section 8**)
- Condition of the couplings
- Oil level
- Tightness of the piping
- Tightness of shaft seals
- Firm seating of all machine guards
- Also follow the instructions in **section 8** (initial commissioning)

9.4.4 Recommissioning after a prolonged standstill (storage)

After a prolonged shutdown (storage) of **more than 6 months**, proceed with recommissioning as follows:

- Carry out the checks described in **section 9.4.3**.
- Remove the coat of corrosion inhibitor as described in **section 8**.
- For recommissioning, proceed as described in **section 8** (initial commissioning).

	NOTICE
	Pay attention to the storage conditions as stated in **section 6**.

9.5 Inspection and maintenance

Performing regular inspection and maintenance on our Pekrun gearboxes ensures maximum operational reliability and safety.

Inspection and maintenance must be performed when the gearbox is at a standstill.

Proceed as follows:

- Keep a maintenance record or maintenance plan. This will help you to keep to the specified maintenance intervals.
- Have regular gearbox inspection and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with the inspection and maintenance of the gearbox about the existing residual risks (see **section 2**, **Safety**)

	NOTICE
	Keep to the inspection and maintenance plan given in **section 11**.

9.6 Decommissioning

To decommission the gearbox, proceed as follows:

- Switch off the drive unit.
- Have decommissioning work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with the decommissioning of the gearbox about the existing residual risks (see **section 2**: **Safety**)
- Close the cooling water intake for gearboxes with water/oil coolers or cooling coils. If there is a risk of frost, drain the water from the cooler or the cooling coil. (See **section 8.3.3**.)

TAKE CARE

Risk of damage

Risk of gearbox damage from shutting down the oil supply system!

For **short stoppages**, keep the oil supply system running.

For **a longer shutdown**, also keep the oil supply system running for about 60 minutes at first. This avoids a heat build-up.

With **longer stoppages (>1 week to <6 months)**, run the gearbox for a short time once a week to ensure all internal components are wetted with oil. This keeps the gearbox protected from corrosion for a short time.

In the case of **decommissioning** for over **6 months**, provide the gearbox with anti-corrosion protection as described in **section 6, Storage conditions**.

10 Troubleshooting

	NOTICE If you have any technical queries, please contact our factory: Our Customer Service address is given in **section 1.6** of these operating instructions.

10.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

	NOTICE Pay attention to the safety instructions in **section 2**, “**Safety**”

	WARNING **Risk of injury during troubleshooting!** There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers). Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts during troubleshooting. Personnel may slip or fall as a result of leaking oil or existing spills of oil. – Clean up any oil spills or oil leaks with an oil binder. – Wear PPE. – Have all troubleshooting work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with troubleshooting work about the existing residual risks (see **section 2**, “Safety”) **Take especial care with troubleshooting when the unit is running!** **Keep to safety clearance distances!** **Always take the gearbox out of service before attempting to resolve faults or problems!**

10.2 Fault identification

	NOTICE Also follow the instructions given in **section 11**, **Servicing**

Always report problems that occur during the warranty period to our service address immediately.

Pekrun provides no warranty whatsoever if the gearbox is not used for its intended purpose. This also applies to any modifications made to the gearbox not agreed with Pekrun in advance as well as to the use of non-original Pekrun spare parts.

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If faults occur and you cannot identify the cause, you are advised to contact our Customer Service at the service address.

Please note the following:

- Have all troubleshooting work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with troubleshooting work about the existing residual risks (see section 2: **Safety**)
- **Always take the gearbox out of service before attempting to resolve faults or problems!**
- Switch off the drive unit when working on the gearbox.
- Secure the drive unit so it cannot be accidentally started up again and post up a sign informing personnel of this on the start-up console.

10.3 Initial steps to take when troubleshooting

Table 10-1

Fault/error message	Possible cause(s)	Remedy
Change in gearbox noises	Damage to the gearing	- Contact Customer Service. => Check gearing. Replace damaged parts as necessary.
	Defective bearings	- Contact Customer Service. => Replace defective bearings
	Increased bearing play	- Contact Customer Service. => Adjust bearing play
Operating temperature too high	Oil level in gearbox too high	- Correct the oil level
	Cooler defective	- Check the cooler => Replace if necessary (check cooler operating instructions)
	Cooling water feed defective (cooling coils -> deposits/ sedimentation)	– Check cooling water supply => Clean the cooling coils and replace if necessary. Check cooler operating instructions.
	Cooling air feed defective or contaminated	– Check cooling air supply => Clean. Check cooler operating instructions.
	Line filter dirty	– Clean the line filter. Check filter operating instructions.
	Oil is very dirty	- Contact Customer Service. => Change oil
	Oil is too old	- Contact Customer Service. => Change oil
	Oil line leaking	=> Check oil-conducting lines. Seal if necessary. – Check oil pump

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Troubleshooting

Fault/error message	Possible cause(s)	Remedy
	Oil pump is defective	=> Check oil pump operating instructions. Repair or replace oil pump.
Increased temperature on the bearing point	Defective bearing Oil pump is defective Oil line leaking Oil is too old Oil level in gearbox is too high or too low	- Contact Customer Service. => Replace defective bearings – Check oil pump => Replace if necessary. Check oil pump operating instructions. - Contact Customer Service. => Check oil-conducting lines. Seal if necessary. => Change oil - Correct the oil level - Contact Customer Service.
Oil leaking from gearbox	Seal faulty on housing cover or housing component joints Radial shaft seals are defective	=> Seal the housing cover or housing component joints => Replace the shaft seals
Oil is foaming in the oil sump Water in the oil	Unsuitable oil or contaminated oil (water in oil) Oil cooler or cooling coil defective Incorrect installation conditions (e.g. high humidity)	- Contact Customer Service. => Have oil condition checked - Contact Customer Service. => Check the oil cooler or cooling coil for leaks. Repair the leak if necessary. Replace the cooler or cooling coil. Check cooler operating instructions. - Contact Customer Service.
Pressure monitoring triggers an alarm	Oil pressure has dropped below minimum lubricating pressure (standard: 0.5 bar)	- Check oil level at room temperature => Correct oil level as necessary – Check oil filter => Clean or replace as necessary - Contact Customer Service. – Check oil pump => Check oil pump operating instructions. Repair or replace oil pump.
Oil filter's contamination display triggers an alarm	Line filter is dirty	=> With switchable line filters, perform switchover according to the operating instructions => Replace the dirty filter cartridge
Switching operation makes noises or does not work	Torque is acting on the shafts.	- Check all shafts involved to see if torque is acting on the shafts;

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Troubleshooting

Fault/error message	Possible cause(s)	Remedy
		release loads on shafts as necessary.
	The shafts are still rotating.	– Check to confirm all shafts are not moving; force shafts to a standstill if necessary.
	Damage to gearing in switching gearwheels	– Contact Customer Service. – Check gearing => Replace damaged parts as necessary
	Monitoring instruments or end stops are faulty or incorrectly aligned	– Contact Customer Service. – Check end stops and also check installation. => Repair or replace end stops. Check end stop operating instructions.
	Switching cylinders do not work. Switching cylinders are faulty	– Check switching cylinder unit to confirm free to move/for any obstructing objects => Remove any obstacles to free movement if found. – Check the pressure being applied to the hydraulic/pneumatic cylinder. => If necessary, pressurise the lines or fix the leaks. – Check hydraulic/pneumatic lines for leaks. => Fix leak or replace lines. – Contact Customer Service. – Check the switching cylinders => Replace defective parts as necessary

11 Servicing and maintenance

NOTICE

If you have any technical queries, please contact our factory.

Our Customer Service address is given in **section 1.6** of these operating instructions.

11.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

NOTICE

Pay attention to the safety instructions in **section 2**, “**Safety**”

WARNING

Risk of injury during servicing and maintenance

There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers).

Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts during troubleshooting.

Personnel may slip or fall as a result of leaking oil or existing spills of oil.

– Clean up any oil spills or oil leaks with an oil binder.

– Wear PPE.

– Have servicing and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.

– Inform all personnel entrusted with servicing and maintenance work about the existing residual risks (see **section 2**, “Safety”)

Take especial care with troubleshooting when the unit is running!

Keep to safety clearance distances!

Always take the gearbox out of service before attempting to resolve faults or problems!

11.2 Maintenance record

Keep a maintenance record or maintenance plan. This will help you to keep to the specified maintenance intervals.

11.3 Control procedures and test jigs

Have regular gearbox inspection and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.

Regularly check all the operating data, e.g. the pressure, the temperature, the current consumption, the level of soiling on line filters and other visual checks. This helps to detect and eliminate faults at an early stage.

For preventive maintenance, it is advisable to use a machine diagnostics system that allows you to check machine states easily.

Using a vibration measurement system, you can generate a trend analysis by collecting measured data on a regular basis.

Other analysis tools let you determine and verify damage to bearings and gearing before a total failure of the system occurs.

Pekrun engineers can carry out vibration measurement and analysis.

If Pekrun engineers perform analysis, the results of comparable Pekrun gearboxes will also be included and taken into account.

11.4 Special tools and operating materials

Contact thermometer for measuring temperatures.

Endoscope for carrying out visual inspections of the inside of gearboxes.

Stethoscope for monitoring running noises in the gearbox.

Standard hand tools, e.g. open-ended spanners, ring spanners, Allen keys, etc.

11.5 Inspection and maintenance plan

NOTICE

The following details apply to operation with mineral oil.

Table 11-1

D = daily, W = weekly, M = monthly, A = annually, 1/2 = every six months

Work to be carried out	D	W	M	A
Check oil temperatures	X*	X*		
Check the gearbox for changes in noises		X		
Check the monitoring instruments on the gearbox and OSS			X	
Check the oil level			X	
Clean the oil filter as soon as the soiling indicator shows a warning			X	
Check that the gearbox is leak-proof			X	
Check that the piping is leak-proof			X	
Check that the oil supply system is leak-proof and functioning properly			X	
Check the condition of the air/oil cooler				X
Check the condition of the water/oil cooler				X
Check the water content of the oil				X
Check the machine guards				X
Clean the venting filter				1/2
Check fixing screws for firm seating				1/2
Check cooling coil for deposits	At same time as oil change			
Change oil filter	At same time as oil change			
Change oil	See table 11-2 + 11-3			
Re-apply grease lubrication to bearing points/seals	After 3000 operating hours or 6 months at the latest			
Full inspection of gearbox				X

* Depending on the use case, the oil temperature may also need checking daily.

11.6 Lubrication plan

11.6.1 Oil lubrication

Important information before changing oil:

⚠	**CAUTION** **Risk of injury from toxic vapours or fluids!** When changing oil, there is a risk of injury from breathing in and/or coming into contact with lubricants or other process media. – Observe the safety data sheet for the media being used. – Wear suitable personal protective equipment (safety goggles, protective gloves) for oil-changing work. – Have suitably-qualified personnel carry out the work. – Clean up any oil spills that occur immediately (e.g. with oil binder).

!	**TAKE CARE** **Risk of damage** **Risk of damage to gearbox from unsuitable lubricating oil!** Avoid incompatibilities with the lubricating oil used later on. To ensure optimum reliability for lubrication, oils of the same type and viscosity should be used, but should not be mixed from different manufacturers. Do not mix oils of different types or ones made by different manufacturers. In particular, do not mix synthetic oils with mineral oils or other synthetic oils. When switching from a mineral oil to a synthetic oil or vice versa, or when switching from synthetic oils with one base chemistry to synthetic oils with a different base chemistry: – Drain off the old lubricating oil completely. – Flush the gearbox thoroughly with the lubricating oil to be used later. (See **section 6.6**, “Flushing before commissioning”.) – Fill with the new lubricating oil (see **section 8**) *Check first with the lubricant manufacturer/supplier.*

When changing the oil, always try to use the grade that you used before.

When changing the oil, flush the housing and clean it thoroughly.

Before filling with fresh oil, completely remove any and all oil sludge, abraded matter and used oil residue.

In special operating conditions, e.g. ambient air that is very damp, has a high dust content or contains chemical vapours, it may be necessary to change the oil more often. In the same way, favourable operating conditions can extend the useful life of the oil. In special cases, consult the technical customer service of the oil company for advice.

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Oil change interval:

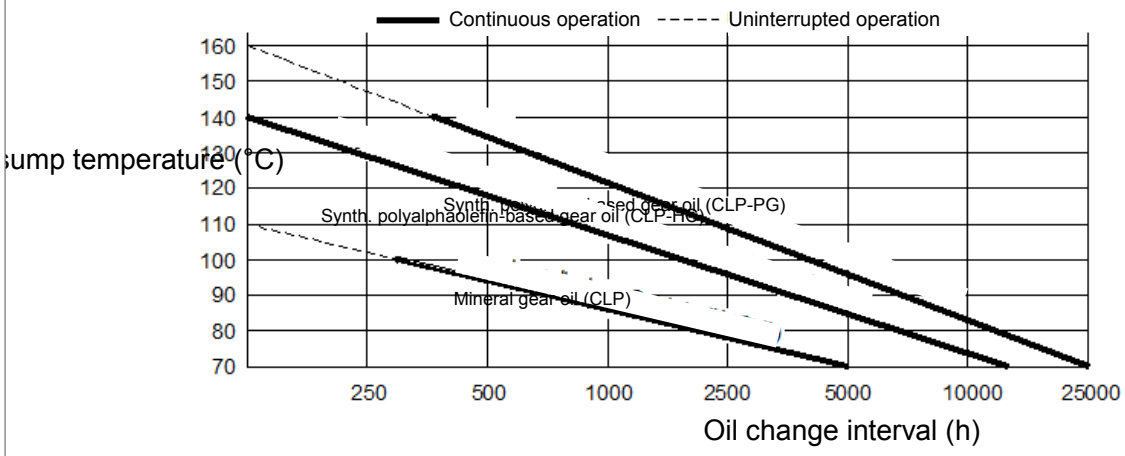
Reference values for oil change intervals can be found in table 11-2. These apply for normal operating conditions and for an oil sump temperature below 70 °C.

Table 11-2

		LUBRICANT TYPE			
		Mineral oil-based CLP	**Synthetic polyalphaolefin-based CLP - HC**	**Synthetic polyglycol-based CLP - PG**	**Grease**
1st oil change	**Worm gearboxes**	500 h	100 to 500 h	250 to 1000 h	
	Cylindrical gearbox Bevel gearbox	1000 h	2000 h	5000 h	
Next oil change	**Worm gearboxes**	3000 to 4000 h	5000 to 7500 h	8000 to 10000 h	5000 h
	Cylindrical gearbox Bevel gearbox	5000 h	12000 h	25000 h	8000 h
Regular intervals	**Worm gearboxes**	12 to 18 months	2 to 3 years	4 to 5 years	2 years
	Cylindrical gearbox Bevel gearbox				

At higher oil sump temperatures, oil change intervals can be determined by consulting diagram 11-3.

Diagram 11-3



Description of oil change work:

	WARNING **Risk of burn injuries from escaping hot working fluid!** **This may cause serious scald injuries.** During oil changing work directly following operation – and for a period of time after standstill – there is a risk of serious injury from escaping hot working fluid (>55 °C). – Have servicing work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with servicing work about the existing residual risks (see **section 2**, “Safety”). – When changing the oil, wear suitable PPE (protective gloves/goggles).

	NOTICE Drain the oil immediately after the system comes to a standstill, when the oil is still warm and has a low viscosity. Collect the used oil in suitable containers. Clean up any oil spills that occur immediately. Dispose of the drained used oil, oil binders and cleaning rags soaked in oil according to applicable local environmental regulations.

- When draining the oil, use a suitable collection container.
- Close the coolant supply to gearboxes with cooling coils or water/oil coolers.
- If you drain the oil through the oil drain hole, place a suitable container below it.
- While draining the oil, ensure that enough air can enter the housing via the aeration filter. If necessary, undo the screws on the aeration filter and remove.
- Use a suitable oil binder to mop up and dispose of any oil that escapes immediately.
- Screw the oil drain plug back in.
- Fill the gearbox with lubricant as described in **section 8.4**.

11.6.2 Grease lubrication:

Gearboxes are provided with grease lubrication for special operating conditions. The gearboxes are filled with grease at the acceptance test bench and are also delivered in this condition.

	NOTICE The grease lubrication is intended to last for the gearbox’s lifetime. Consult with the manufacturer before changing prior to this date.

NOTICE

For gearbox grease recommendations, refer to the lubricant table for Pekrun gearboxes (details given in **section 8.4**).

11.6.3 Grease lubrication of the bearings or seals:

On some gearboxes, grease lubrication is provided for the bearings or the seals of extended shaft ends. Such points are equipped with pressure grease nipples and filled with grease on delivery of the gearboxes.

TAKE CARE

Risk of damage

Risk of damage to gearbox from unsuitable grease!

Do not mix greases with different soap bases.

Check first with the lubricant manufacturer/supplier.

NOTICE

For reapplying or renewing the grease, use only compatible, branded anti-friction bearing greases. For details, see **section 8.4** and the lubricant table for Pekrun gearboxes.

Re-lubrication of the bearing points is required after each **3000 operating hours** or an interval of **6 months**, whichever is the greater.

NOTICE

Seals on extended shaft ends may need to be re-lubricated more frequently, depending on the operating conditions.

When renewing the entire grease filling for a bearing, proceed as follows:

- Wash out the bearing thoroughly with white spirits (or similar).
- Brush the hollow spaces of the anti-friction bearing evenly with grease.
- Also fill 1/3 of the bearing housing cavity with grease, to prevent excessive heating.

NOTICE

For shafts running at low speeds (n<60 rpm), we recommend filling the entire bearing housing space with grease.

11.7 Description of inspection and maintenance work

NOTICE

For the operation and maintenance of the components as listed below, also follow the operating instructions listed in the order-specific appendix as provided.

NOTICE

Replace any bolts/screws rendered unusable by assembly or dismantling work. Always replace with bolts/screws of the same design and strength class.

Please note the following:

- Have inspection and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with inspection and maintenance work about the existing residual risks (see section 2: **Safety**)
- **Always take the gearbox out of service before attempting any work.**
- Switch off the drive unit when working on the gearbox.
- Secure the drive unit so it cannot be accidentally started up again and post up a sign informing personnel of this on the start-up console.

11.7.1 Cleaning the fan and gearbox

Heavy soiling on the fan or gearbox surface significantly reduces the cooling effects otherwise obtained. Regular cleaning of the fans and gearbox is therefore required.

Caution: Take the gearbox out of service before starting cleaning work.

- Remove any dirt deposits from the fan rotor, fan hood and the protective grille with a hard brush (for example).
- Carry out cleaning in the same way for the surface of the gearbox housing using a hand brush (for example).

TAKE CARE

Risk of damage

Risk of damage from the ingress of moisture!

Do not clean the gearbox with a pressure washer: this can cause moisture to penetrate inside the gearbox, where it can cause serious damage.

TAKE CARE

Risk of damage

Risk of damage to gearbox from incorrect assembly!

When reinstalling the fan, ensure that the fan does not touch the fan hood.

11.7.2 Checking the cooling coil (if present)

Proceed as follows:

- Disconnect the cooling water intake and drain lines.
- Check the inner wall of the cooling coil for deposits/limescale.
- If soiled, clean the cooling coil with a suitable cleaning agent or replace the cooling coil with a new part.
- Then reconnect the cooling water intake and drain lines.

11.7.3 Checking the air/oil cooler (if present)

- Remove any dirt on the cooling assembly.
- Check the condition of the screw connections and replace them if necessary.

TAKE CARE

Risk of damage

Risk of damage to gearbox from incorrect assembly!

Ensure that air can circulate freely around the cooler. If necessary, remove any objects in the way.

11.7.4 Checking the water/oil cooler (if present)

- Check that the pipes carrying water are leak-proof.
- Check the condition of the screw connections and replace them if necessary.

11.7.5 Checking the line filter (if present)

- Check the soiling indicator.
- If necessary, clean the line filter using a suitable cleaning agent.

11.7.6 Check the fixing screws

- Use a torque spanner to check that all fixing screws are seated firmly.
- Check the bolts for tightening torque according to table 11-4.
- Unusable bolts must be replaced with new ones of the same strength class.

Table 11-4 Tightening torques for headless steel screws

TIGHTENING TABLE FOR HEADLESS SCREWS				
	TIGHTENING TORQUE M_a [Nm] @ μ=0.14			
	SIZE	8.8	10.9	12.9
COARSE-PITCH THREAD	M6	10	15	18
	M8	25	37	43
	M10	51	75	87
	M12	87	130	150
	M16	215	310	370
	M20	430	620	720
	M24	740	1060	1240
	M30	1500	2100	2500
	M36	2450	3450	4150
	M42	3950	5550	6650
	M48	5950	8400	10100
FINE-PITCH THREAD	M8x1	27	40	47
	M10x1.25	54	79	93
	M12x1.25	96	140	165
	M12x1.5	92	135	155
	M16x1.5	230	340	390
	M20x1.5	480	690	800
	M24x2	810	1160	1350
	M30x2	1670	2370	2780

The table values for Ma take into account:

- Friction value μtot. = 0.14
- Utilisation of minimum yield point = 90%
- The torsional torque when tightening to the fiction value of μtot. = 0.14 applies to nuts and bolts without coating and lightly oiled.

TAKE CARE

Risk of damage

Risk of damage to gearbox from incorrect assembly!

Additional lubrication of the thread considerably changes the coefficient of friction and results in unspecified tightening conditions.

11.7.7 Full inspection of gearbox

You should request a complete inspection of the gearbox from the Pekrun Customer Service department. Our engineers and supervisors are best placed for assessing whether gearbox components need to be replaced – and if so, which components.

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12 Dismantling and disposal

12.1 Safety

All work must be carried out with the greatest of care and attention to **safety**!

Always observe the safety regulations that apply in the country of use. Environmental regulations for disposal.

NOTICE

Pay attention to the safety instructions in **section 2**, **Safety**

WARNING

Risk of injury during dismantling work

There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers).

Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts.

Personnel may slip or fall as a result of leaking oil or existing spills of oil.

– Clean up any oil spills or oil leaks with an oil binder.

– Wear PPE.

Have dismantling and disposal work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.

– Inform all personnel entrusted with dismantling and disposal work about the existing residual risks (see **section 2**, “Safety”)

Keep to safety clearance distances!

CAUTION

Risk of injury from toxic vapours or fluids!

When draining and disposing of oil, there is a risk of injury from breathing in and/or coming into contact with lubricants or other process media.

When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.

When working on parts filled with oil, such as piping and the interior of the gearbox, skin can be exposed to contact with aggressive media.

– Observe the safety data sheet for the media being used.

Wear suitable personal protective equipment (safety goggles, protective gloves) for oil-changing work.

– Have suitably-qualified personnel carry out the work.

– Clean up any oil spills that occur immediately (e.g. with oil binder).

12.2 Dismantling

Description of dismantling work:

- Have dismantling work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with dismantling work about the existing residual risks (see **section 2**, **Safety**)
- Take the gearbox out of service first. Follow the instructions in **section 9**, **Decommissioning**.

  To take the gearbox out of service, switch the drive unit off.
- Switch off the power supply to the accessory units.
- Secure the drive unit so it cannot be accidentally started up again. Attach an informative sign to the start-up console.
- Next, drain the oil into a suitable container. To do this, follow the instructions in **section 11, Servicing**.
- Disconnect the drive shaft from the drive unit (e.g. motor). Follow the operating instructions from the plant manufacturer.
- Disconnect the output shaft(s) from the machine. Follow the operating instructions from the plant manufacturer.
- Dismantle and remove any piping that may be present. Use a suitable oil binder to mop up and dispose of any oil leaks in accordance with environmental protection regulations.
- Disconnect all connecting lines present.
- Unscrew and remove all fixing screws.
- Clean and degrease the gearbox before disposal.
- You can now remove the gearbox using suitable load-handling equipment. Follow the safety instructions and details about in-house transportation given in **section 5**.

12.3 Disposal

Description of disposal work:

If disposal is carried out correctly, the gearbox can be recycled.

Dispose of electronic components at a special facility in accordance with applicable regulations.

We recommend commissioning a local specialist firm with the disposal of used oil according to the environmental protection regulations in the country of use.

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13 Supplementary documents

13.1 Declaration of Incorporation

Content and structure of the Declaration of Incorporation:

EU Declaration of Incorporation

According to EC- directive 2006/42/EC on machinery (Annex II B)

Name and address of manufacturer:

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany

We hereby declare that the partly completed machinery described below

PRODUCT DENOMINATION:	GEARBOX
Model / Type:	ASR… / BSR… / CSR… / ALG... / AGZ… / *AG* / *CH* / *GV* / *HS* / *KR* / *KS* / *KZ* / *LG* / *MK* / *PG* / *PL* / *SH* / *SO* / *SV* / *VG* / *VH* / *VN* / SN*../ SNU*../ SNO*../ SNV*../ SNC*../ SNA*../ SNAF*../ SW*../SHS*../ SDA*../ SVA*../.SZA*../ ZVA*../ SEO*.. / K*../KN*../ KNV*../ KNA*../ KS*../ / KW*../KZV*../ VKZ*../ SKV*.. / SSN *../ SSNV*../ SSW*../ KSN
Machinery / Serial number:	1**** / 1000****
Year of manufacture:	20**

meets the following essential requirements of the Machinery Directive 006/42/EC - including the changes which applied at the time of the declaration.

Completely satisfied essential safety and health protection requirements:
1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.4, 1.4.2.1, 1.5.1, 1.5.13, 1.5.15, 1.5.2, 1.5.3, 1.5.4, 1.5.6, 1.5.7, 1.5.9, 1.6.1, 1.6.2, 1.7.1.1, 1.7.2, 1.7.3, 1.7.4

Partially satisfied essential safety and health protection requirements:
1.2.6, 1.3.2, 1.3.3, 1.3.7, 1.3.8.1, 1.3.9, 1.4.1, 1.5.5, 1.5.8, 1.6.3

The following legislation have been applied:
Machinery Directive 2006/42/EC

It is forbidden to put this product into service until the machine or system in which this product is to be installed or of which it represents a component corresponds to the provisions of all relevant complies with the legislation

The special technical documents have been compiled for the product according to Annex VII, part B; these documents can be forwarded to a national authority on the basis of a reasoned request.

The person authorised to compile the relevant technical documentation (must be established within EU):

location:	Iserlohn	Wuppertal
	Beate Schröder Köbbingser Mühle 14 58640 Iserlohn Germany	Annette Lindemann Köbbingser Mühle 14 58640 Iserlohn Germany

NOTICE

The original Declaration of Incorporation is supplied separately. You will receive this together with the delivery. This will (where possible) be affixed to the outside of the gearbox.

13.2 Drawings and order-specific documents

The documents supplied will vary according to the requirements and use case.
These specify the intended use and point out order-specific peculiarities.

The following documents belong to this operating instructions:

- Technical data sheet (prepared per order)
- Pekrun recommended lubricants table (RLT)
- Original Declaration of Incorporation

The following additional documents are supplied in individual cases:

- Dimensional or section drawing
- Spare parts list
- Documentation for components
  (Operating instructions / safety-relevant data sheets)

All supplied documents are part of these OI (see pt. 1.5.2)

WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument-Nr.: OFF-036743– Rev.: -
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Getriebeöle auf Mineralölbasis

Gear oil based on mineral oils
Huile à engrenages minérale
Óleos para engrenagens à base de óleos minerais
Aceite de base mineral
Tandwielolie op basis van minerale olie
Редукторные масла на минеральной основе

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION		ADDINOL	Chevron
CLP 32	Degol BG 32	Alpha EP 32 Alpha VT 32 Optigear EP 32	Mobil DTE 24	RENOLIN ZAF B 32 HT	RENOLIN ZAF B 32 HT	–	Shell Tegula V 32	–	GST EP 32
CLP 46	–	Alpha SP 46 Optigear BM 46 Optigear EP 46	Mobil DTE 25	RENOLIN ZAF B 46 HT	RENOLIN ZAF B 46 HT	Klüberoil GEM 1-46 N	Shell Tellus S2 MA 46	–	GST EP 46
CLP 68	Degol BG 68	Alpha EP 68 Alpha SP 68 Optigear BM 68 Optigear EP 68	Mobilgear 600 XP 68	RENOLIN CLP 68 RENOLIN CLP 68 Plus	GEARMASTER CLP 68	Klüberoil GEM 1-68 N	Shell Omala S2 GX 68	Eco Gear 68 M	Meropa 68
CLP100	Degol BG 100	Alpha EP 100 Alpha SP 100 Optigear BM 100 Optigear EP 100	Mobilgear 600 XP 100	RENOLIN CLP 100 RENOLIN CLP 100 Plus	GEARMASTER CLP 100	Klüberoil GEM 1-100 N	Shell Omala S2 GX 100	Eco Gear 100 M Gear Oil 100 F	Meropa 100 Meropa XL 100 Meropa MG 100
CLP 150	Degol BG 150	Alpha EP 150 Alpha SP 150 Optigear BM 150 Optigear EP 150	Mobilgear 600 XP 150	RENOLIN CLP 150 RENOLIN CLP 150 Plus	GEARMASTER CLP 150	Klüberoil GEM 1-150 N	Shell Omala S2 GX 150	Eco Gear 150 M Gear Oil 150 F	Meropa 150 Meropa XL 150 Meropa MG 150
CLP 220	Degol BG 220	Alpha EP 220 Alpha SP 220 Optigear BM 220 Optigear EP 220	Mobilgear 600 XP 220	RENOLIN CLP 220 RENOLIN CLP 220 Plus RENOLIN CLP 220 VCI	GEARMASTER CLP 220	Klüberoil GEM 1-220 N	Shell Omala S2 GX 220	Eco Gear 220 M Gear Oil 220 F	Meropa 220 Meropa XL 220 Meropa MG 220
CLP 320	Degol BG 320	Alpha EP 320 Alpha SP 320 Optigear BM 320 Optigear EP 320	Mobilgear 600 XP 320	RENOLIN CLP 320 RENOLIN CLP 320 Plus RENOLIN CLP 320 VCI	GEARMASTER CLP 320	Klüberoil GEM 1-320 N	Shell Omala S2 GX 320	Eco Gear 320 M Gear Oil 320 F	Meropa 320 Meropa XL 320
CLP 460	–	Alpha EP 460 Alpha SP 460 Optigear BM 460 Optigear EP 460	Mobilgear 600 XP 460	RENOLIN CLP 460 RENOLIN CLP 460 Plus	GEARMASTER CLP 460	Klüberoil GEM 1-460 N	Shell Omala S2 GX 460	Eco Gear 460 M Gear Oil 460 F	Meropa 460 Meropa XL 460
CLP 680	–	Alpha EP 680 Alpha SP 680 Optigear BM 680	Mobilgear 600 XP 680	RENOLIN CLP 680 RENOLIN CLP 680 Plus	GEARMASTER CLP 680	Klüberoil GEM 1-680 N	Shell Omala S2 GX 680	Eco Gear 680 M Gear Oil 680 F	Meropa 680 Meropa XL 680
CLP 1000	–	Alpha SP 1000 Optigear BM 1000	–	–	–	Klüberoil GEM 1-1000 N	–	–	Meropa 1000

Beratung durch technischen Dienst / please consult technical service:

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -
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Synthetisches Getriebeöl auf Polyalphaolefinbasis

Synthetic gear oil based on polyalphaolefines
Huile à engrenages sur base de Poly-Alph-Oléfine
Óleo sintético de engrenagens à base de polialfaolefin
Aceite sintético con base polialfaolefinica
Synthetische reductiekast olie op Polyalpha basis
Синтетические редукторные масла на основе полиальфаолефина

DIN 51502	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION		ADDINOL	Chevron
CLP HC 32	Alphasyn T 32 (CL HC)	Mobil SHC 624	RENOLIN Unisyn OL 32	RENOLIN Unisyn OL 32	Klübersynth GEM 4-32 N	–	Foodproof UNI 32 S	–
CLP HC 46	Alphasyn T 46 (CL HC)	Mobile SHC 625	RENOLIN Unisyn OL 46	RENOLIN Unisyn OL 46	Klübersynth GEM 4-46 N	–	Foodproof UNI 46 S	–
CLP HC 68	Alphasyn HTX 68 Optigear Synthetic PD 68 ES	Mobil SHC 626	RENOLIN Unisyn CLP 68	GEARMASTER SYN 68	Klübersynth GEM 4-68 N	–	Eco Gear 68 S-T	–
CLP HC 100	Alphasyn T 100 (HL HC) Optigear Synthetic PD 100 ES	Mobil SHC 627	RENOLIN Unisyn CLP 100	GEARMASTER SYN 100	Klübersynth GEM 4-100 N	–	Eco Gear 100 S	–
CLP HC 150	Alphasyn EP 150 Alphasyn HTX 150 Optigear Synthetic PD 150 ES	Mobil SHC 629 Mobil SHC Gear 150 Mobil SHC Elite 150	RENOLIN Unisyn CLP 150 RENOLIN UNISYN XT 150	GEARMASTER SYN 150	Klübersynth GEM 4-150 N	Shell Omala S4 GXV 150	Eco Gear 150 S	Meropa Synthetic EP 150
CLP HC 220	Alphasyn EP 220 Alphasyn HTX 220 Optigear Synthetic PD 220 ES	Mobil SHC 630 Mobil SHC Gear 220 Mobil SHC Elite 220	RENOLIN Unisyn CLP 220 RENOLIN UNISYN XT 220	GEARMASTER SYN 220	Klübersynth GEM 4-220 N	Shell Omala S4 GXV 220	Eco Gear 220 S	Meropa Synthetic EP 220
CLP HC 320	Alphasyn EP 320 Alphasyn HTX 320 Optigear Synthetic PD 320 ES	Mobil SHC 632 Mobil SHC Gear 320 Mobil SHC Elite 320	RENOLIN Unisyn CLP 320 RENOLIN UNISYN XT 320	GEARMASTER SYN 320	Klübersynth GEM 4-320 N	Shell Omala S4 GXV 320	Eco Gear 320 S	Meropa Synthetic EP 320 Meropa EliteSyn WL 320
CLP HC 460	Alphasyn EP 460 Alphasyn HTX 460 Optigear Synthetic PD 460 ES	Mobil SHC 634 Mobil SHC Gear 460	RENOLIN Unisyn CLP 460 RENOLIN UNISYN XT 460	GEARMASTER SYN 460	Klübersynth GEM 4-460 N	Shell Omala S4 GXV 460	Eco Gear 460 S	Meropa Synthetic EP 460
CLP HC 680	Alphasyn EP 680 Optigear Synthetic PD 680 ES	Mobil SHC 636 Mobil SHC Gear 680	RENOLIN Unisyn CLP 680 RENOLIN UNISYN XT 680	GEARMASTER SYN 680	Klübersynth GEM 4-680 N	–	Eco Gear 680 S	Meropa Synthetic EP 680 Meropa EliteSyn WL 680
CLP HC 1000	Alphasyn HTX 1000	Mobil SHC 639	RENOLIN UNISYN XT 1000	GEARMASTER SYN 1000	Klübersynth GEM 4-1000 N	–	–	–

Beratung durch technischen Dienst / please consult technical service:

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WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

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Biologisch abbaubare vollsynthetische Getriebeöle auf Esterbasis

Biological degradeable fully synthetic gear oils based on ester
Huiles à engrenages synthétiques biodégradables base ester
Óleos de engrenagens totalmente sintéticos e biodegradáveis à base de éster
Aceite de reductores, sintético biológicamente desintegrable, con base de Ester
Biologisch afbreekbare volsynthetische reductiekastolie op Ester basis
Биологически расщепляемые синтетические редукторные масла на основе эфира

DIN 51502	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	
CLP E 32	-	-	PLANTOHYD 32 S PLANTOSYN 32 HVI	ECO-HYD 32 S	-	
CLP E 46	-	-	PLANTOHYD 46 S PLANTOSYN 46 HVI	ECO-HYD 46 S	-	
CLP E 68	-	Mobil SHC Aware 68	PLANTOSYN 68 HVI	GEARMASTER ECO 68	Klüberbio EG 2-68	
CLP E 100	-	Mobil SHC Aware 100	PLANTOGEAR 100 HVI	GEARMASTER ECO 100	Klüberbio EG 2-100	
CLP E 150	-	Mobil SHC Aware 150	PLANTOGEAR 150 HVI	GEARMASTER ECO 150	Klüberbio EG 2-150	
CLP E 220	Performance Bio GE 220 ESS	-	PLANTOGEAR 220 S	GEARMASTER ECO 220	Klübersynth GEM 2-220	
CLP E 320	Performance Bio GE 320 ESS	-	PLANTOGEAR 320 S	GEARMASTER ECO 320	Klüberbio EG 2-320	
CLP E 460	-	-	PLANTOGEAR 460 S	GEARMASTER ECO 460	Klüberbio CA 2-460	
CLP E 680	-	-	PLANTOGEAR 680 S	GEARMASTER ECO 680	-	
CLP E 1000	-	-	-	-	-	

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Synthetisches Getriebeöl auf Polyglykolbasis

Synthetic gear oil based on polyglycols
Huile à engrenages sur base de Poly-Glycolle
Óleo sintético de engrenagens à base de poliglicol
Aceite sintético con base poliglicol
Synthetische reductiekast olie op Polyglycol basis
Синтетические редукторные масла на основе полиальфаолефина

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	Shell	ADDINOL	Chevron
CLP PG 32	-	-	-	RENOLIN PG 32	GEARMASTER PGP 32	Klübersynth GH 6-32	–	–	-
CLP PG 46	–	-	-	RENOLIN PG 46	RENOLIN PG 46	Klübersynth GH 6-46	–	–	-
CLP PG 68	-	-	-	RENOLIN PG 68	GEARMASTER PGP 68	Klübersynth GH 6-80	–	–	-
CLP PG 100	-	Optigear Synthetic 800/100	-	RENOLIN PG 100	GEARMASTER PGP 100	Klübersynth GH 6-100	–	Poly Gear PG 100	-
CLP PG 150	Degol GS 150	Alphasyn PG 150 Optigear Synthetic 800/150	Mobil Glygoyle 150	RENOLIN PG 150	GEARMASTER PGP 150	Klübersynth GH 6-150	Shell Omala S4 WE 150	Poly Gear PG 150	Meropa Synlube WS 150 Meropa EliteSyn WS 150
CLP PG 220	Degol GS 220	Alphasyn GS 220 Alphasyn PG 220 Optigear Synthetic 800/220 Optigear Synthetic 1300/220	Mobil Glygoyle 220	RENOLIN PG 220	GEARMASTER PGP 220	Klübersynth GH 6-220	Shell Omala S4 WE 220	Poly Gear PG 220	Meropa Synlube WS 220 Meropa EliteSyn WS 220
CLP PG 320	Degol GS 320	Alphasyn GS 320 Alphasyn PG 320 Optigear Synthetic 800/320	Mobil Glygoyle 320	RENOLIN PG 320	GEARMASTER PGP 320	Klübersynth GH 6-320	Shell Omala S4 WE 320	Poly Gear PG 320	Meropa Synlube WS 320 Meropa EliteSyn WS 320
CLP PG 460	Degol GS 460	Alphasyn GS 460 Alphasyn PG 460 Optigear Synthetic 800/460 Optigear Synthetic 1300/460	Mobil Glygoyle 460	RENOLIN PG 460	GEARMASTER PGP 460	Klübersynth GH 6-460	Shell Omala S4 WE 460	Poly Gear PG 460	Meropa Synlube WS 460 Meropa EliteSyn WS 460
CLP PG 680	Degol GS 680	Alphasyn GS 680 Optigear Synthetic 800/680 Optigear Synthetic 1300/680	Mobil Glygoyle 680	RENOLIN PG 680	GEARMASTER PGP 680	Klübersynth GH 6-680	Shell Omala S4 WE 680	Poly Gear PG 680	Meropa Synlube WS 680 Meropa EliteSyn WS 680
CLP PG 1000	–	Optigear Synthetic 800/1000	Mobil Glygoyle 1000	RENOLIN PG 1000	GEARMASTER PGP 1000	Klübersynth GH 6-1000	–	–	–

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Getriebeöle für die Nahrungsmittelindustrie

Gear oils for the food industry
Huiles à engrenages pour industrie alimentaire
Óleo de engrenagens para a indústria alimentar
Aceite de reductores para industria alimenticia
Reductiekastolie voor de levensmiddelen industrie
Редукторные масла для пищевой промышленности

DIN 51502	Castrol	Mobil	bremer & leguil	FUCHS LUBRITECH	KLÜBER LUBRICATION	ADDINOL
CLP E 32	CASSIDA FLUID GL 150	-	Rivolta F.L. 50	CASSIDA FLUID HFS 32	-	Foodproof UNI 32 S
CLP E 46	Optileb HY 46 (HLP HC 46)	-	Rivolta F.L. 75	CASSIDA FLUID HFS 46	-	Foodproof UNI 46 S
CLP E 68	Optileb HY 68 (HLP HC 68)	-	Rivolta F.L. 100	CASSIDA FLUID HFS 68	Klüberoil 4 UH1-68 N	Foodproof UNI 68 S
CLP E 100	Optileb GT 100	Mobil SHC Cibus 100	Rivolta F.L. 125	CASSIDA FLUID HFS 100	Klüberoil 4 UH1-100 N Klübersynth UH1 6-100	Foodproof UNI 100 S
CLP E 150	Optileb GT 150	Mobil SHC Cibus150 Mobil Glygoyle 150	Rivolta F.L. 170	CASSIDA FLUID GL 150	Klüberoil 4 UH1-150 N Klübersynth UH1 6-150	Foodproof UNI 150 S
CLP E 220	Optileb GT 220 (HC) Optileb GT 1800/220 (PG)	Mobil SHC Cibus 220 Mobil Glygoyle 220	Rivolta F.L. 250	CASSIDA FLUID GL 220	Klüberoil 4 UH1-220 N Klübersynth UH1 6-220	Foodproof UNI 220 S (HC), Foodproof CLP 220 WX (min)
CLP E 320	Optileb GT 320 (HC)	Mobil SHC Cibus 320 Mobil Glygoyle 320	Rivolta F.L. 400	CASSIDA FLUID GL 320	Klüberoil 4 UH1-320 N Klübersynth UH1 6-320	Foodproof UNI 320 S (HC), Foodproof CLP 320 WX (min)
CLP E 460	Optileb GT 460 (HC) Optileb GT 1800/460 (PG)	Mobil SHC Cibus 460 Mobil Glygoyle 460	Rivolta F.L. 500	CASSIDA FLUID GL 460	Klüberoil 4 UH1-460 N Klübersynth UH1 6-460	Foodproof UNI 460 S
CLP E 680	Optileb GT 680 (HC) Optileb GT 1800/680 (PG)	Mobil Glygoyle 680	CASSIDA FLUID GL 680	CASSIDA FLUID GL 680	Klüberoil 4 UH1-680 N Klübersynth UH1 6-680	Foodproof UNI 680 S
CLP E 1000	-	Mobil Glygoyle 1000	-	-	Klübersynth UH1 6-1000	Foodproof UNI 1000 S

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Sonstige Schmierstoffe

Other lubricants
D'autres lubrifiants
Otros lubricantes

Outros lubrificantes
Andere smeermiddelen
Другие смазочные материалы

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION		ADDINOL	Chevron
Lithiumverseifte Wälzlagerfette Lithiumgrease; Lithium saponifiés huiles pour roulements; Grasa de base lítica para rodamientos, Wentellagervetten verzeept met lithium; Massas de sabão de lítio para rolamentos de esferas de rolos; Литий мыльная основа смазки для подшипников									
KPSK-20	Aralub HLP 2	Spheerol EPL 2 Tribol GR 100-2 PD Optileb GR UF 1 (H1, NLGI 1)	Mobilux EP 2	RENOLIT LZR 2	LAGERMEISTER LP 2	CENTOPLEX 2 EP	Shell Gadus S2 V220 2	EP Mehrbereichsfett LM 2 EP	Multifak EP 2
Öl für Rücklaufsperren Oils for return flow safety device; Huiles pour cliquets de retour; Aceite para antiretornos; Olie voor terugloop-blokkades; Óleo para bloqueios de retorno; Масла для предохранительного устройства обратный поток									
HLP 32	Vitam GF 32	Hyspin AWS 32 Hyspin ZZ 32 Optileb HY 32 (H1)	Mobil DTE 24	RENOLIN B 10 VG 32 RENOLIN ZAF B 32 HT RENOLIN ZAF D 32 HT RENOLIN MR 32 MC	RENOLIN B 10 VG 32 RENOLIN ZAF B 32 HT RENOLIN ZAF D 32 HT RENOLIN MR 32 MC	LAMORA HLP 32	Shell Tellus S2 MX 32 Shell Tellus S3 M 32	Hydrauliköl HLP 32	Rando HD 32 Clarity Hydraulic Oil AW 32 (ashless)
Fließfette für fettgeschmierte Getriebe Fluid grease for grease lubricated gear units; Graisses pour réducteurs graissés; Grasa fluída para reductores lubricados con grasa; Vloiebare vetten voor met vet gesmeerde tandwielkasten; Massas lubrificantes fluídas para engrenagens lubrificadas por massa lubrificante; Смазка Жидкость для консистентной смазкой редукторов									
GP00K-20	–	Spheerol EPL 00 Tribol GR 100-00 PD Optileb GR UF 00 (H1)	Mobil Chassis Grease LBZ	RENOLIT GFW 00	GEARMASTER LXG 00	MICROLUBE GB 00 Klübersynth BEM 44-4600	–	Fliessfett SGR 4-00-9 P	Multifak EP 00

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Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

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Korrosionsschutzinhibitor (VCI- Konzentrat)

Anti-corrosion inhibitor (VCI- concentrate)
Inhibiteur de corrosion (concentré de VCI)
Inhibidor de la corrosión (concentrado de VCI)
Inibidor anti-corrosão (concentrado de VCI)
Anti-corrosie remmer (VCI- concentraat)
антикоррозийный ингибитор (концентрат VCI)

	Castrol	FUCHS	
	CORROSION INHIBITOR N 213	ANTICORID VCI UNI O 40	
!	Anwendung nach Pekrun- Vorschrift: Konservierung mit VCI- Konzentrat + Hersteller: Produkt Information Application according to Pekrun instruction : Preservation with VCI- concentrate + Manufacturer: Product Information Application: Selon la réglementation Pekrun: Conservation avec concentrado de VCI + Fabricant: Informations sur le produit Aplicación: Según normativa Pekrun: Conservación con concentrado de VCI + Fabricante: Información del producto Aplicação: De acordo com o regulamento Pekrun: Preservação com concentrado de VCI + Fabricante: Informações do produto Toepassing volgens Pekrun-regelgeving: conservering met VCI-concentraat + Fabrikant: Productinformatie Применение: Согласно правилам Pekrun: Консервация ингибитором с концентратом VCI + Производитель: Информация о продукте		

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Anhang zur Schmierstofftabelle für Pekrun Getriebe
Annex to the List of lubricants for Pekrun gears

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Mischbarkeit von Ölen / Miscibility of oils:

DE Öle auf Polyglykolbasis sind nicht mit Ölen auf Kohlenwasserstoffbasis - d.h. mit Mineralölen oder Polyalphaolefinen mischbar.

EN Oils based on polyglycols are not mixable with oils based on hydrocarbons, that means with mineral oils or polyalphaolefine oils!

FR Des huiles sur base de Poly-Glycolle ne peuvent pas être mèlangées avec des huiles sur base de carbone, c.-à-d. des huiles minérales ou des huiles sur base de Poly-Alpha-Oléfine.

ES Los aceites con base poliglicol no se mezclaran con aceites de base hidrocarburo, es decir aceites minerales o polialfaolefinicos

NI Olien op basis polyglycol kunnen niet worden vermengd met olien op basis van koolwaterstof - dat will zeggen met minerale olien of olien op basis van polyalfaolefine!

RU Масла на основе полигликоля нельзя смешивать с маслами на основе углерода - т.е. с минеральными маслами или полиальфаолефинами

PT Óleos à base de poliglicol não são misturáveis com óleos à base de hidrocarboneto, isto é, com óleos minerais ou com óleos à base de polialfaolefin.

Schmiersicherheit / Lubrication safety:

DE Um optimale Schmiersicherheit zu gewährleisten, sollen Öle gleicher Art und Viskosität jedoch von unterschiedlichen Herstellern nicht gemischt werden. Gegebenenfalls ist mit den Lieferanten Rücksprache zu halten.
Bei Grundölen der hier aufgeführten Wälzlagerfette handelt es sich um Mineralöle. Werden Polyglykolöle verwendet, muss auch das Fett auf das Polyglykolöl abgestimmt sein.

EN In order to guarantee an optimal performance, oils of the same kind and viscosity, but of different manufacturers should not be mixed. When necessary please consult the supplier.
The base oils of the mentioned rolling bearing greases are mineral oils. If polyglycol oils are used, the grease has to correspond with the polyglycol oil.

FR Pour garantir une securité de graissage optimale on ne doit pas mélanger les huiles de la même sorte et de la même viscosité, mais de fabricants différents. Le cas échéant il faut consulter le fournisseur.
Les huiles de base des graisses de roulement ici mentionnées sont des huiles minérales. Quand on emploie des huiles sur base de Poly-Glycolle, l'huile de base de la graisse doit être accordée à l'huile sur base de Poly-Glycolle.

ES Con el fin de garantizar una correcta lubricación, se utilizarán siempre aceites del mismo tipo y viscosidad, no mezclando nunca aceites de distintos fabricantes. En caso de duda, consultar con el proveedor.
La grasa pra rodamientos tiene un aceite de base mineral. Si se utiliza aceite poliglicol, la grasa deberá se compatible con el aceite.

NI Om opitmale smeerveiligheid te kunnen garanderen mogen oliën van het gelijke type en met een gelijke viscositeit, die echter van verschillende producenten stammen, niet worden gemengd. Zo nodig dient contact op te worden genomen met de leverancier.
Bij de basisoliën van de hier genoemde wentellagervetten gaat het om minerale oliën. Wanneer oliën op basis van poliglycol worden gebruikt, moet ook het vet zijn afgestemd op olie op basis van poliglycol.

RU Для обеспечения оптимальной надежности смазки следует не мешать масла одного и того же типа и вязкости разных производителей. При необходимости, следует проконсультироваться с поставщиками. Масляными основами приведенных здесь смазок для подшипников качения являются минеральные масла.
Если будут использоваться масла на полигликольной основе, то необходимо будет подобрать консистентную смазку, подходящую к таким маслам.

PT De modo a garantir a maior segurança de lubrificação, os óleos do mesmo tipo e viscosidade mas de fabricantes diferentes não devem ser misturados. Eventualmente deverá consultar o fornecedor. Os óleos base para as massas dos rolamentos de esferas de rolos aqui mencionados são óleos minerais. Se forem utilizados óleos à base de poliglicol, a massa lubrificante deverá ser igualmente compatível com o óleo à base de poliglicol.

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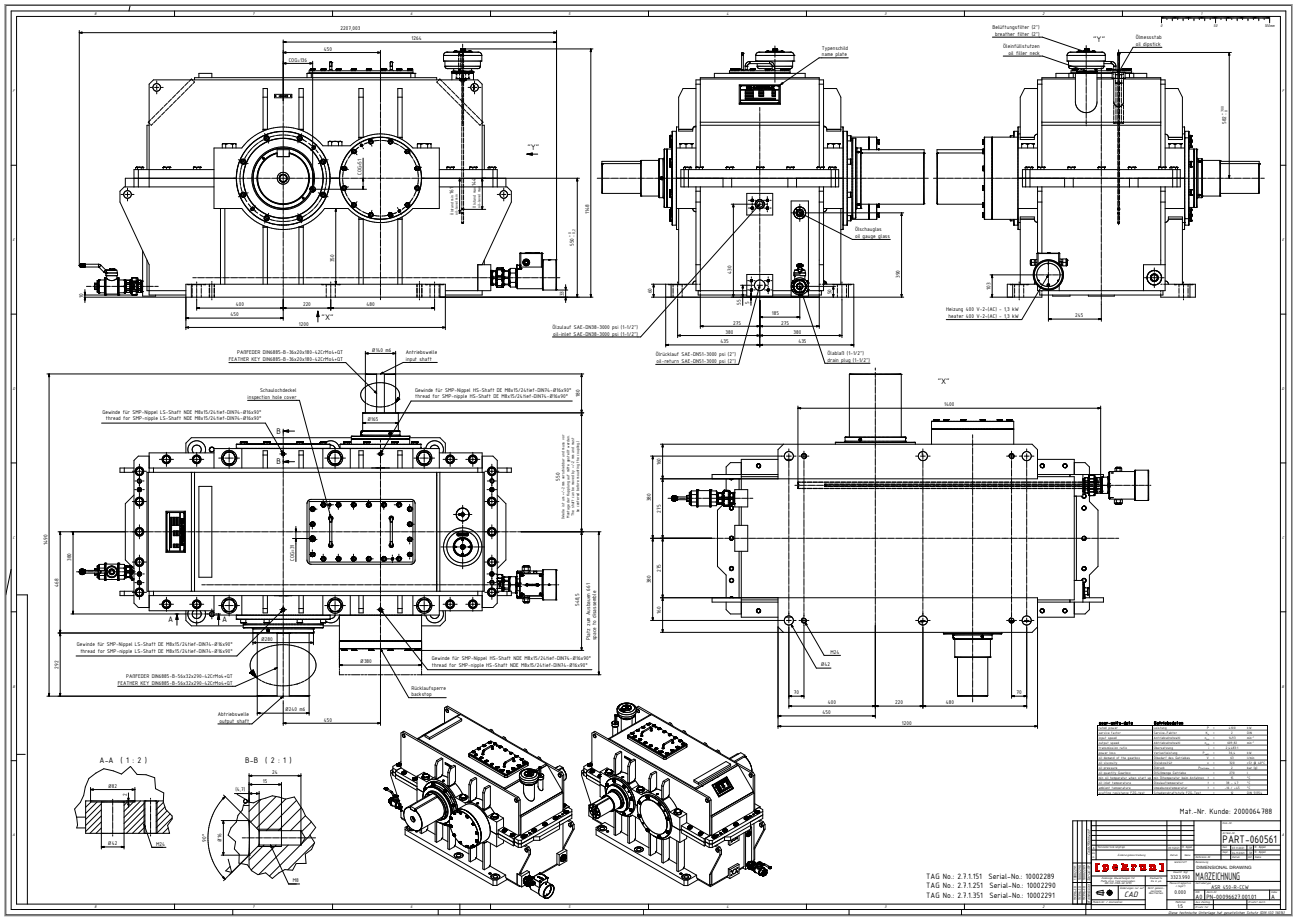
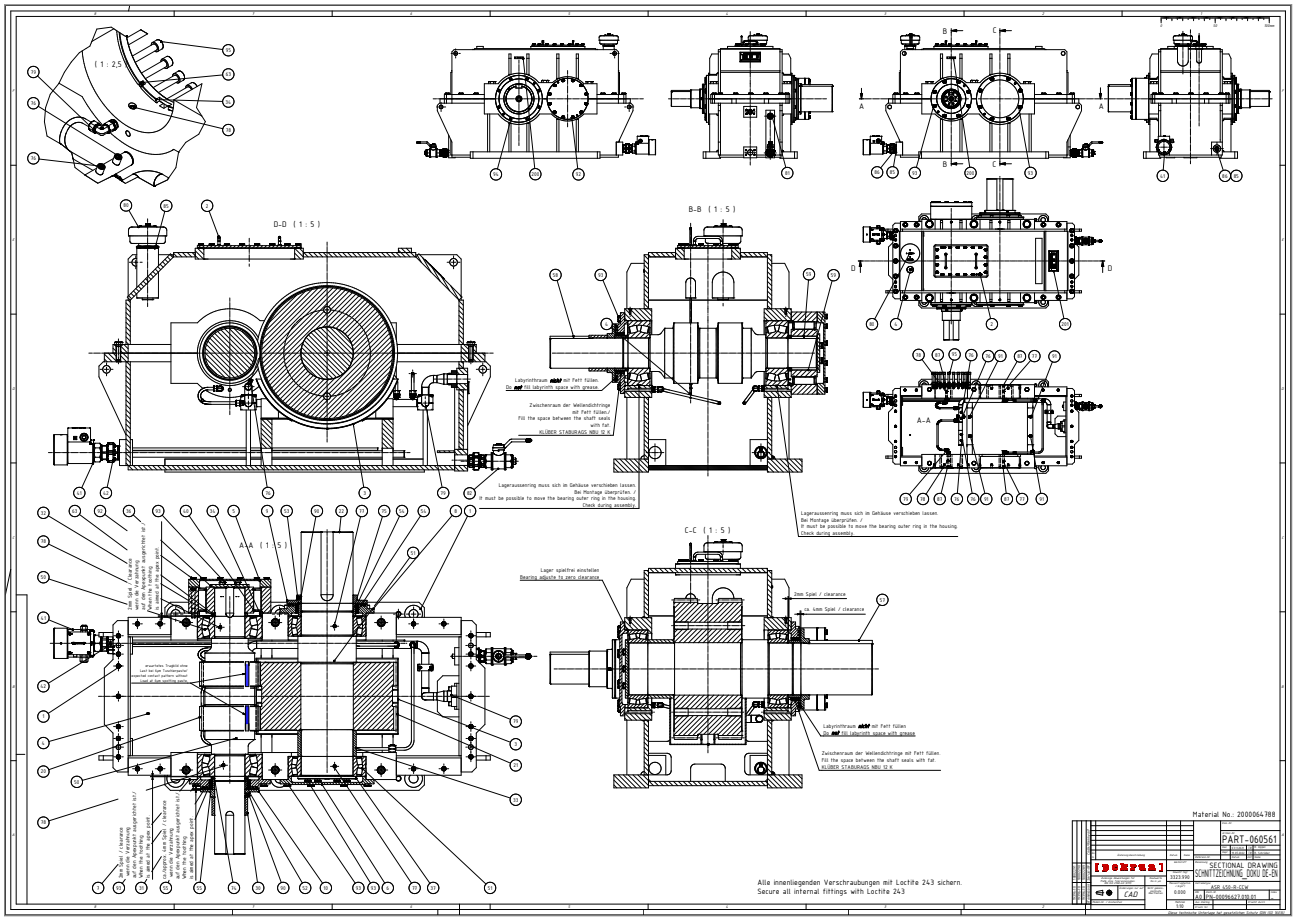

Typenschild
name plate
Belüftungsfilter (2")
breather filter (2")
Ölmeßstab
oil dipstick
Ölschauglas
oil gauge glass
Ölablauf (1-1/2")
drain plug (1-1/2")
Heizung 400 V-2-(AC) - 13 kW
heater 400 V-2-(AC) - 13 kW
Schauloch-deckel
inspection hole cover
Antriebswelle
input shaft
Abtriebswelle
output shaft
Rücklaufsperre
backstop
A-A (1 : 2)
B-B (2 : 1)
TAG No.: 2.7.1.151 Serial-No.: 10002289
TAG No.: 2.7.1.251 Serial-No.: 10002290
TAG No.: 2.7.1.351 Serial-No.: 10002291
Mat.-Nr. Kunde: 2000064788
PART-060561
MARZEICHNUNG
ASR 450-B-CEK
CAD


1 : 2,5
D-D (1 : 5)
B-B (1 : 5)
A-A
C-C (1 : 5)
Labyrinthraum nicht mit Fett füllen.
Do not fill labyrinth space with grease.
Zwischenraum der Wellendichtringe mit Fett füllen./
Fill the space between the shaft seals with fat.
KLÜBER STABURAGS NBU 12 K
Lagerausserring muss sich im Gehäuse verschieben lassen.
Bei Montage überprüfen. /
It must be possible to move the bearing outer ring in the housing.
Check during assembly.
Lager spielfrei einstellen
Bearing adjuste to zero clearance
1mm Spiel / clearance
ca. 1mm Spiel / clearance
Alle innenliegenden Verschraubungen mit Loctite 243 sichern.
Secure all internal fittings with Loctite 243
Material No.: 200006788
PART-060561
SECTIONAL DRAWING
SCHNITTZEICHNUNG DOKU DE-EN
CAD
ASR 450-R-CCW

[pekrun]	Commission:	2.0.19396-10.1	partlist-no.:	PART-060561	GEARBOX ASR 450-R-CCW		page	1
	Gearbox Type:	ASR 450 -R-CCW	dimension drawing-	PN-00096627.001.01				
	Ratio:	2,4348:1	sectional drawing-no.:	PN-00096627.010.01 -		translated (Name/Date)	of:	4
	Name/Date:	Appel/03.11.2021				A B.Schröder/19.05.2022		

Pos.	Qty.		Designation Specification	Article no. Document no.
1	1		HOUSING	PART-057677
				PN-00077526.005.01 -
2	1		INSPECTION COVER WITH HANDLE	PART-054719
				PN-00074215.005.01 -
3	1		OIL PAN	PART-057714
				PN-00077605.000.01 -
4	1		OIL DIPSTICK COMPLETE	PART-057347
				PN-00076785.005.01 -
5	1		COVER 290	PART-057243
				PN-00076539.000.01 -
6	1		COVER 360	PART-057228
				PN-00076520.000.01 -
7	1		LABYRINTH COVER 300	PART-057239
				PN-00076533.000.01 -
8	1		LABYRINTH COVER 360	PART-057234
				PN-00076524.000.01 -
9	1		LABYRINTH RING	PART-057235
				PN-00076526.000.01 -
10	1		LABYRINTH RING	PART-057238
				PN-00076532.000.01 -
20	1		PINION SHAFT 29	PART-057680
				PN-00077528.000.01 -
				PN-00077529.009.01 -
21	1		SPUR GEAR 71	PART-057679
				PN-00077527.000.01 -
22	1		WHEEL SHAFT	PART-057585
				PN-00077353.000.01 -
30	1		SPACER RING	PART-057236
				PN-00076528.000.01 -
31	1		SPACER RING	PART-057237
				PN-00076529.000.01 -
32	1		SPACER RING	PART-057240
				PN-00076535.000.01 -
33	1		SPACER RING	PART-057586

[pekrun]	Commission:	2.0.19396-10.1	partlist-no.:	PART-060561	GEARBOX ASR 450-R-CCW		page	2
	Gearbox Type:	ASR 450 -R-CCW	dimension drawing-	PN-00096627.001.01				
	Ratio:	2,4348:1	sectional drawing-no.:	PN-00096627.010.01 -		translated (Name/Date)	of:	4
	Name/Date:	Appel/03.11.2021				A B.Schröder/19.05.2022		

Pos.	Qty.	Designation / Specification	Article no. / Document no.
			PN-00077354.000.01 -
34	1	SPACER RING	PART-057352
			PN-00076799.000.01 -
36	1	END PLATE	PART-051274
			PN-00068494.000.01 -
37	1	END PLATE	PART-057227
			PN-00076519.000.01 -
40	1	ONE-WAY CLUTCH E-FC5045	PART-057433
			SC-00076947.009.01 -
41	1	HEATING CARTRIDGE-CSN EX R2"-EL=1400	PART-057342
42	1	PIPE FITTING	PART-057346
50	2	ROLLING BEARING DIN635	PART-057211
51	2	ROLLING BEARING DIN635	PART-057212
52	1	INNER RING	PART-001292
53	1	INNER RING	PART-001300
54	2	ROTARY SHAFT LIP TYPE SEAL	PART-019776
55	2	ROTARY SHAFT LIP TYPE SEAL	PART-014878
57	1	PARALLEL KEY	PART-057337
58	1	PARALLEL KEY	PART-057336
59	2	PARALLEL KEY	PART-057590
63	1	SPRING-TYPE STRAIGHT PIN	PART-028305
74	1	O-RING	PART-057513

[pekrun]	Commission:	2.0.19396-10.1	partlist-no.:	PART-060561	GEARBOX ASR 450-R-CCW		page	3
	Gearbox Type:	ASR 450 -R-CCW	dimension drawing-	PN-00096627.001.01				
	Ratio:	2,4348:1	sectional drawing-no.:	PN-00096627.010.01 -		translated (Name/Date)	of:	4
	Name/Date:	Appel/03.11.2021				A B.Schröder/19.05.2022		

Pos.	Qty.		Designation Specification	Article no. Document no.
75	1		O-RING	PART-018892
76	4		ORIFICE PLATE	PART-016279 PN-00034550.000.01 -
77	2		ORIFICE PLATE	PART-015292 PN-00033574.000.01 -
78	2		ORIFICE PLATE	PART-015291 PN-00033573.000.01 -
79	1		PIPING INSIDE COMPLETE	PART-057686 PN-00077549.005.01 -
80	1		AERATION FILTER	PART-033181
81	1		OIL LEVEL INDICATOR	PART-013240
82	1		OIL DRAIN	PART-057341 PN-00076762.005.01 -
85	2		SEALING RING	PART-001230
86	1		SCREW PLUG	PART-013869
87	4		SCREW PLUG	PART-001366
90	6		SET SCREW	PART-013278
91	4		SCREW	PART-013986
92	12		SCREW	PART-011927
93	26		SCREW	PART-003989
94	8		SCREW	PART-003973
95	24		SCREW	PART-010868

[pekrun]	Commission:	2.0.19396-10.1	partlist-no.:	PART-060561	GEARBOX ASR 450-R-CCW		page	4
	Gearbox Type:	ASR 450 -R-CCW	dimension drawing-	PN-00096627.001.01				
	Ratio:	2,4348:1	sectional drawing-no.:	PN-00096627.010.01 -		translated (Name/Date)	of:	4
	Name/Date:	Appel/03.11.2021				A B.Schröder/19.05.2022		

Pos.	Qty.	Designation / Specification	Article no. / Document no.
200	2	DIRECTION OF ROTATION INDICATOR	PART-002302
		BIG SIZE	PN-00020759.000.01 -
201	1	PEKRUN STANDARD TYPE PLATE	PART-028768
		BIG SIZE	PE-00045948.000.01 C

Translation
Created for the applicable standards in Germany

Only for use in a commercial environment!

Instruction manual

Article-Number: 2119931402134040605

Ex-Heater

Type		: 95F/HC-Exdet1,3T3/T200°C/RBE
Power	(KW)	: 1.3
Tolerance of power	(%)	: +5/-10
Voltage		: 400 V, 2~

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1 Product information

Name	: **Ex-Heater**
Type	: **95F/HC-Exdet1,3T3/T200°C/RBE**
EC type approval certificate	: **BVS 15 ATEX E 143 X**
	: **IECEx BVS 15.0117X**
Marking	: **Ⓔx II 2G Ex db eb IIC T3**
	Ⓔx II 2D Ex tb IIIC T200°C
	Flameproof enclosure (d)
	Increased safety (e)
	Protection by enclosure (t)
Temperature class	: **T3**
Mounting position	: **horizontal, sensor protection tube, above**
Design / approval	: **…**
Fields of application	: **zone 1 und zone 21**
Environment temperature at the header	: **- 40°C ... +50°C**
Protection category	: **IP 65**
Drawing number	: **hand sketch**

2 Intended use

Ex-device, type 95F/...- Ex det. T., according to EC-Type Examination Certificate BVS 15 ATEX E 143 X. Operating range: Zone 1 or Zone 21.

The Ex-device is used for heating the liquid specified under the operating data within the prescribed limits stated there. **Deviations from this are not allowed.**

For this purpose, the heating elements of the Ex-device are introduced into pipelines, containers or the like.

3 Safety

Observe the basic instructions in this Operation Manual for installation and operation.
The Operation Manual must be read and understood by the installation engineer and operating company responsible prior to assembly and commissioning.

Keep the Instruction Manual for later use.
Pass on the Instruction Manual to all subsequent owners and operating companies.

⚠ Surface temperatures of **up to 200°C** may occur on the ex-device in the area of the flange/cooling line due to the high media temperatures. There is a risk of burns. Suitable measures must be taken on site for protection against burns.

Do not make any modifications to the product.
Modifications can disable safety devices and cause personal injury and property damage.
Modifications lead to invalidation of conformity.

Respect any specified installation position and the flow direction of the medium to be heated.

The attention of operators is hereby drawn to the statutory requirements valid in every country for the operating of pressure vessel appliances.

Carry out periodic inspections in compliance with the national provisions.
Inspect safety-relevant components for proper function prior to commissioning.

Carry out an annual function inspection of the safety devices.
At shorter intervals depending on the level of use and ambient conditions.

4 Connection and performance data

A direct connection of aluminium conductors to the connection terminals is not allowed.
The site connection cable must have a minimum cross-section of 1.5 mm².
The cable must be suitable for high temperatures, insulation temperature min. 85°C.

Electrical data3

Power	(kW)	**: 1.3**
Tolerance of power	(%)	**: +5/-10**
Steps		**: 1**
Voltage		**: 400 V, 2~**
Connection		**: triangle**
Cable gland		**: 2x M20x1,5, -55…+160°C, IP66, stainless steel**
		5…9mm (sealing insert with Inlet)
		9…14mm (sealing insert without Inlet)
		..1x for connection Ex-device
		1x for limiter and controller

Heating element

Type		**: High performance cartridge compacted**
Diameter tube	(mm)	**: 32**
Material tube		**: 1.4571**
Immersion length of heat. elem.	(mm)	**: 1.400**
Unheated length	(mm)	**: 50**
Cooling line	(mm)	**: without**
Diameter tube bundle	(mm)	**: 50**

Process Data

Medium		**: gear-oil, resting**
Installation location		**: vessel**
Operating temperature	(°C)	**: 40**
Min. permissible Temperature	(°C)	**: 0**
Max. permissible Temperature	(°C)	**: 80**
Max permissible Pressure	(bar g)	**: 0.5**
Operating pressure	(bar g)	**: …**
Max. permissible pressure	(bar g)	**: …**

Flange

DIN	**: ISO228, G2" .1.4571**
Sealing	**: Vovapress universal**

Temperature Monitoring

Controller	**: 0-100°C, 230V, 16A**
Temperature Limiter	**: 0-150°C, 230V ~, 16A,**

The limiter is set to 80° C and sealed.
The manufacturer sets the limiter and it is not allowed to change.
The limiter and controller are directly interconnected.

Connection head	**: GGG40.3, coated**

A level monitor and an electrical controller are necessary for operation. These safety devices are not included in the delivery of the Ex-device. They have to be installed and adjusted by the constructor. Please note "mounting instructions" for safety devices in this operation manual.

5 Mounting notes

1. Installation location / installation conditions

The Ex-device must be installed in a suitable container / vessel in such a way that the heating elements and the heat can be dissipated unimpeded. The unheated length of the Ex-device and the installation conditions must be compatible. The heated length of the Ex device must be at least 50 mm in the medium. Heating within the container nozzle is not permitted. Deviations from this could lead to heat accumulation causing overheating/rendering the temperature limit ineffective.

The Ex unit must be installed in the vessel in such a way that the sensor protection tubes for regulator and limiter are above the cartridge tube in the medium.

A level monitor and an electrical controller are necessary for operation. These safety devices are not included in the delivery of the Ex device. They have to be installed and adjusted by the constructor. Please note "mounting instructions" for safety devices in this operation manual.

2. Temperature limiter

The temperature limiter has already been installed by the manufacturer. The trigger temperature has already been set and can not be changed.

3. Level monitor

The level monitor must be installed in such a way that minimum monitoring of the device with the heated medium of 50 mm is ensured. Triggering of the level monitor must result in switching off the device.

This measure must ensure that the device cannot run dry and/or a filling level that is too low offsets the reliable switch-on function of the limiter, e.g. due to the limiter sensor running dry.

4. **Electrical controller**
   The Ex-device must be operated with an electrical controller. When shutting down a safety device (temperature limiter, flow monitor or level monitor), the Ex-device must be disconnected from the mains supply by means of a separate shut-down method (contactor) of the controller. This separate shut-down method must work independently of operationally necessary measuring and/or control devices.

5. **Requirements for the safety devices**
   Monitoring devices (temperature limiters, level monitoring) must be functionally and reliably tested in accordance with the relevant regulations. Within the scope of Directive RL2014/34/EU they must either:
   - Be certified according to RL2014 / 34 / EU (Examination Basis DIN EN 50495 SIL 1)
   - In the framework of the assessment of the protection concept for the installation by the installer / operator, be assessed separately in accordance with RL2014 / 34 / EU.

6. **Arrangement connection head**
   The connection head of the Ex-device must not be arranged in the immediate vicinity (<2m) of charged flowing particles (e.g. high-voltage electrode, ionizer, product stream that is not conducted within a closed metallic tube).

7. **Ambient temperature range**
   During operation, the minimum or maximum ambient temperatures at the connection head specified in these instructions must not be exceeded or fallen short of. In the event of deviating ambient temperatures, the Ex-device must be switched off.

8. **Unimpeded heat dissipation connection head**
   The connection head must not be provided with thermal insulation, as this would cause the connection area to overheat.

9. An **overpressure safety valve** must be provided on-site.

10. **Subsequent painting**
    A subsequent coat of paint or powder coating of the Ex-device is forbidden.

11. **Requirements for the medium**
    No contamination or foreign objects may enter the device / system. The medium must be free from impurities. Deposits, abrasive wear or similar are not permitted. Install appropriate measures, e.g. Filter, etc.

12. **Emptying**
    Provide suitable facilities for emptying the container.

13. **Exchange cable entry**
    If the cable glands mounted by the manufacturer should be replaced, suitable cable glands with an additional gasket or sealant must be used.

6 Mounting instructions

Before using the Ex-device, a visual inspection for transport damage must be carried out. It is not permitted to use a damaged Ex-device.

The Ex-device must be permanently installed and operated according to the specified installation position.

The transportation equipment and lifting gear must selected in such a way that the heating elements cannot be bent or damaged during transportation and installation.
The Ex-device may only be attached to suitable structures designed to bear the weight of the Ex-device. For lifting and for the installation of the Ex-device only means of transport and tools, which are suitable for the load, may be used. For lifting may be used only lifting attachment which are sufficiently dimensioned and exhibit no damages.
Enough space must be allowed to ensure that any subsequent expansion of the Ex device is possible. Linear expansion during heating must be taken into account. The Ex- device must be brought to the final installation position slowly and while simultaneously aligning it.

Installation note:

- Use a suitable wrench.
- Put it only on the hexagon of the threaded flange on the wrench.

In any case, the force may be introduced via the connection head.

- The thread must be in perfect condition.
- Screw the threaded flange firmly.
- Tightening after the first heating (if necessary).

The Ex-device is to be screwed on firmly.

7 Electric Installation

An electrical engineer with the respective training may only execute the work described below.

The directive EN 60079-14 (VDE 0165/1) must be observed for the installation of the device. It must only be executed by persons who are familiar with **explosion protection**, i.e. by engineers with the respective training. The erecting engineer must write a respective installation certificate.

TT- and TN systems: A fault current protection device with a calculation value of the fault current of any more than 100 mA must be installed. Fault current protection device with a calculation value of the fault current of 30 mA are preferred.
IT system: An isolation control device has to be used, which interrupts the supply whenever the insulation resistance amounts to no more than 50 Ohm/V, related to the calculation tension.

- The supply voltage must be checked for compliance with the voltage indicated on the type plate.
- The temperature class required for the installation location must be checked for compliance with the temperature class indicated on the type plate.
- When choosing the cross sections for connection, the loads, fuse protection etc., the relevant regulations must be observed. (See a.o. VDE 0100, VDE 0298-4).

Electrical installation

A direct connection of aluminium conductors to the connection terminals is not allowed.
The site connection cable must have a minimum cross-section of 1.5 mm².
The cable must be suitable for high temperatures, insulation temperature min. 85°C.

1. Unscrew the 4 cover screws.
2. Take of the connection box.
3. Insert the cables through the cable glands into the connection box.
4. The nut of the cable gland must be drawn up to guarantee strain relief and protection category. (Cables and gable glands must be matched, so that the required protection category is guaranteed.)
5. Connect cable to the Ex conductor terminals according to the connection diagram
6. Connect the earth terminals.
7. Make earth conductor connection.
8. Generate external equipotential connection.
9. Check connections for tight fit.
10. Replace the cover of the connector box again.
11. Tighten the 4 cover screws. (About 2 Nm)

8 Commissioning

Important instructions:

The temperature class is defined by the manufacturer. The local and operating conditions are specified.
Commissioning is only permissible if the Ex-device has been installed according to the specifications stated in the chapter MOUNTING INSTRUCTIONS.

1. Guarantee before switching on, that the temperature monitoring is connected
2. Before use check the correct closeness of the connection hood.
3. Guarantee before switching on, that the device is filled with the medium, witch can be warmed up, and/or that it´s sufficiently flowed through by the medium.

9 Repair of malfunctions

Exclusively electrical engineers who are familiar with explosion protection must execute the work described below.

- Check fusing outside the Ex-area.
- An official confirmation, that no fire hazard exists must be asked for, whenever the terminal box must be opened for measurement purposes.

Malfunction: Ex-device does not heat up

Repair: Check fusing
Control the supply voltage
Check the control unit
The on-site temperature control is set to a low temperature.
→ Set temperature control to the correct temperature.
Ex-temperature-limiter switched off circuit.
→Check reason, remove fault, reset temperature limiter.

- Run the initial start-up procedure after each repair of malfunctions/ failures.

10 Repairs

Repairs may only be carried out after written approval by the Schniewindt GmbH & Co. KG.

Only spare parts approved by the manufacturer (Schniewindt GmbH & Co. KG) may be used.

A repair on the flameproof gaps may only be carried out by the manufacturer. The repair of flameproof gaps according to the values of table 3 of the IEC 60079-1:2014 is not permitted.

11 Maintenance and servicing

Inspect the safety device (temperature limiter, level monitor) to make sure that they function properly in compliance with the relevant provisions. **An annual inspection is recommended. At shorter intervals depending on the level of use and ambient conditions.** To satisfy the requirements of the EX-protection, the device must remain sealed.

- To fulfil the Ex-protection requirements, the Device must remain closed.

For perfect operation of the device the following aspects must be checked:

- ✓ measure the insulation values
- ✓ measure the resistance values (Ω)
- ✓ measure and check the thermostat and / or limiter function
- ✓ Visual inspection for damage
- ✓ Visual inspection for deposits or incrustations on the heating elements
- ✓ Visual inspection for leaks
- ✓ Visual inspection of the electrical connection compartment (Moisture, rust, .. reduce the insulation value and must be removed.)

Deposits or incrustations on the heating element can destroy the device and must be removed.
The cleaning must be do carefully, so that the surface is not damaged.

Carry out an annual functional test of the safety devices.
Depending on the application and environment in a shorter interval.

12 Dismantling

- Only dismantle the system if there is no danger of explosion. (fire permit)
- Switch off the system and secure to prevent unintentional restart.
- Allow the Ex-device to cool to room temperature.
- Uninstall and remove the connecting cable.

13 Storage

The store room must be dry and free of dust.
Make sure that the storing temperatures are between -40°C and +40°C.
Before storing, be sure that there is no humidity penetrated inside the terminal box during transport or interim storing.
All openings must be closely locked, in order to prevent a penetration from dust/moisture.
The terminal box shall be tightly closed if necessary the cable entries must be equipped with blinds.
Place a drying agent in the terminal box to absorb existing humidity.
Use only chemically indifferent drying agents (e.g., silica gel).
Change the drying agent at the specified intervals. Observe the instructions of the drying agent manufacturer.
During storage over a longer periods (several months), it is to be expected that the system-related insulation resistance reduces.
The device may be put into operation only when it is ensured that the insulation resistance is greater, in accordance with the standard DIN 44874, part 1, paragraph 5.3

$$R_{iso} = \frac{2\ M\Omega}{\text{Number of installed tubular heating elements}}$$

Measured in the cold state with a voltage of 500V DC.

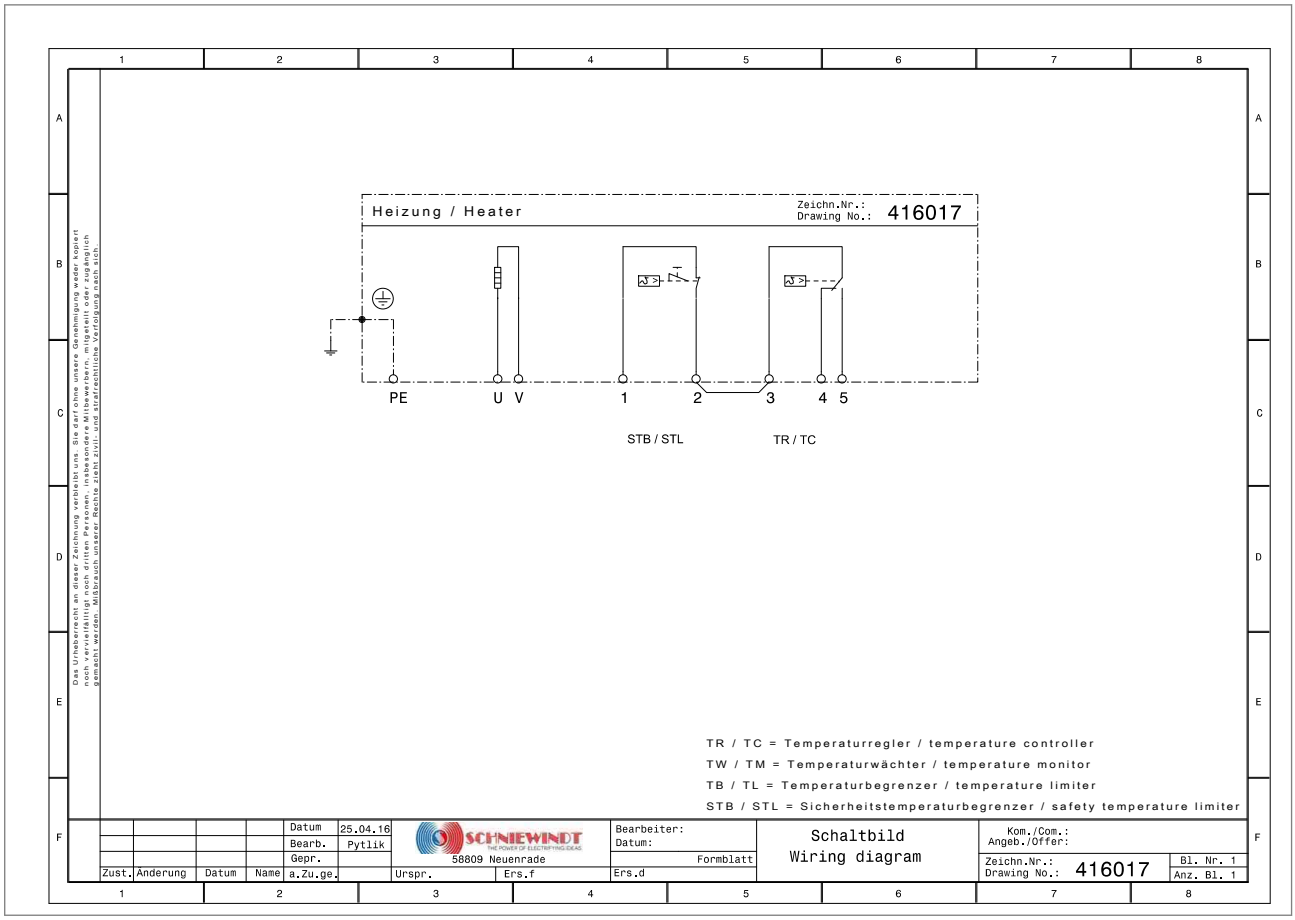
14 Disposal

- Remove any problematic deposits in accordance with local regulations.
- Dispose of the Ex-device in accordance with local regulations.
- Give metals and plastics sorted for recycling or scrapping.

15 Standards

The applied standards can be found in the enclosed EC declaration of conformity. The device is manufactured in compliance with the following international standards:

⇒	EN 60079-0	General requirements
⇒	EN 60079-1	Flameproof enclosure „d“
⇒	EN 60079-7	Increased safety „e“
⇒	EN 60079-31	Protection by Enclosure „t“



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SCHNIEWINDT
THE POWER OF ELECTRIFYING IDEAS

EU-Konformitätserklärung / EU declaration of conformity

Wir/ We **Schniewindt GmbH & Co. KG**
Schöntaler Weg 46, 58809 Neuenrade

erklären in alleiniger Verantwortung, dass das Produkt /
hereby declare in sole responsibility that the product

CSN® Ex Heizkörper / CSN® Ex Heater
95**/**-Exde* ***T*/T***°C

Kennzeichnung/ marking: II 2G Ex db eb IIC T. und / and optional
II 2D Ex tb IIIC T…°C

auf das sich diese Erklärung bezieht, den Bestimmungen der folgenden Richtlinie entspricht /
to which this declaration relates is in accordance with the provisions of the following directive

2014/34/EU **„ATEX- Richtlinie“ / „ATEX- Directive“**
2014/30/EU **„EMV- Richtlinie“ / „EMC- Directive“**

Angewandte harmonisierte Normen / Applied harmonised standards:

EN60079-0:2012+A11:2013	EN60079-1:2014
EN60079-7:2015	und / and optional EN60079-31:2014
EN61000-6-2:2005/AC:2005	EN61000-6-4:2007+A1:2011

EU-Baumusterprüfbescheinigung nach Anh. III/EC type examination certificate according to Ann. III
BVS 15 ATEX E 143 X der / from
DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Kennnummer / identification number: 0158

Produktionsüberwachung nach Anhang VII/Production surveillance according to Annex VII:
BVS 15 ATEX ZQS/E401 der / from
DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Kennnummer / identification number: 0158

Neuenrade, den 12.11.2018

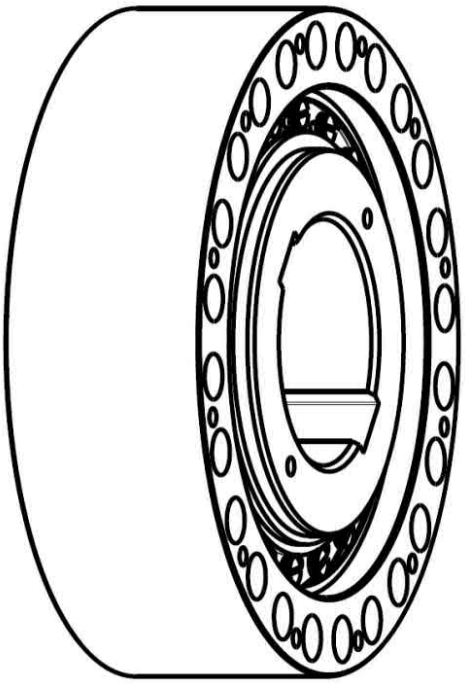
Dr. Karl Kaluza

Leiter des Qualitätsmanagements/
Head of Quality Management

9_KE95Exdet_I_EXAM

CE Erklärungen 26.10.2018.xlsm

Assembly and maintenance manual
Type FC5045



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General safety instructions

	WARNING!	**Risk of injury due to moving components!** Rotating driven components can cause the most severe injuries. Therefore, during operation: ➢ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➢ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: ➢ Switch off the power supply and secure it against being switched on again ➢ Wait for lagging components to come to a standstill

	DANGER!	**Danger due to improper operation!** ➢ Modifications to the one-way clutch are not permitted and may impair safety ➢ All tasks may only be performed by personnel with the requisite training and expertise ➢ Repairs and maintenance tasks may only be performed when the machine is at a standstill. To this end, the machine is to be secured against a restart

	WARNING!	**Risk of injury due to incorrect assembly!** Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

	WARNING!	**Risk of injury for insufficiently qualified personnel!** Improper handling can cause significant personal injury and property damage. Therefore: Only ever have tasks performed by those persons to whom the tasks have been assigned.

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1 Genaral

1.1 Information relating to the assembly and maintenance manual

This assembly and maintenance manual provides important information regarding the installation and commissioning of the one-way clutch.

Prerequisite for safe operation is compliance with all of the stated safety and handling instructions.

Moreover, the relevant local accident protection guidelines and general safety provisions for the field of application of the one-way clutch are to be complied with.

Read the assembly and maintenance manual carefully prior to installation and commissioning. It is a product component and must be kept in the immediate vicinity of the installation site and be accessible to personnel at all times. Furthermore, all safety instructions stated in the assembly and maintenance manual are to be observed.

1.2 Explanation of symbols

Warnings are marked throughout this assembly and maintenance manual by symbols. These warning symbols are introduced by signal words which indicate the extent of the danger. Comply with these warning symbols under all circumstances and act with due care and attention to avoid accidents, personal injury and property damage.

	DANGER!	...indicates an imminently dangerous situation which can be fatal or cause severe injuries if it is not averted.
	WARNING	...indicates a potentially dangerous situation which can be fatal or cause severe injuries if it is not averted.
	ATTENTION	...indicates a potentially dangerous situation which can cause minor or light injuries if it is not averted.
	CAUTION	...indicates a potentially dangerous situation which can cause property damage if it is not averted.
	NOTE	… highlights helpful tips and recommendations as well as information for efficient and fault-free operation.

1.3 Manufacturer

STIEBER GmbH, D-69126 Heidelberg, Hatschekstr. 36, Germany
Phone +49 (0) 6221 3047-0, Fax -31

1.4 Labeling

Front face of the outer race

- Manufacturer's name
- Type designation
- Date of manufacture (coded)

1.5 Environmental protection

Energy:	The one-way clutch does not use any electrical energy.
Materials:	Steel
Recycling:	Steel parts are up to 100% recyclable.

2 Safety

2.1 Intended use

One-way clutches of type FC5045 are directional clutches, engaged and disengaged automatically, depending on the relative direction of rotation.

The torque is transmitted by a force-locking connection. They can be used as overrunning clutches or backstops in machinery and equipment.

Driving operation of an overrunning clutch:

When operating in torque transmission mode the driving machine element and the driven member are connected in a force-looking manner. In this operating state, a torque will be transferred.

Overrunning operation of an overrunning clutch:

The overrunning clutch disengages automatically when the driven member rotates faster than the driving member.

The contact-free operation will be ensured, when the driven member connected with the inner race runs above a defined speed. From this speed up the wear-free operation of all function-relevant components is guaranteed.

Lockout mode of a one-way clutch:

When operating in the locking direction of the one-way clutch, the machine shaft and the torque bracing to the machine element are connected in a force-looking manner.

In this operating state, a torque will be transferred.

Overrunning mode of a one-way clutch:

The one-way clutch disengages automatically the force-locked connection between the machine shaft and the torque bracing to the machine element, when the machine shaft runs in freewheeling direction. The contact-free operation will be ensured, when the machine shaft is rotating above a defined speed. From this speed up the wear-free operation of all function-relevant components is guaranteed.

2.2 Responsibility of the operator

The operator of the machine, in which the one-way clutch is installed, is subject to the legal obligations concerning occupational safety.

The valid provisions for the site of operation as well as the safety and accident prevention regulations of the trade associations are to be observed. This, in particular, means that the operator:

- is aware of the valid occupational safety provisions
- implements the necessary behavioral requirements for operation of the machine, in which the one-way clutch is installed, at the site of operation
- clearly defines responsibilities for installation, operation, maintenance and cleaning of the machine in which the one-way clutch is installed
- ensures that all staff members, who work at or with the machine in which the one-way clutch is installed, are employed and have read and understood the operating manual. Moreover, he must, at regular intervals, provide training for personnel on how to handle the machine, in which the one-way clutch is installed, and inform them of the potential dangers. In addition, the operator is responsible for ensuring that the machine in which the one-way clutch is installed:
    - is always in perfect technical condition
    - is maintained in accordance with the specified maintenance intervals
    - has all its safety equipment checked regularly for completeness and functionality

2.3 Assembly and maintenance personnel

⚠	**WARNING**	**Risk of injury for insufficiently qualified personnel!** Improper handling can cause significant personal injury and property damage. Therefore: ➢ Only ever have tasks performed by those persons to whom the tasks have been assigned

Qualified personnel are those persons who, owing to their training, experience and instruction as well as their knowledge of relevant standards, provisions, accident prevention regulations and operating conditions, have been authorized by the person responsible for the safety of the plant to perform the requisite tasks and are able to recognize and avoid potential dangers in

doing so. Knowledge of first-aid measures and on-site emergency equipment must also be included.

2.4 Personal protective equipment

It is necessary to wear personal protective equipment when handling the machine, in which the one-way clutch is installed, to minimize health risks.

The necessary protective equipment such as work shoes, gloves, safety goggles etc. is to be put on prior to all tasks and kept on during the task.

2.5 Limitations of use

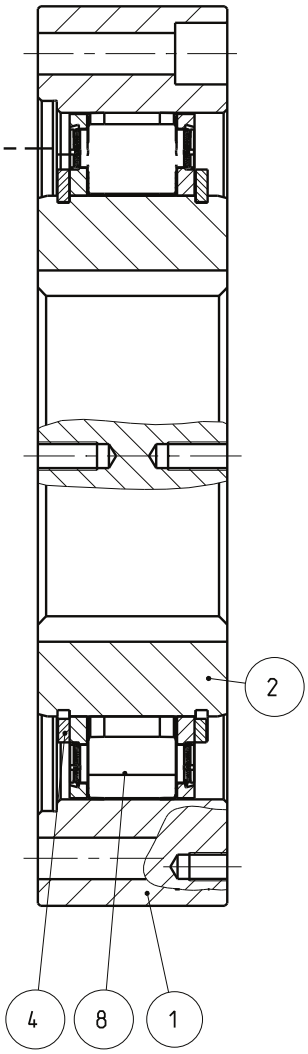
Typ FC5045	bore dia. [mm]	maximum torque [Nm]	Overrunning speeds [rpm]		admissible runout (T.I.R.) outer race to shaft [mm]	admissible axial run-out outer race to shaft [mm]	Number/ size fixing screws
			min.	max.			
	140	76000	330	1600	0,6	0,15	24xM16

*Torque limited by keyway, key

- Limits for ambient temperature: from –20°C to +80°C
- Maximum operating temperature: 90°C
- Overrunning: Machine shaft (inner race)
- Required machine shaft tolerance: d = h6 or j6
- Required tolerance outer race centering (inner diameter) : d = h7 or g7
- Oil lubrication: approved oils according Stieber catalogue / WN900
- Grease lubrication: approved greases according Stieber catalogue / WN900

3 Structure and function

3.1 Structure



Pos. 1	Outer race
Pos. 2	Inner race
Pos. 4	Circlip
Pos. 8	Cage

Fig. 1a Structure

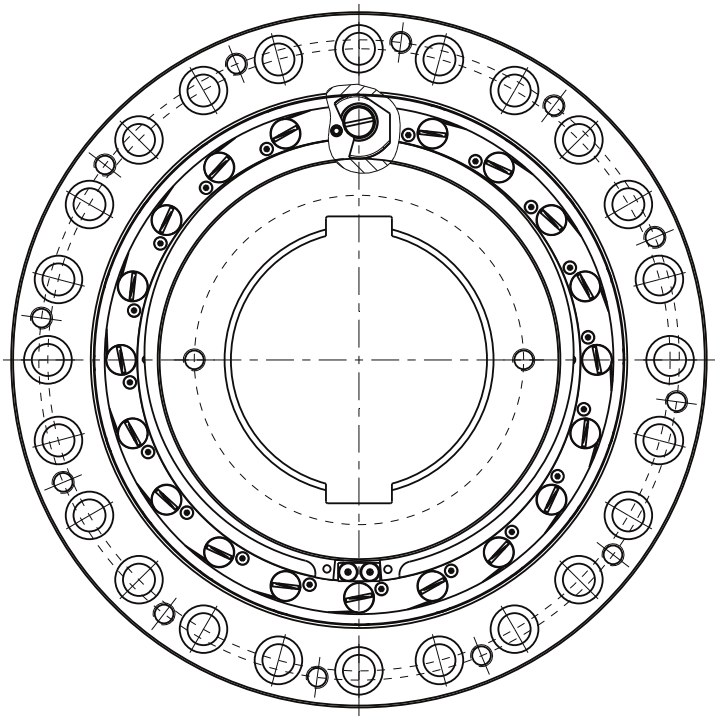


Fig. 1b Structure

3.2 Function

When the torque is transmitted through the one-way clutch, the outer race (1) and the inner race (2) are coupled in a force-locked manner (see Fig. 2). For this purpose, clamping elements are used, the outer contours of which generates the force-locked coupling. The clamping elements are integrated into a cage (8) and are energized by springs into contact with the outer and inner race. The springs ensure rapid responding behavior of the one-way clutch at the start of torque transmission.

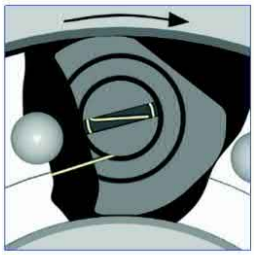


Fig.2 Torque transmission

In overrun operation, above the minimum permissible overrunning speed, the centrifugal force, in connection with the geometry of the clamping elements, generates a force which turns the clamping elements against the spring force (see Fig. 3). A contact-free position is brought about in this way so that wear-free operation of the one-way clutch can be achieved. The minimum permissible overrunning speed may only be lower for a short period during the start-up or shut-down stage otherwise the damage to the contact partner caused by wear and tear may lead to the failure of the one-way clutch.

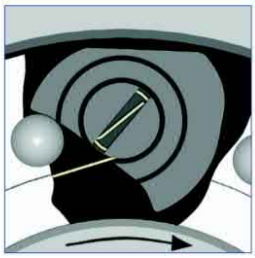


Fig.3 Contact-free position

4 Transport and packaging

⚠	**WARNING**	**Risk of injury due to the one-way clutch falling down or tipping over!** The weight of the one-way clutch can injure people and cause severe crushing. Therefore: ➢ Use a pallet on which the one-way clutch can be moved with a forklift ➢ Use suitable lifting gear for lifting (slings, etc.) which is able to support the weight of the one-way clutch

	NOTE	The local provisions regarding the disposal of transport and packaging materials are to be observed.

One-way clutches of Type FC5045 are packed in air cushion foils.

All components are sent in a box on a pallet.

To prevent the component from breaking or falling apart it is secured by a transportation lock (see Figure 4).

Transport damage to the packaging and / or the one-way clutch is to be reported to the respective transit company!

The one-way clutch must be unpacked in a clean and dry environment!

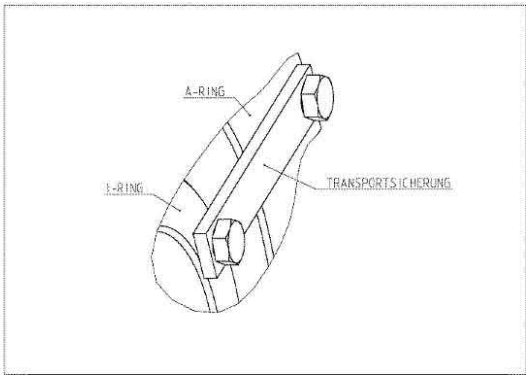


Fig. 4 Transportation lock

5 Storage

5.1 Short-term storage

The type FC5045 is packed in VCI bubble wrap. The VCI bubble wrap is to be checked at regular intervals. The frequency of these intervals is dependent on the environmental conditions (temperature, moisture, salt content of the air, etc.) at the storage site.

The maximum storage period (short-term storage) is 6 months. Moreover, the backstop must have long-term storage corrosion protection applied to it.

Store packages under the following conditions:

- Do not keep outdoors
- Keep dry and free from dust
- Do not expose to aggressive media

- Keep away from direct sunlight
- Avoid mechanical shocks and vibrations
- Storage temperature: −10 to +60°C
- Relative humidity: max. 95%, non-condensing

5.2 Long-term storage

For long-term storage, the one-way clutch must be shrink-wrapped with a desiccant and provided with a hygroscope. The corrosion protection must be checked after a period not exceeding one year or else depending on the environmental conditions (temperature, moisture, salt content of the air, etc.) at the storage site.

Store packages under the following conditions:

- Do not keep outdoors
- Keep dry and free from dust
- Do not expose to aggressive media
- Keep away from direct sunlight
- Avoid mechanical shocks and vibrations
- Storage temperature: −10 to +60°C
- Relative humidity: max. 95%, non-condensing

6 Installation

6.1 Checking the direction of rotation

⚠	**WARNING**	**Risk of injury due to incorrect assembly!** Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

⚠	**WARNING**	**Risk of injury due to moving components!** Rotating driven components can cause the most severe injuries. Therefore, during operation: ➢ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➢ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: ➢ Switch off the power supply and secure it against being switched on again ➢ Wait for lagging components to come to a standstill

!	CAUTION	**Risk of injury due to falling components!** The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.

The direction of rotation at idle speed is marked as FREE on the cage (8). The direction of rotation can be changed by turning the inner race (2) including cage (8).

Procedural steps:

- Place the one-way clutch facing upward the label "FREE" on an assembly table
- Remove the transportation lock
- Lift the inner race (2) including the cage (8) out of the outer race (1). Use appropriate lifting gear at the threaded hole of the inner race for this
- Place the inner race (2) including the cage (8) facing downwards the label "FREE" on an assembly table
- Secure (see Fig. 5 and 6) the clamp bodies in lift-off position (against the spring force) using an O-ring / cable connector as an assembly aid

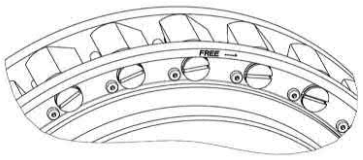


Figure 5: Clamp bodies “neutral position“

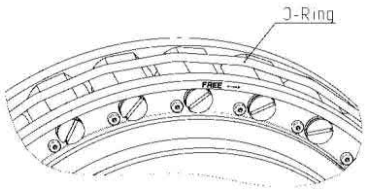


Figure 6: Clamp bodies “after lift-off”

- Insert the inner race (2) with cage (8) into the outer race (1) until half of the clamp body is covered

i	NOTE	The assembly aid (O-ring / cable connector) must be completely removed. Non-observance of this note can cause functional impairment and even failure.

- Remove the assembly aid (O-ring / cable connector) completely and lower the inner race and cage completely
- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation
- Install the transportation lock

6.2 Lubrication

One-way clutches of Type FC5045 do not require any lubrication in overrun operation above the lift-off speed as they operate without contact.

Similarly, no lubrication is required in lockout operation as only a minimal degree of rolling motion in the clamp bodies occurs.

Additional lubrication is required if the one-way clutch runs with frequently repeated or permanent working cycles below the lift-off speed. To this end, a lubricating film, which coats the clamp bodies and tracks of the outer race, is mandatory. The lifetime is limited under these operating conditions!

6.2.1 Operation with oil lubrication

An oil mist is sufficient for mounting inside a gear box.

If the one-way clutch runs with frequently repeated or permanent working cycles below the lift-off speed, splash lubrication or oil supply between the cage and the outer track is necessary. The lifetime is limited under these operating conditions!

The oil volume which is necessary for splash lubrication depends on the surrounding construction.

The level should be up to a maximum of 10 mm to an inside diameter of the outer race.

6.2.2 Operation with grease lubrication

	NOTE	Excessive lubrication may negatively affect the one-way clutch functionality! Note the required grease quantities!

	NOTE	Unsuitable lubricants can negatively affect the one-way clutch functionality! Only use greases approved by Stieber!

Select only lubricating greases complying with product catalogue/ Stieber WN900.

Procedural steps for greasing:

- Place the one-way clutch facing upward the label "FREE" on an assembly table
- Remove the transportation lock
- Lift the inner race (2) including the cage (8) out of the outer race (1). Use appropriate lifting gear at the threaded hole of the inner race for this
- Grease the outer track with a layer thickness of approx. 1 mm
    - Use grease of NLGI class 000 to 2 with a maximum base oil viscosity of 42 mm2/s

- Evenly spread the remaining grease quantity (see chapter 2.5) over the inner race surface and cage
- Secure (see Fig. 5 and 6) the clamp bodies in lift-off position (against the spring force) using an O-ring / cable connector as an assembly aid
- Insert the inner race (2) with cage (8) into the outer race (1) until half of the clamp body is covered
- Remove the assembly aid (O-ring / cable connector) completely and lower the inner race and cage completely.

	NOTE	The assembly aid (O-ring / cable connector) must be completely removed. Non-observance of this note can cause functional impairment and even failure.

.

- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation.
- Install the transportation lock

6.2.3 Protection against corrosion damage

One-way clutches must be protected against corrosion damage.

	Note	Treat unpainted surfaces with suitable anticorrosive agents. As a corrosion inhibitor use grease of NLGI class 000 to 2 with a maximum base oil viscosity of 42 mm2/s !

6.3 Assembly

	WARNING	**Risk of injury due to incorrect assembly!** Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

	WARNING	**Risk of injury due to moving components!** Rotating driven components can cause the most severe injuries. Therefore, during operation: ➢ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➢ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: ➢ Switch off the power supply and secure it against being switched on again ➢ Wait for lagging components to come to a standstill

!	**CAUTION**	**Risk of injury due to falling components!** The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.

Procedural steps :

- Lift up the one-way clutch using suitable lifting gear and push it onto the oiled machine shaft
- Remove the transportation lock
- Fasten the one-way clutch axially on the machine shaft
- Center the outer race in the torque-supporting machine element

i	**NOTE**	Screw qualities 12.9 must not be used!

- Secure the outer race in the torque-supporting machine element with the appropriate fixing screws (e.g. as per standard DIN EN ISO 4762) and with screw quality 10.9 or 8.8; tightening torque (see Table Tightening torque)

Tightening torque [Nm]		
Size	**8.8**	**10.9**
M16	206	290

Table: Tightening torque (according VDI 2230 Sheet1, μ=0.12 metric standard thread)

- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation

6.4 Mounting example

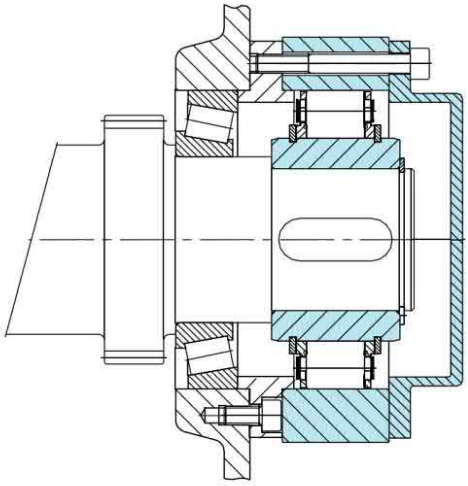


Figure 7: Mounting at the end of the shaft

7 Maintenance

⚠	WARNING	**Risk of injury due to incorrect assembly!** Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

⚠	WARNING	**Risk of injury due to moving components!** Rotating driven components can cause the most severe injuries. Therefore, during operation: ➢ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➢ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: ➢ Switch off the power supply and secure it against being switched on again ➢ Wait for lagging components to come to a standstill

!	**CAUTION**	**Risk of injury due to falling components!** The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.

One-way clutches of Type FC5045 must be checked for damage and serviced after an operating period not exceeding 5 years.

7.1 Disassembly in case of maintenance

Procedural steps:

- Loosen the fastening screws of the outer race (1)
- Remove the axial retention of the inner race
- Install the transportation lock

!	**CAUTION**	**Risk of injury due to falling components!** The outer race or inner race can fall down if the transportation lock has been removed. Therefore: ➢ Install the transportation lock!

- Pull the one-way clutch from the machine shaft. Use suitable lifting gear for this
- Place the one-way clutch facing upward the label "FREE" on an assembly table
- Remove the transportation lock
- Lift the inner race (2) including the cage (8) out of the outer race (1). Use appropriate lifting gear at the pull holes of the inner race for this
- Remove the circlip (4) of the inner race (2) and pull the cage (8) off the inner race (2)

7.2 Test criteria in case of maintenance

Procedural steps:

- Pre-clean the outer race (1) and cage (8) with a petroleum-based industrial cleaning agent and degrease with an acetone-based cleaning agent
- Check for damage, wear and cracks (see the testing criteria):
  - The outer race track must not exhibit any signs of damage / ruptures
  - Increased diameter due to wear in the outer race track maximum 0.1 mm compared to the area free from wear
  - Traces of deformation / indentations to the track diameters of the inner and outer race maximum 0.1 mm deep
  - Completeness of all spring elements (2 per clamp body)
  - Spring elements free of damage / deformation

- Smooth rotation of the clamp bodies from stop to stop
- Maximum width of the wear facet on the clamp bodies (see Figure 8)

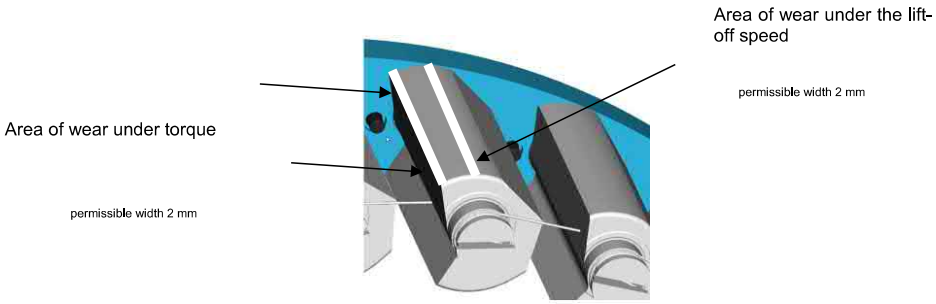


Figure 8: wear zones

- The one-way clutch can continue to be used only if all of the test criteria are met

7.3 Assembly in case of maintenance when using grease lubrication

Procedural steps:

- Mount the cage (8) on the inner race (2) and secure it axially using circlips (4)
- Grease the outer track with a layer thickness of approx. 1 mm
  - Use grease of NLGI class 000 to 2 with a maximum base oil viscosity of 42 mm2/s
- Evenly spread the remaining grease quantity (see chapter 2.5) over the inner race surface and cage
- Secure (see Fig. 5 and 6) the clamp bodies in lift-off position (against the spring force) using an O-ring / cable connector as an assembly aid
- Insert the inner race (2) with cage (8) into the outer race (1) until half of the clamp body is covered
- Remove the assembly aid (O-ring / cable connector) completely and lower the inner race and cage completely

	NOTE	The assembly aid (O-ring / cable connector) must be completely removed. Non-observance of this note can cause functional impairment and even failure.

- Install the transportation lock

- Lift up the one-way clutch using suitable lifting gear and push it onto the oiled machine shaft observing the overrun direction of rotation in the process
- Remove the transportation lock
- Fasten the one-way clutch axially on the machine shaft
- Center the outer race in the torque-supporting machine element

	NOTE	Screw qualities 12.9 must not be used!

- Secure the outer race in the torque-supporting machine element with the appropriate fixing screws (e.g. as per standard DIN EN ISO 4762) and with screw quality 10.9 or 8.8; tightening torque (see Table Tightening torque)

Tightening torque [Nm]		
Size	**8.8**	**10.9**
M16	206	290

Table: Tightening torque (according VDI 2230 Sheet1, μ=0.12 metric standard thread)

- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation

8 Disassembly

	WARNING	**Risk of injury due to incorrect assembly!** Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

⚠	**WARNING**	**Risk of injury due to moving components!** Rotating driven components can cause the most severe injuries. Therefore, during operation: ➢ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➢ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: ➢ Switch off the power supply and secure it against being switched on again ➢ Wait for lagging components to come to a standstill

!	**CAUTION**	**Risk of injury due to falling components!** The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.

Procedural steps:

- Loosen the fastening screws of the outer race (1)
- Remove the axial retention of the inner race
- Install the transportation lock
- Pull the one-way clutch from the machine shaft. Use suitable lifting gear for this

9 Disposal

ℹ	**NOTE**	The local provisions regarding the disposal of metallic components and any lubricants present are to be observed.

The one-way clutch is comprised of metallic materials which are coated with grease or oil. Metallic materials are fully recyclable. Lubricants and anticorrosive agents are to be disposed of separately. The local disposal provisions are to be observed in this regard.

10 Faults

The manufacturer is to be contacted immediately should any faults arise.

STIEBER GMBH, D-69126 Heidelberg, Hatschekstr. 36, Germany
Phone +49 (0) 6221 3047-0, Fax -31

11 Spare parts

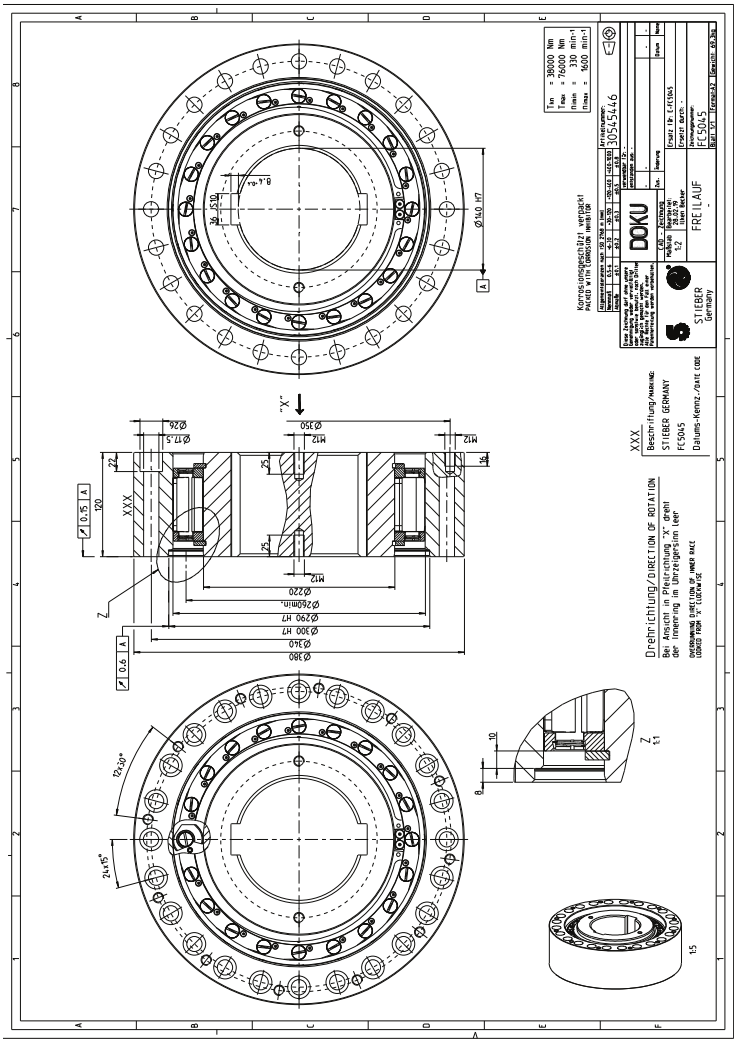
⚠	**WARNING**	**Risk of injury due to incorrect spare parts!** Incorrect or faulty spare parts can cause damage, malfunctions or total failure as well as impair safety. Therefore: ➢ Only use original spare parts from the manufacturer

Procure spare parts only from authorized dealers or from the manufacturer directly.

12 Appendix

M1260E_0 | Assembly and maintenance manual | Stieber Ultra Industrial Motion

12.1 Drawing FC5045



Test documentation

Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn
www.pekrun.de

PRÜFDOKUMENTATION

TESTDOCUMENTATION

ZUM AUFTRAG
TO THE ORDER

IHRE BESTELL NR. *YOUR ORDER NO.*	4500494756
KENNWORT *CODE WORD*	Projekt-Nr. 4000369 / 4000370
IHRE WERKS NR. *YOUR WORKS NO.*	Material-No.: 2000064788
PEKRUN SERIAL NR. *PEKRUN SERIAL NO*	10002289
GETRIEBE TYP *GEAR UNIT TYPE*	ASR 450-R-CCW
PEKRUN KOM. NR. *PEKRUN COM. NO.*	19396/10

PRÜFDOKUMENTATION
TESTDOCUMENTATION

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	S/No. 10002289

Inhalt nach ITP	***Contents acc. to ITP***
1. Zeugnisse Radwelle	*1. Certificates to the wheel shaft*
2. Zeugnisse Stirnrad	*2. Certificates to the bull gear*
3. Zeugnisse Baugruppe Radwelle mit Stirnrad	*3. Certificates to the assembly group, bull gear with wheel shaft*
4. Zeugnisse Ritzelwelle	*4. Certificates to the wheel shaft*
5. Zeugnisse Gehäuse	*5. Certificates to the housing*
8. Zeugnisse zur Getriebeprüfung	*8. Gear box test certificates*
9. Allg. Informationen	*9. General Information*

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
1	**Gear shaft (LS Shaft)**										
1.1	Material verification	42CrMo4 EN 10083	Specification		Material labeling		R				
1.2	Chemical analysis	42CrMo4 EN 10083	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
1.3	Mechanical characteristics Ultrasonic test	42CrMo4 EN 10083 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
1.4	Dimensional check after mechanical processing	Drawing	All fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
1.5	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
2	**Bull gear**										
2.1	Gear shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R				
2.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
2.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
2.4	Dimensional check after mechanical processing	Drawing	Al fit measurements Accuracy of toothing	100%	Tolerance acc. to drawing	Measurement record	W	R			
2.5	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Measurement record	W	R			
3	**Assembly group, bull gear with gear shaft**										
3.1	Dimensional check of the toothing		Tooth trace, profile, pitch and runout	3 times circumference	Tolerance acc. to drawing	Test report	W	R			
3.2	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
3.3	Balance check		Acc. to drawing		Tolerance acc. to drawing	Test report	W	R			
4	**Pinion Shaft (HS Shaft)**										
4.1	Pinion shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R	R			
4.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

[pekrun]

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
4.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
4.4	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Test report	R	R			
4.5	Dimensional check after mechanical processing	Drawing	AI fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
4.6	Balance check		Acc. to drawing		Tolerance acc. to drawing	Test report	W	R			
4.7	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
5	**Housing**										
5.1	Chemical analysis	P355NL1/2 EN 10028-3	Chemical composition in % by weight (% by mass) according to ladle analysis	100%	Material Standard	EN10204 3.1	R	R			
5.2	Mechanical characteristics	P355NL1/2 EN 10028-3	Tensile strength, Yield strength, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
5.3	Annealing		Stress free	100%	Material Standard	Diagram or record	R	R			
5.3	Casing leak test		Liquid penetrant inspection	all relevant welding seams	welding seams, no leakage allowed	Test report	W	R			
5.5	Dimensional check after mechanical processing	Drawing	All bearing seats and connecting dimensions	100%	Tolerance acc. to drawing	Measurement record	W	R			
8	**Gear unit**										
8.1	Backlash + contact check of the toothing	Manufacturer test instructions	Executed in job casing contact check, tape lift			Test report	W	W			
8.2	Control of assembly and conneting dimensions	Manufacturer test instructions	AI fit dimensions		Tolerance acc. to drawing	Test report	W	R			
8.3	Check at the Oil supply system bevor the test run.	Pekrun Testprocedure	Filter and cleanliness				W				
8.4	Test run main rotors	Pekrun Testprocedure	No load full speed			Test report	W	W			4 hour test run
8.5	Vibration and temperature reading during the test run	Pekrun Testprocedure	Measured with vibration probes and resistance thermometer			Test report	W	W			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
9	**General Information**										
9.1	Machinery directive	2006/42/EG	Machinery Directive			Certificates	R	R			Part of the operating instructions.
9.2	Coating check		Surface cleanlines, Thickness of the coat, Adhesion acc. to ISO 2409		Grid cut test on test piece: ISO GT (1)	Certificates	R	R			
9.3	Documentation										

Remarks: Documentation (Quality certificates and reports) in german and english, **MRT**= Mechanical running test
R: Review. Verification of test results.
H: Hold Point. Inspection of a critical step in fabrication or testing. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer shall not continue fabrication if inspection parties are not present, except inspection has been waived by prior written notice.
W: Witness Point. Witnessing of a critical fabrication or testing step. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer may continue with work even if inspection parties are not present.

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BGH

Radwelle_wheel shaft_material certificates_PART-057585

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

BGH SL-Stahl GmbH
Chromstraße 3
30916 Isernhagen
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat 412193

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **BSVF16004734TSE**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816364-010-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält Round bars,forged,peeled
Werkstoff / Quality	1.7225 42CrMo4mod/4140mod/4145mod
Anforderungen / Requirements	SL-LV 4 Rev. 6 - 12/11 AISI 4140 mod. + AISI 4145 mod. ,Kundenvereinbarung

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d´élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d´identification(analyse spectrale)
ohne Beanstandung without objection	E- LF/VD	ohne Beanstandung without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
10	2	280 mm rd. x 5715 + 5868 mm	5608 kg	733746

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Al
733746	0,430	0,29	0,98	0,006	0,0010	1,14	0,28	0,45	0,020

Wärmebehandlungszustand / Condition of heat treat: vergütet / quenched and tempered / gehärtet/quenched + 600°C 10h Luft/air

Probe-Nr. / Test-No.	Lage / Loc.	Temp. °C	Rp0,2 N/mm²		Rm N/mm²	A5 %	Z %	Kerbschlagarbeit / Impact value J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness HB
Soll/Req.	L L	RT	>=760		>=965 <=1100	>=13	>=40	>=45 >=27			RT -30°C	>=285 <=326
503R2 503R2	L L	RT	818		965	14,3	58	103 56	110 45	100 45	RT -30°C	300-290

Stirnabschreckversuch / Jominy test - EN ISO 642:

mm	1,5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
HRC	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56

Umformgrad : 8.3 : 1
Reduction ratio:

Gefüge : Vergütungsgefüge
Microstructure: quench and temper structure

Korngröße nach ASTM E 112: 5
Grain size acc. ASTM E 112:

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	16.09.2021	**Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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BGH

Radwelle_wheel shaft_material certificates_PART-057585

BGH Edelstahl Siegen GmbH

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30916 Isernhagen
Deutschland

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Certificate of material tests according to DIN EN 10204 **3.1**
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Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **BSVF16004734TSE**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816364-010-01**

Reinheitsgrad nach ASTM E 45, Methode A :
Degree of purity acc. ASTM E 45, method A:

Type	A	B	C	D
dünn/thin	0,0	0,8	0,5	1,0
dick/heavy	0,0	0,3	0,3	0,5

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection limit of 0.1 Bq/g.

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	16.09.2021	**Langer**

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Page

US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Radwelle_wheel shaft_material certificates_PART-057585

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. **BSVF16004734TSE**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816364-010-01**
BGH works no.
BGH référence

Zeugnis-Nr. **412193**
Certificate no.
No. de certificat

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.7225 42CrMo4mod/4140mod/4145mod
Abmessung/Dimension: 280 mm rd. x 5715 + 5868 mm
Anzahl/Quantity : 2 Gewicht /Weight : 5608 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
Tab.3 Typ 1a (100%) und Tab.5, QK 4 (Randzone) / QK 3 (Restbereich)
table 3 type 1a (100%) and table 5, quality class 4 (edge zone) / quality class 3 (residual area)

Prüfgerät : Deutsch Echograph 1090
Testing device

Prüfkopf : S 10 W 4 C
Search unit

Kopplungsmittel : Kleister / Wasser
Couplant glue / water

Prüfumfang : halber Umfang über gesamte Länge
Amount of inspection half circumference over total length

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0 mm
Recording threshold FBH 2.0 mm

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 16.09.21	Prüfer Testing operator Opérateur Kosch Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A	BGH Q 30	Überwacher Supervisor Surveilleur

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Radwelle / wheel shaft	PN-00077353.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagersitz	Ø 240 m6	+0,046 +0,017	240,03
Fügesitz	Ø 242,48 h6	0 -0,029	242,47-242,48
Lagersitz	Ø 240 m6	+0,046 +0,017	240,03-240,035
Durchmesser	Ø 240 m6	+0,046 +0,017	240,025-240,035
Durchmesser	Ø 240 m6	+0,046 +0,017	240,025-240,035

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	02.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057585
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Radwelle / wheel shaft	PN-00077353.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	42CrMo4+QT	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Wellenübergang / shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	02.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
58640 ISERLOHN

TELEFON 02371/945-0
TELEFAX 02371/945-299
EMAIL: INFO@PEKRUN.DE

Stirnrad_spur gear_material certificates_PART-057679

Prüfbescheinigung / Type of document

Abnahmeprüfzeugnis 3.1 / Inspection Certificate 3.1 - DIN EN 10204

Schmiedewerke Gröditz GmbH Riesaer Straße 1 01609 Gröditz

Schmiedewerke Gröditz GMH GRUPPE

Besteller / Customer: Delta Qualitätsstahl GmbH

Nr. / No.: S 2578

Seite/Page 1 von/of 2

Bestell-Nr. / P.O.No.: 170443 + Nachtrag v./dd. 03.03.2021

Gegenstand / Object: geschmiedetes Rundmaterial / forged round material

Kommissions-Nr. / Commission No.:5200454255 / 5

Abmessung / Dimension [mm]: ø 675 x 1 x 5100 / Stückgewicht/Single weight: 14520 kg / Block-Nr. / block-no.: 111
ø 675 x 1 x 2530 / Stückgewicht/Single weight: 7200 kg / Block-Nr. / block-no.: 112

Werkstoff / Material: 18 CrNiMo 7-6 / 1.6587 ID-Nr./ID-No.:

Lieferzustand / Condition of delivery: vorvergütet / pre quenched and tempered, vorbearbeitet / pre machined

Anforderungen / Demands: ISO-6336-5/08.16; DIN EN ISO-683-3/04.19; LVL02 18Cr Rev.18

Erschmelzungsart / Steelmaking process: EV/EAF

Chemische Analyse / Chemical analysis (% / H_2 ; O_2 ppm)

Stück Quantity	Chargennr. Heat no.	Probe Sample		C	Si	Mn	P	S	Cr	Ni	Mo	V	Cu	Al	Ti	Sn	Nb	As	Sb	Ca	N	H2	F01*	F02*
2	GP107894	Heat		,18	,28	,59	,009	,002	1,73	1,59	,29	,009	,14	,028	,0018	,007	,002	,0052	,0016	,0006	,0095	,9	,2	2,9

F01*: Cu+(10*Sn); F02*: Al/N

Prüfergebnisse / Test results

Probe / Sample		Lage / Orientation	Zugversuch / Tensile test						Kerbschlagbiegeversuch / Impact test							Härte / Hardness
			Prüftemp. Test temp. [°C]	$R_{p0,2}$ [N/mm²]	R [N/mm²]	R_m [N/mm²]	A5 [%]	Z [%]	Prüftemp. Test temp. [°C]	KV2 [J]			$\overline{KV2}$ [J]		Zähbruch / Tough fracture	
Charge/Heat no.	Nr. /No.	L	RT	>=785	-	1120 - 1350	>=11	>=35	RT	-			40	-	-	
		L	-	-	-	-	-	-	-20	-			27	-	-	
		T	RT	>=785	-	1120 - 1350	>=8	>=25	RT	-			30	-	-	
GP107894	5151	T	23	1026		1343	10,4	34	23	53	55	63	57	Blindhärteprobe	blank hardness test	
GP107894	5153	L	23	1018		1345	13,4	58	23	67	63	69	66	Blindhärteprobe	blank hardness test	
GP107894	5153	L							-20	52	46	49	49	Blindhärteprobe	blank hardness test	

Härte Soll / Hardness required [HBW]: min - max 235

Härte Ist am Teil / Hardness measured on part [HBE] : 173; 176

Stirnrad_spur gear_material certificates_PART-057679

Prüfbescheinigung / Type of document

Abnahmeprüfzeugnis 3.1 / Inspection Certificate 3.1 - DIN EN 10204

Schmiedewerke Gröditz GMH GRUPPE

Schmiedewerke Gröditz GmbH Riesaer Straße 1 01609 Gröditz

Besteller / Customer: Delta Qualitätsstahl GmbH	Nr. / No.: S 2578 Seite/Page 2 von/of 2
Bestell-Nr. / P.O.No.: 170443 + Nachtrag v./dd. 03.03.2021	Gegenstand / Object: geschmiedetes Rundmaterial / forged round material
Kommissions-Nr. / Commission No.:5200454255 / 5	Abmessung / Dimension [mm]: ø 675 x 1 x 5100 / Stückgewicht/Single weight: 14520 kg / Block-Nr. / block-no.: 111 ø 675 x 1 x 2530 / Stückgewicht/Single weight: 7200 kg / Block-Nr. / block-no.: 112

Anmalung / paint-marking: 88995
O2 Gehalt / O2 content: 12 ppm
mechanische Werte an Blindhärteprobe / mechanical properties on blank hardened test ø 30 mm, Wärmebehandlung / heat treatment: 870°C/2h/Öl/oil, 180°C/2h/Luft/air
Verschmiedungsgrad / forging ratio: 3,8
auf Materialverwechslung geprüft - keine Beanstandung / material mix up tested - satisfactory
Radioaktivität innerhalb gesetzlicher Vorgaben wird gewährleistet / radioactivity within legal requirements guaranteed
Restmagnetismus max. 5 Gauss- wird gewährleistet / residual magnetism max. 5 Gauß - guaranteed
Reinheitsgrad gemäß DIN 50602: K4 = 0 / micropurity acc. to DIN 50602: K4 = 0
Reinheitsgrad nach / micropurity acc. to ISO 4967 Meth. A - A 0,3/0,7; B 0/0; C 0/0,3; D 0/0,5; DS 1,5
austenitische Körngröße gemäß DIN EN ISO 643 nach Wärmebehandlung 950°C 50 h: G = 5 und feiner, max. 2% gröber 5 erfüllt
austenitic grain size acc. to DIN EN ISO 643 after heat treatment 950°C 50 h: G = 5 and finer , max. 2% rougher 5 fulfilled

Anlagen / annex: - Ultraschallprüfbericht / ultrasonic test report
- Jominy Prüfprotokoll / Jominy report

Die gestellten Anforderungen sind erfüllt. Besichtigung und Ausmessungen: o.B.
The a.m. results meet requirements. Visual and dimensional inspection: satisfactory

Herstellerzeichen, Manufacturer's brand qu	Stempel des Sachverständigen Inspector's stamp	Datum / Date: 05.08.2021 Abnahmebeauftragter Hersteller Manufacturers authorized representative

Stirnrad_spur gear_material certificates_PART-057679

Ultraschallprüfbericht Ultrasonic test report gemäß / acc. to DIN EN 10204 3.1	Nr./No.: 8/21/32-UT FA 520488995 Seite/page 1 von/of 1	Schmiedewerke Gröditz GMH GRUPPE

Besteller Customer Delta Qualitätsstahl GmbH Hamm	**Gegenstand** Item Rundmaterial round material
Bestell-Nr. Order-No 170443 + Nachtrag	**Werkstoff** Material 18 CrNiMo 7-6
Wärmebehandlung vergütet Heat treatment quenched and tempered	**Oberflächenzustand** mech. bearbeitet Surface condition mech. processed
Kennwort Code word -	**Lfd.-Nr.** Part-No -
Zeichnungs-Nr./Abmessung Liefermaß/delivery dimension: Dmr./dia. 1x 675 x 5100 Drawing-No./Dimensions Dmr./dia. 1x 675 x 2530	

Kommission Job No. 5200454255/5	**Chargen-Nr.** Charge No. GP107894	**Stückzahl** Pieces 2

Spezifikation Specification DELTA LVL 02 18Cr Rev. 18	**Prüfumfang** gemäß Vorschrift Scope of test acc. to specification

Fertigungs- und Prüffolgeplan Fabrication and Inspection plan ☐ Nr/No:	**Prüf- und Abnahmeplan** Test and Inspection plan ☐ Nr/No:	**Prüfanweisung** test procedure ☒ Nr/No: QP-ZFP-A-01 Rev. B

Prüfdaten / Test data

Prüfgerät Test unit EPOCH650 - 190783502	**Koppelmittel** Couplant Tapetenleim / wallpaper paste

Prüfer Falkenberg Tested by ISO9712 Stufe 2/level 2	**Prüfdatum** Date of testing 20.07.2021	**Prüfort** Place of testing Gröditz

Registriergrenze
Registration level gemäß Vorschrift / acc. to specification

Prüfkopf / Probe | **Justierung** / Calibration

Nr. No.	Typ Type	Fre-quenz Fre-quency	Winkel Angel	Justierbe-reich Calibration range	Methode Method	s_j	s_{max}	V_j	ΔV	ΔV_T ☐ ΔV_A ☐	ΔV_κ	ΔV_K	V_R
		MHz	°	mm		mm	mm	dB	dB	dB	dB	dB	dB
1	B2S	2	0	850	AVG/BI DGS/RI	677	677	32	50	-	-	-	82

s_{max} - Bewertungsschallweg/evaluated sound distance, s_j-Justierschallweg/Calibration distance, V_j-Justierverstärkung/ Calibration Gain, Δ V-Verstärkungszuschlag/Additional Gain, ΔV_T-Transferkorrektur/ Transfer correction, ΔV_A -Ankopplungskorrektur/ Coupling correction, ΔV_κ -Schallschwächungskorrektur/Soundattenuation correction, ΔV_K - Kontrollkörperkorrektur für Winkelprüfköpfe bzw. Krümmungskorrektur für Senkrechtprüfköpfe/Adjusting block correction for angle beam probes or curvature correction for straight beam probes, V_R -Bewertungsverstärkung Evaluation Gain

Ergebnisse - Results:

Es wurden keine registrierpflichtigen Anzeigen festgestellt.
No recordable indications were found.

Beurteilung gemäß Spezifikation/ Evaluation acc. to specification :

ERFÜLLT ☒ PASSED	**NICHT ERFÜLLT** ☐ NOT PASSED	**ERGEBNIS S. ANLAGE** ☐ RESULT L. ANNEX
Datum / Date 05.08.2021	**Prüfaufsicht**/ Supervisor i.V. Knobloch ISO9712 Stufe 3/level 3	

Stirnrad_spur gear_material certificates_PART-057679

Schmiedewerke Gröditz
GMH GRUPPE

Jominy- Protokoll / Jominy - Report

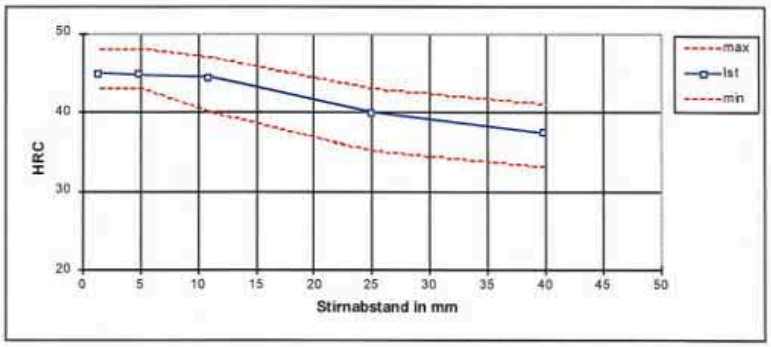
gem. ISO 642 / acc. to ISO 642
Berechnung nach/ calc. acc. to SEP 1664, Tafel 12 - 2. Ausgabe Juni 2004

Gegenstand/Item: Stabstahl / steel bar
Stahlmarke/Steel grade: 18 CrNiMo 7-6
Charge/Heat-No.: GP 107894

Austenit.bedingungen/
Austen. conditions: 860°C/30min

mm	1,5	5	11	25	40
Ist	44,9	44,7	44,4	39,9	37,4
max	48	48	47	43	41
min	43	43	40	35	33

* Sollwerte nach / Limits acc. to DELTA LVL02 18Cr Rev. 18



Freigabe durch:
Released by: gez. Rink
TQW

21.07.2021

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Stirnrad / spur gear	PN-00077527.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Fügesitz	Ø 242 H7	+0,046 0	242,02-242,04
Verzahnung Vorfräsen			i.O.

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	04.03.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

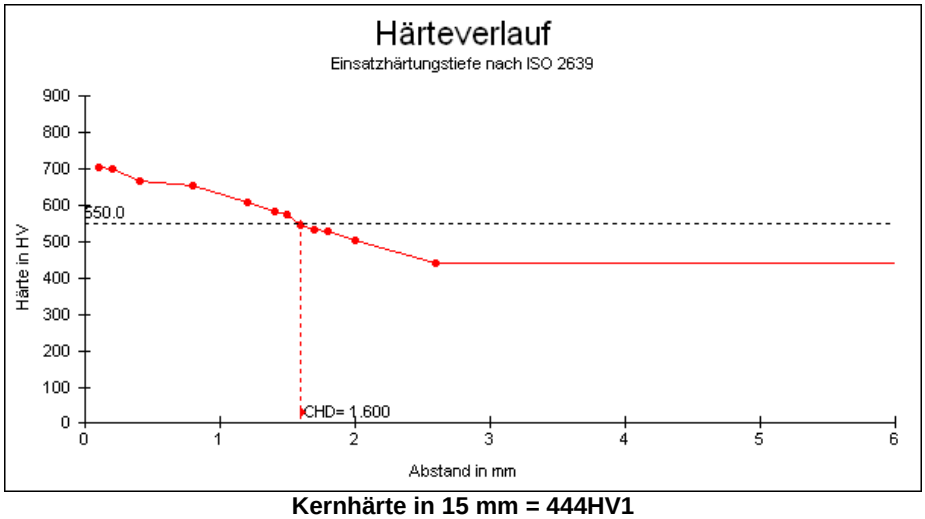
PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

DOK-QS-121	Härteverlauf Hardness profile	REINTJES POWERTRAIN SOLUTIONS

Abnahmeprüfzeugnis gemäß DIN/EN 10204 – 3.1
Inspection certificate according to DIN/EN 10204 - 3.1

Kunde: Customer:	**Pekrun**	**Benennung:** Object:	**Stirnrad 71**
FAUF: Production No.:		**Bestell Nr. /Pos:** Purchase Order No./Item:	**4500058759**
Zeichnungs Nr.: Drawing No.:	**PN-00077527**	**Auftrags Nr.:** Order No.:	**2053592**
Werkstoff: Material:	**18 CrNiMo 7-6**	**Proben Nr.:** Sample No.:	**09215**
Stückzahl: No. of pieces:	**3**	**Ofencharge:** Oven batch:	**C22-21935**

CHD 550H V1 = 1.60 mm



Kernhärte in 15 mm = 444HV1

Oberfl.-Härte IST: Surface hardness actual:	**60**	HRC	**EHT IST:** Penetration depth actual:	**1,60**	mm
Oberfl.-Härte SOLL: Surface hardness nominal:	**60 +- 2**	HRC	**EHT SOLL:** Penetration depth nominal:	**1,4 + 0,2**	mm
Martensit IST: Martensit actual:		%	**Restaustenit IST:** Resodual austenite:		%
Randoxidation IST: Surface oxidation actual:		µm	**Randentkohlung IST:** Surface dicarborising actual:	---	µm
Karbidanteil IST: Katbit actual:	---	%	**Rand C-Gehalt IST:** Surface-C actual:		%
Bemerkungen: Remark:					

Prüfer / Workinspector i.A. V.Gärtner Prüfdatum / Work date: 02.03.22

Dieses Zeugnis wurde maschinell erstellt und ist OHNE Unterschrift gültig.
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Prozessverantwortlicher:	QS / Hr. Dr. Reso / 17.01.2018	Revisions-Nr.:	02

Seite 1 von 1

PEKRUN

Profil / Flankenlinie — **DIN3962**

Auftrag: 71Z 8M-P-057679

19396/10-P-057679-1 R.V.OBEN ZW=656.155-655.945

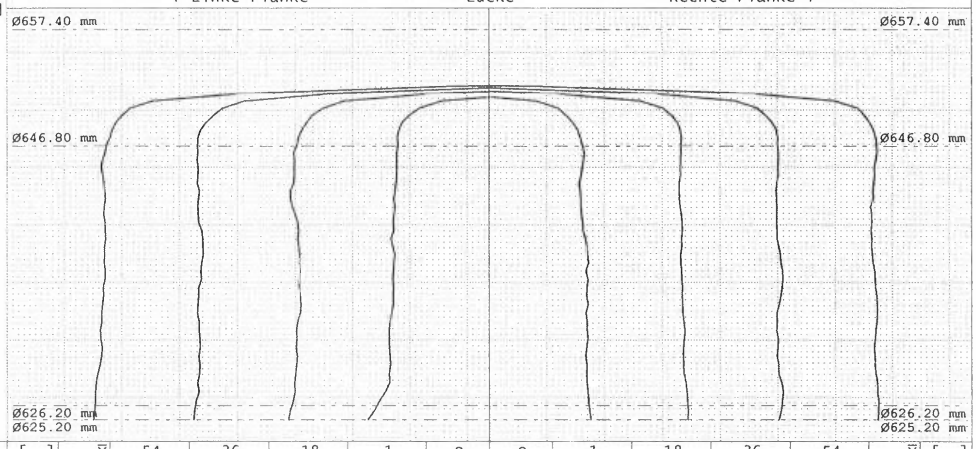
Maschine: #945 — 05.05.2022 05:31:27 23.0°C

z	71	β [Grad]	27.0000	da [mm]	652.7000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	620.9500
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
D⟷● Ø [mm]	2.0	Messhöhe [mm]	0.0000	Lα [mm]	27.6532
		Messkreis [mm]	637.4810	Lβ [%]	80.0

Profil

20.0 µm — 500:1 — 6.1 mm — 1.6:1

+ Linke Flanke - Lücke - Rechte Flanke +

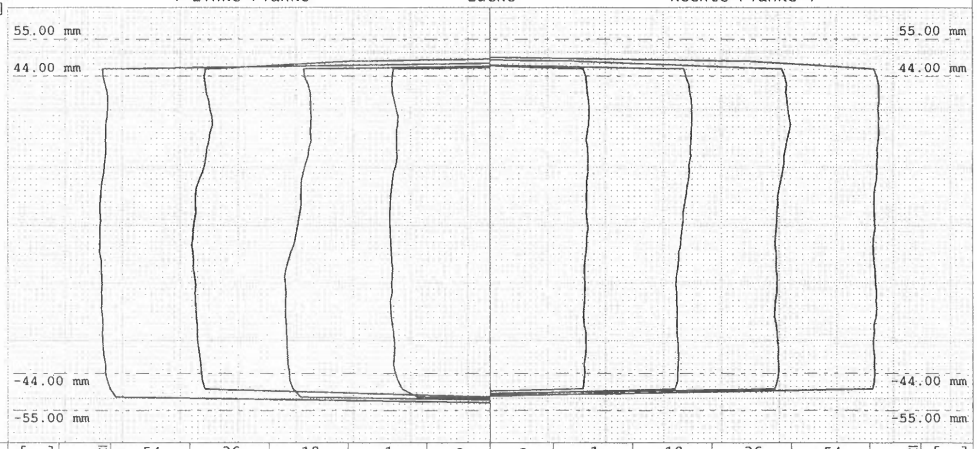


[µm]	[..]	x̄	54	36	18	1	Q	Q	1	18	36	54	x̄	[..]
Fα	16.0	3.9	3.5	2.5	3.5	6.0	3	1	3.0	3.0	2.5	3.0	2.9	16.0
ffα	14.0	2.9	2.5	2.5	3.0	3.5	2	1	2.5	1.5	2.5	2.5	2.3	14.0
fHα	9.0	-1.4	-2.5	0.0	1.0	-4.0	4	2	-2.5	-2.0	-1.0	-1.5	-1.8	9.0
Q Soll / Q Ist							6/ 4	6/ 2						

Flankenlinie

20.0 µm — 500:1 — 17.1 mm — 1:1.7

+ Linke Flanke - Lücke - Rechte Flanke +



[µm]	[..]	x̄	54	36	18	1	Q	Q	1	18	36	54	x̄	[..]
Fβ	16.0	5.5	3.0	7.0	9.0	3.0	4	2	2.0	6.0	5.5	2.0	3.9	16.0
ffβ	12.0	4.1	2.5	5.5	6.0	2.5	3	1	1.5	3.5	3.5	1.5	2.5	12.0
fHβ	11.0	-4.3	-1.0	-4.5	-10.5	-1.0	6	5	1.5	6.5	4.5	1.5	3.5	11.0
Q Soll / Q Ist							6/ 6	6/ 5						

GearPro V3.17.97 — 1 / 1

PEKRUN

Teilung **DIN3962**

Auftrag: 71Z 8M-P-057679

19396/10-P-057679-1 R.V.OBEN ZW=656.155-655.945

Maschine: #945 05.05.2022 06:07:30 23.0°C

z	71	β [Grad]	27.0000	da [mm]	652.7000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	620.9500
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
Ø [mm]	2.0	Messhöhe [mm]	0.0000	Messkreis [mm]	637.4810

[µm]		Q Soll	Q Ist	[..]	Istwert	Min	Max
20.0 µm	+ fp -						
	fp	6	2	11.0	3.0	31	6
	fu	6	3	14.0	4.5		32
20.0 µm	- fp +						
	fp	6	3	11.0	4.0	42	5
	fu	6	3	14.0	5.5		41
20.0 µm	+ Fp -						
	Fp	6	1	45.0	8.0	3	40
20.0 µm	- Fp +						
	Fp	6	2	45.0	9.0	37	2
20.0 µm	+ Fr -						
	Fr	6	2	36.0	8.0	11	37

Zweikugelmaß für Kugeldurchmesser 14.00 mm Soll: 656.050 mm / Ist: 656.144 mm

GearPro V3.17.97 1 / 1

PEKRUN

Profil / Flankenlinie **DIN3962**

Auftrag: 71Z 8M-P-057679

19396/10-P-057679-1 L.V.UNTEN ZW=656.155-655.945

Maschine: #945 04.05.2022 11:45:36 23.4°C

z	71	β [Grad]	-27.0000	da [mm]	652.8000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	621.2000
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
Ø [mm]	2.0	Messhöhe [mm]	0.0000	Lα [mm]	30.6824
		Messkreis [mm]	637.4810	Lβ [%]	80.0

Profil

20.0 µm 500:1 — 6.6 mm 1.5:1

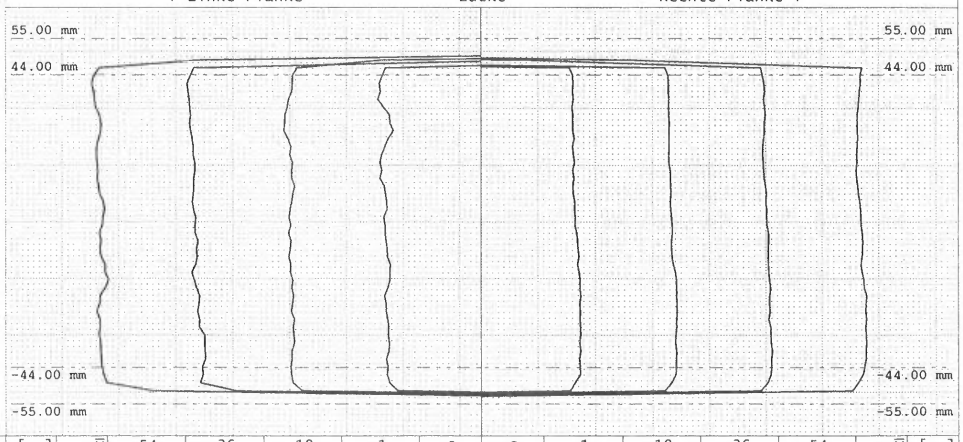
+ Linke Flanke - Lücke - Rechte Flanke +

[µm]	[..]	X̄	54	36	18	1	Q	Q	1	18	36	54	X̄	[..]
Fα	16.0	6.4	5.0	6.5	6.0	8.0	4	3	1.0	3.5	1.5	6.0	3.0	16.0
ffα	14.0	4.6	4.0	3.5	5.0	6.0	4	2	1.0	2.0	1.0	3.5	1.9	14.0
fHα	9.0	-4.1	-2.0	-5.0	-3.0	-6.5	5	4	-0.5	-2.5	-0.5	-4.5	-2.0	9.0
Q Soll / Q Ist							6/ 5	6/ 4						

Flankenlinie

20.0 µm 500:1 — 17.1 mm 1:1.7

+ Linke Flanke - Lücke - Rechte Flanke +



[µm]	[..]	X̄	54	36	18	1	Q	Q	1	18	36	54	X̄	[..]
Fβ	16.0	5.5	6.0	6.5	4.0	5.5	3	1	3.0	3.0	3.5	4.0	3.4	16.0
ffβ	12.0	4.3	4.5	3.5	3.5	5.5	3	1	1.5	1.5	1.5	3.5	2.0	12.0
fHβ	11.0	2.8	2.5	5.0	1.5	2.0	4	2	-3.5	-3.5	-3.5	-3.5	-3.5	11.0
Q Soll / Q Ist							6/ 4	6/ 2						

GearPro V3.17.97 1 / 1

PEKRUN

Teilung DIN3962

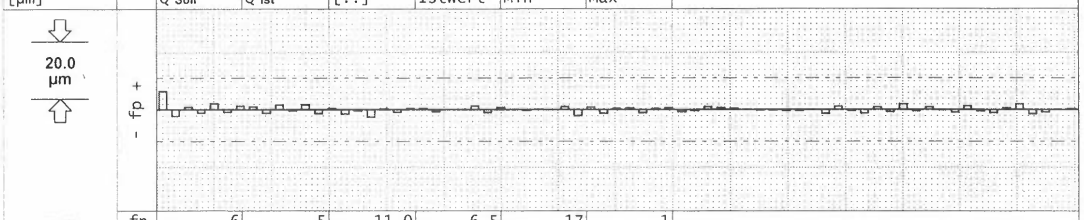
Auftrag: 71Z 8M-P-057679

19396/10-P-057679-1 L.V.UNTEN ZW=656.155-655.945

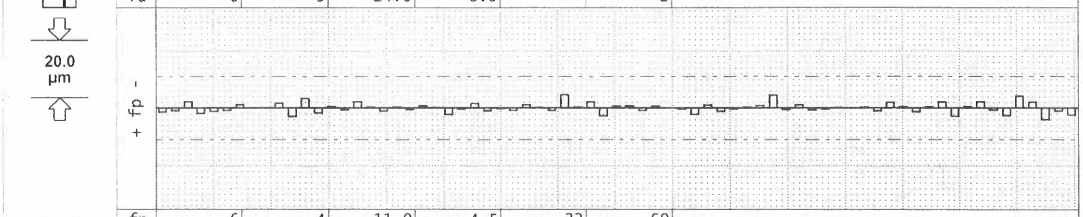
Maschine: #945 04.05.2022 11:59:00 23.5°C

z	71	β [Grad]	-27.0000	da [mm]	652.8000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	621.2000
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
D⟹● Ø [mm]	2.0	Messhöhe [mm]	0.0000	Messkreis [mm]	637.4810

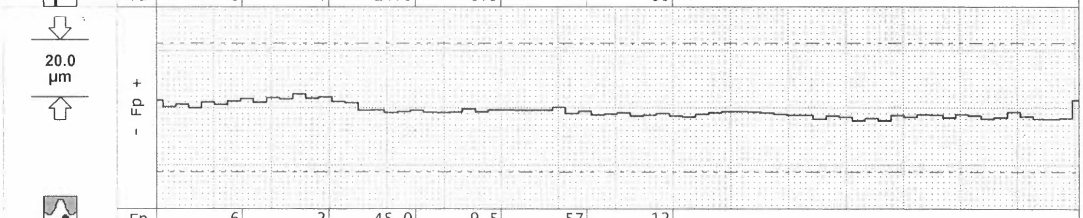
[µm]		Q Soll	Q Ist	[..]	Istwert	Min	Max



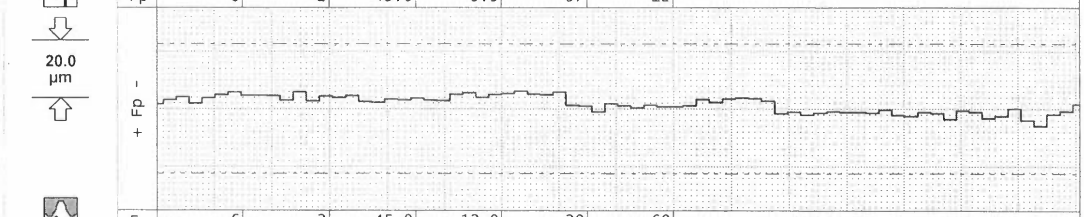
fp	6	5	11.0	6.5	17	1
fu	6	5	14.0	8.5		2



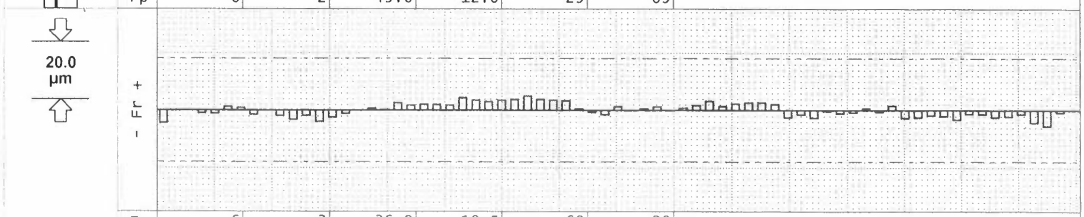
fp	6	4	11.0	4.5	32	69
fu	6	4	14.0	6.5		66



Fp	6	2	45.0	9.5	57	12



Fp	6	2	45.0	12.0	29	69



Fr	6	3	36.0	10.5	69	29

Zweikugelmaß für Kugeldurchmesser 14.00 mm Soll: 656.050 mm / Ist: 656.031 mm

GearPro V3.17.97 1 / 1

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057679
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Stirnrad / spur gear	PN-00077527.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo 7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Verzahnungsbereich / toothing area*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	12.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

BG Radwelle_assembly group wheel shaft_balancing report_PART-057682

```
*****************************************
Pekrun Getriebebau GmbH
Koebbingser Muehle 14
58640 Iserlohn/Germany
*****************************************
Operator : Ferdi Basar                          10.05.22 07:50
  Rotordaten              Fall   1              19396/10-057585
  a: 178.5 mm             b: 311.0 mm            c: 162.5 mm
  r1: 280.0 mm            Eb1/Eb2                r2: 280.0 mm
  m1: -polar                                     m2: -polar
  Tol1: 9999. gmm                                Tol2: 9999. gmm
                          N soll    :  400.  1/Min
  Ergebnisse              Rotor: Radwelle 1          10.05.22 07:50
  Lauf  2                 N ist     :   401.  1/Min
Eb 1:       10.9  g                     Eb 2:       29.4  g
            217. Grad                               351. Grad
            in Tol                                  in Tol
Anteil in Tol.Einheiten  :
        3043. gmm                                 8221. gmm
```

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Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **414819**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-005-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält Round bars,forged,peeled
Werkstoff / Quality	1.6587 18CrNiMo7-6
Anforderungen / Requirements	LVL- 02 18Cr Rev.18 - 07/20 1.6587 18CrNiMo7-6 ,ISO 6336 -5 Third ed. 2016-08-15 1.6587 18CrNiMo7-6 ,DIN EN ISO 683 -3 April 2019 Lieferzustand: Vorvergütet Die Werkstoffqualität "MQ/ME" nach ISO 6336-5 wird bestätigt. Diese Bestätigung gilt nur für die Eigenschaften, die vom Stahlhersteller beeinflußt werden können. Für Eigenschaften, die von der konstruktiven Gestaltung, der Endwärmebehandlung und der Einsatzbedingungen abhängig sind, kann der Stahlhersteller keinerlei Garantie und Gewährleistung übernehmen. The material quality "MQ/ME" acc. ISO 6336-5 will be confirmed. This confirmation is only valid for the properties, which can be affected by the steel producer. The steel producer cannot provide any guarantee for properties, which are dependent on the constructional design, the final heat treatment and the application conditions.

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d'élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d' identification(analyse spectrale)
ohne Beanstandung without objection	E- LF/VD	ohne Beanstandung without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
5	4	290 mm rd. x 3751 - 3860 mm	8006 kg	735116

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb	V	Ti
735116	0,175	0,28	0,54	0,007	0,0010	1,71	0,32	1,52	0,102	0,003	0,009	0,001

Al	N	H(ppm)	O	Sn	Sb	Ca	Al/N	Cu+10xSn
0,023	0,0110	1,50	0,0014	0,004	0,003	0,0004	2,091	0,142

Wärmebehandlungszustand / Condition of heat treat	
	vergütet quenched and tempered

Probe-Nr. / Test-No.	Lage / Loc.	Temp. °C	Rp0,2 N/mm²		Rm N/mm²	A5 %	Z %	Kerbschlagarbeit / Impact value J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness / HB
Soll/Req.	T	RT	>=785		>=1120 <=1450	>=8	>=25	>=30			RT	<=238
332W2	T	RT	923		1321	8,2	36	63	64	66	RT	192
332W2	T							49	50	50	-20°C	am Material

Die mechanischen Kennwerte wurden an einer Referenzprobe (30 mm rd.) ermittelt:
The mechanical properties were tested at a reference block (30 mm dia.) :
870°C 2h Oel/oil, 180°C 2h Luft/air

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	06.12.2021	**Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

This certificate was generated by data system and it is valid without signature as well.
Ce certificat a été établi sur système informatique et est valable sans signature aussi.

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Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat 414819

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 3.1
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client 171472

BGH-Auftrags-Nr. / BGH works no. / BGH référence 816888-005-01

```
Stirnabschreckversuch / Jominy test - EN ISO 642:
mm     1,5  5    11   25   40
HRC    45   44   43   38   36

Umformgrad      : 4.8 : 1
Reduction ratio:

Korngröße  nach ASTM E 112: 6
Grain size acc. ASTM E 112:

Korngröße  nach ISO 643 (950°C 50h Oel): 6
Grain size acc. ISO 643 (950°C 50h oil):

Reinheitsgrad nach DIN 50602   : K4 = 2 (Ox + S)
Degree of purity acc. DIN 50602:

Reinheitsgrad nach ISO 4967, Methode A  : DS = 1,5
Degree of purity acc. ISO 4967, method A:
Type           A      B      C      D
Dünn/fine     0,0    0,8    0,5    1,0
Dick/thick    0,0    0,5    0,3    0,5

Restmagnetismus   : < 8 A/cm
Residual magnetism:

Das Material wurde gemäß der Spezifikation hergestellt.
The Material was produced in compliance with the Specification.

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done                  : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze
von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection
limit of 0.1 Bq/g.
```

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	06.12.2021	Langer

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Ce certificat a été établi sur système informatique et est valable sans signature aussi.

Seite / Page 3 / 3

Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **414819**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-005-01**

Bei Überschreitung der regelwerksseitigen Abmessungsgrenze sind im Zweifelsfall die Vorgaben
des Regelwerks vom Bauteilhersteller zu verifizieren. Seitens des Werkstoffherstellers werden
nur die, an der von ihm produzierten Geometrie, überprüften Eigenschaften bestätigt.
In case of doubt, the specifications of the regulations must be verified by the component manufacturer
if the dimensional limit of the regulations is exceeded. On the part of the material manufacturer,
only the properties verified on the geometry, produced by him, are confirmed.

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	06.12.2021	**Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Seite 1 / 1
Page

US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. **171472**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816888-005-01**
BGH works no.
BGH référence

Zeugnis-Nr. **414819**
Certificate no.
No. de certificat

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.6587 18CrNiMo7-6
Abmessung/Dimension: 290 mm rd. x 3751 - 3860 mm
Anzahl/Quantity : 4 Gewicht /Weight : 8006 kg
Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
DIN EN 10228-3 Tab. 3 Typ 1a (100%)und
Tab. 5 Qualitätsklasse 4 für Randzone (1/3 D, min. 60mm)
Tab. 5 Qualitätsklasse 3 für Restbereich
DIN EN 10228-3 Tab.3 typ 1a (100%)and
Tab.5 quality class 4 for surface zone (1/3 D, min. 60 mm)
Tab.5 quality class 3 for remaining area

Prüfrichtlinie : DIN EN 10228-3 Tab. 3 & 4 (vollständig 360°)
Specification

Prüfgerät : K.Deutsch RPT.S 1156
Deutsch Echopraph 1090
Testing device

Prüfkopf : STS32.20P4L150C, STSE18/16P4
S 24 W4, SE 18/16 PB4
Search unit

Kopplungsmittel : Wasser / Kleister
Couplant water / glue

Prüfumfang : 360°
Amount of inspection

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0
Recording threshold FBH 2.0 mm

Schallschwächung : < 6 dB/m
Wave attenuation

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 06.12.21	Prüfer Testing operator Opérateur Drobin Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A BGH Q 30	Überwacher Supervisor Surveilleur

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This certificate was generated by data system and it is valid without signature as well.
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EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Abnahmeprüfzeugnis

gemäß DIN EN 10204-3.1

Belegnr	**PZ-2022-0097335**
Auftragsnr	**2022-0238565-2**
Kundennr	1011419
Ausgeber	Virzi, Laura
Telefon	0234/903660
Datum	25.03.2022
Seite	1/1

Teile/Verfahren	Stück	Gewicht
Ihre Auftragsnr: 19396/Pos.10	3	---

Ihre Liefers.Nr: Abholung vom 17.03.2022
Ihre Bestellnr: 4500060199-P / 20 vom 17.03.2022
Uns. Auftragsnr: 2022-0238565-2 von 2 vom 21.03.2022
Bezeichnung: Ritzelwelle
Teilenummer: PART-057680
Zeichnungsnr: PN00077528
Fr. Feld: 2053591
WE-Nummer: WE-000096728
Werkstoff: 1.6587/18CrNiMo7-6/17CrNiMo6
Vorschrift: Isolieren, Einsatzhärten, Strahlen, Richten, Zeugnis

Soll-Vorgaben

Randhärte	58-62 HRC
Einsatzhärtetiefe	1,4-1,6 mm

Ergebnisse	Prüfer	Prüfdatum
RH:59-60 HRC EHT:1,60 mm	Rainer Theuer	25.03.2022

Die CHD haben wir an unserer Chargenbegleitprobe aus 18CrNiMo7-6 ermittelt.

Hiermit bestätigen wir, dass obige Teile gemäß den Vereinbarungen bei der Bestellannahme auf der Grundlage der Ihnen bekannten Allgemeinen Geschäftsbedingungen der Härterei Reese Bochum GmbH, Stand: Juli 2018 behandelt wurden.

Dieses Dokument wurde elektronisch erstellt und ist daher ohne Unterschrift gültig.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/9036-0
Fax +49 (0) 234/9036-96

Oberscheidstr. 25 · 44807 Bochum
bochum@haerterei.com
Handelsregister: HRB 1717
Ust-ID-Nr.: DE257486215
Steuer-Nr.: 306/5709/0368

National-Bank Essen BIC: NBAGDE3EXXX IBAN: DE89 3602 0030 0006 3781 29
VB Bochum Witten eG BIC: GENODEM1BOC IBAN: DE83 4306 0129 0123 2073 00
Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

www.haerterei.com

EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Inspection certificate

according to DIN EN 10204-3.1

Document #	PZ-2022-0097335
Job #	2022-0238565-2
Customer #	1011419
Issuer	Virzi, Laura
Telephone	0234/903660
Date	25.03.2022
Page	1/1

Parts/Process		Quantity	Weight
Your Job #:	19396/Pos.10	3	---
Your P/S. #:	Abholung vom 17.03.2022		
Your P.O. #:	4500060199-P / 20 from 17.03.2022		
Our Job #:	2022-0238565-2 of 2 from 21.03.2022		
Description:	pinion shaft		
Serial #:	PART-057680		
Drawing #:	PN00077528		
Free Field:	2053591		
RG-No.:	WE-000096728		
Material:	1.6587/18CrNiMo7-6/17CrNiMo6		
Process:	protection, case hardening, shot blasting, straightening, certificate		

Hardness requirements

Surface hardness	58-62 HRC
Case hardening depth	1,4-1,6 mm

Results	Auditor	Test date
EH:59-60 HRC CHD:1,60 mm	Rainer Theuer	25.03.2022

CHD was tested on our test-piece 18CrNiMo7-6 from the same batch.

We hereby confirm that the above parts will be treated and examined in accordance with the agreements applying on acceptance of order and based on the familiar General terms and conditions of business of Härterei Reese Bochum GmbH Edition: July 2018.

This document automatically generated valid without signature.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/9036-0
Fax +49 (0) 234/9036-96

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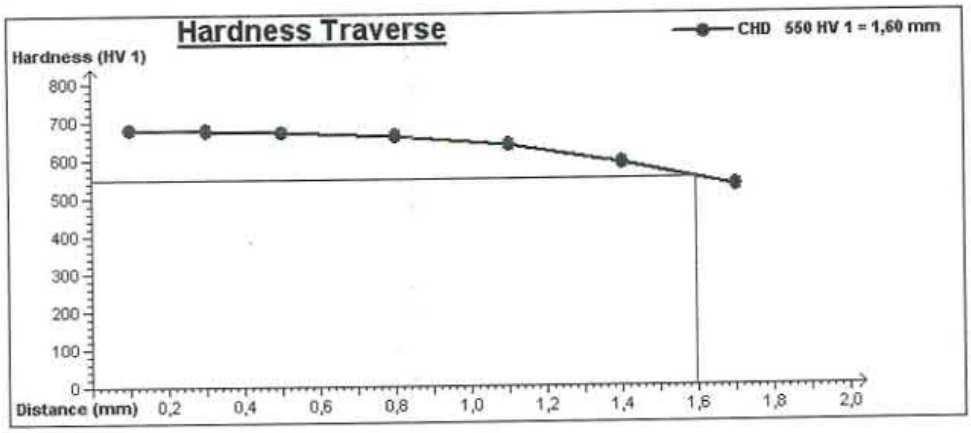
Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

www.haerterei.com

Härterei Reese
Bochum GmbH
Oberscheidstrasse 25
44807 Bochum

Chargen-Nr.:	.
Datum:	25.03.2022
Auftrags-Nr.:	2022-0238565-2
Prüfer:	Labor

Kunde: Pekrun
Proben-Nr.: 18 CrNiMo7-6
H.R.Probe



Ergebnis

CHD 550 HV 1 = 1,60 mm

Reihe 1

Punkt	Abstand	Härte	Kommentar
1	0.100	680 HV 1	
2	0.300	678 HV 1	
3	0.500	672 HV 1	
4	0.800	661 HV 1	
5	1.100	637 HV 1	
6	1.400	589 HV 1	
7	1.700	529 HV 1	

QUALITÄTSWESEN HÄRTEREI REESE BOCHUM

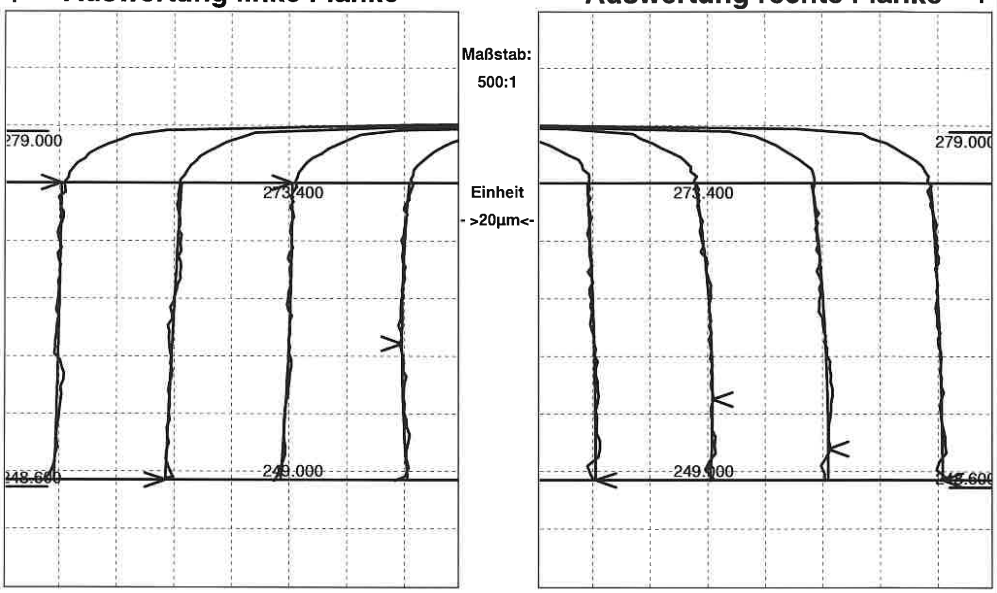
Profilmessung

Messung vom 08/02/2022 19:37:44 Dauer: 00:03:25 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.1

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Linksschräg 27.000000 Grad	Meßbreite	57.500 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	279.000 mm	Fußformkreis (d)	248.600 mm

+ Auswertung linke Flanke - | - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
5	9.4		9.9	10.8	9.6	7.2	F_α	5.7	6.7	6.4	7.9		6.7	4
5	- 3.2	0.0	- 2.5	- 5.6	- 4.1	- 0.5	fH_α	- 2.9	- 5.2	- 5.5	- 4.2	0.0	- 4.4	5
4	4.9		5.4	4.8	3.6	6.0	ff_α	4.5	3.3	4.4	4.1		4.1	3
	0.3	4.0	- 0.3	0.2	- 1.0	2.2	C_α	0.7	2.8	1.7	1.0	4.0	1.5	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

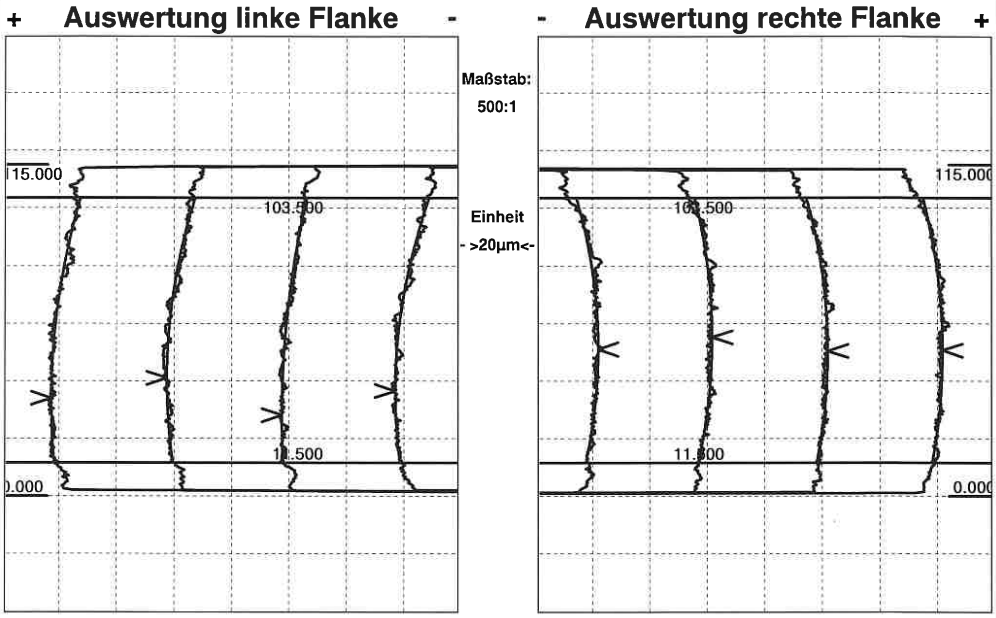
Alle Angaben in µm
Qualitäten nach DIN 3961

Flankenlinienmessung

Messung vom 05/11/2022 21:41:27 Dauer: 00:07:43 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.1

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	232
Schrägungswinkel	Linksschräg 27.000000 Grad	Meßzylinder (d)	261.294 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	115.000 mm		



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
3	7.0		7.8	5.9	6.3	8.0	Fβ	9.0	6.8	6.0	5.5		6.9	4
5	- 8.8	-5.0	- 9.0	- 7.7	- 8.2	- 10.1	fHβ	- 3.2	- 1.2	- 3.4	- 3.1	-5.0	- 2.7	2
3	4.9		5.7	4.7	4.1	5.1	ffβ	7.8	6.2	4.7	4.8		5.9	4
	4.6	6.0	4.4	5.3	3.2	5.5	Cβ	5.8	5.5	5.5	5.1	6.0	5.5	

Vert. Maßstab 1:2, d.h. 10 mm entspr. 20 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

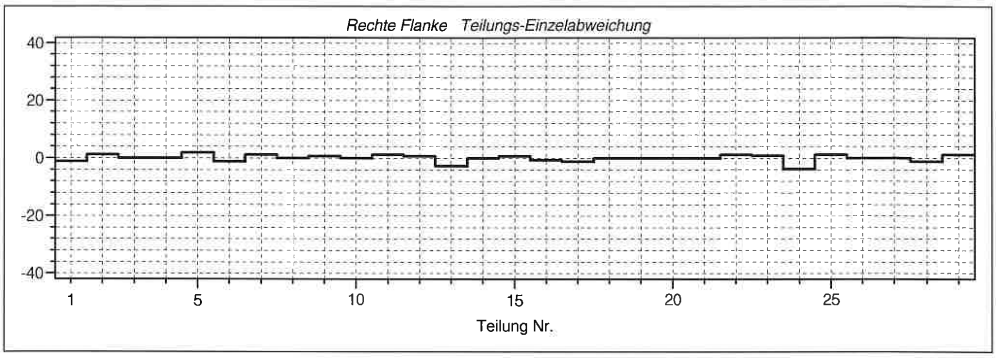
Alle Angaben in µm
Qualitäten nach DIN 3961

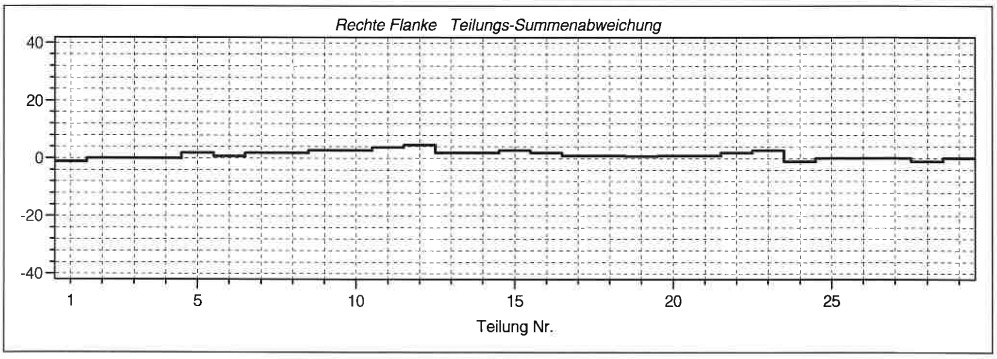
Teilungsmessung

Messung vom 05/11/2022 21:53:29 Dauer: 00:06:08 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.1

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.294 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.174		
Zahnweite (Nennmaß)	111.740 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.429 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.824 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 3.8	3	Teilungs-Schwankung (Rp)	5.7	
Teilungs-Gesamtabw. (Fp)	5.7	1	Max. Teilungssprung (fumax)	4.9	3
Teilungs-Spannenabw. (Fp(z/8))	2.6	1			

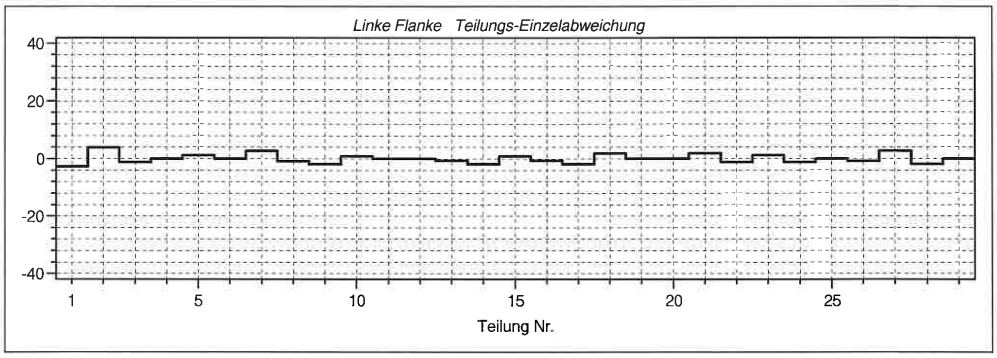
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

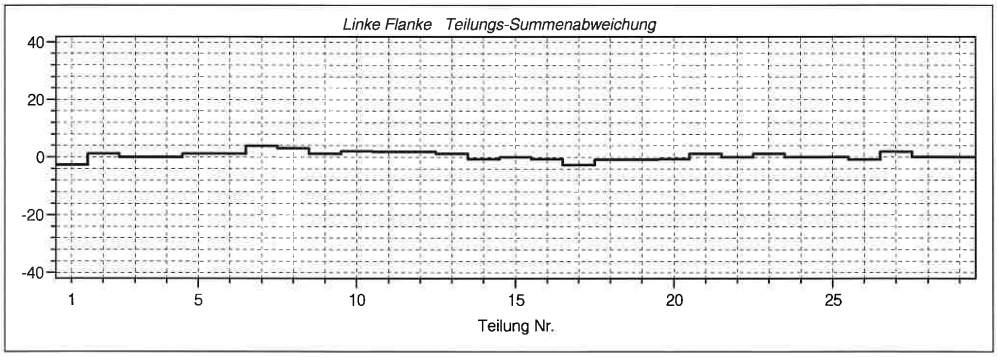
Teilungsmessung

Messung vom 05/11/2022 21:53:29 Dauer: 00:06:08 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.1

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.294 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.174		
Zahnweite (Nennmaß)	111.740 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.429 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.824 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	3.9	3	Teilungs-Schwankung (Rp)	6.5	
Teilungs-Gesamtabw. (Fp)	6.6	2	Max. Teilungssprung (fumax)	6.5	4
Teilungs-Spannenabw. (Fp(z/8))	3.9	1			

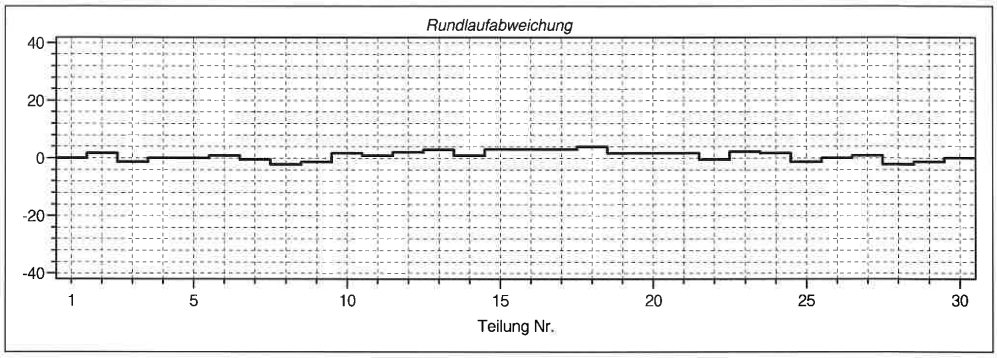
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

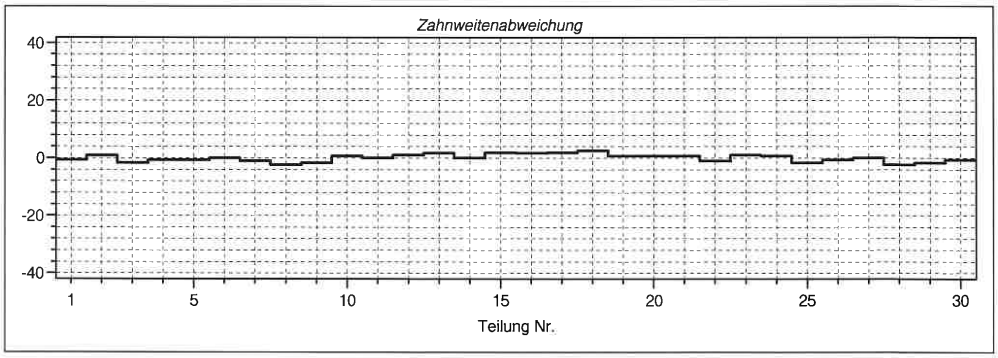
Teilungsmessung

Messung vom 05/11/2022 21:53:29 Dauer: 00:06:08 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.1

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.294 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.174		
Zahnweite (Nennmaß)	111.740 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.429 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.824 mm	Meßrollendurchmesser	14.000 mm





				Q
Min. Zahnweite (mm)	111.711	Mittl. Zahnweite (mm)	111.713	
Max. Zahnweite (mm)	111.716	Zahnweiten-Schwankung (µm)	4.9	
Anzahl Meßzähne	5			
		Rundlaufabweichung (Fr)	6.1	2
		Meßkugeldurchmesser (mm)	14.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

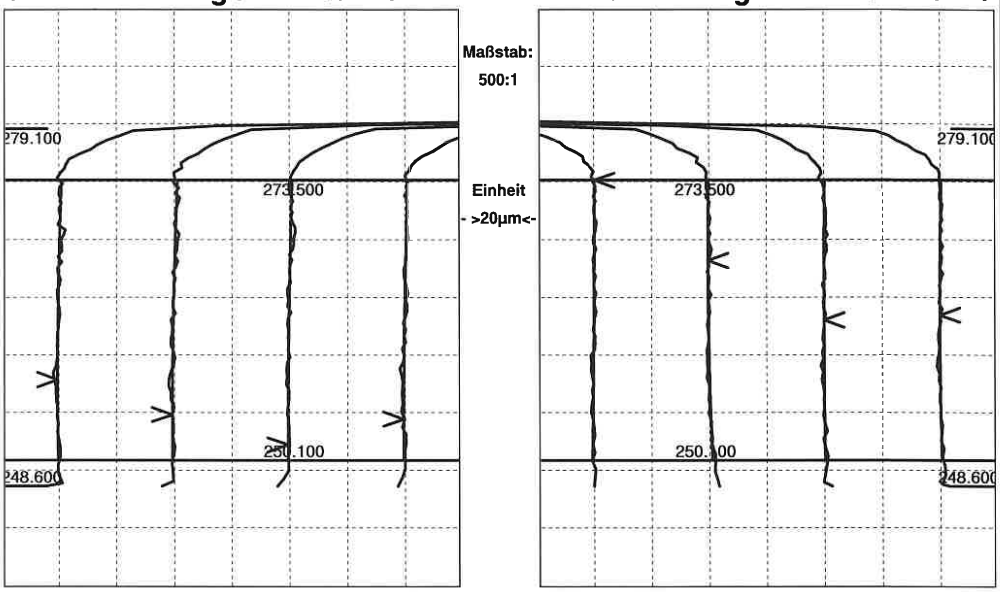
Profilmessung

Messung vom 05/11/2022 18:40:50 Dauer: 00:03:27 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.1

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Rechtsschräg 27.000000 Grad	Meßbreite	57.500 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	279.100 mm	Fußformkreis (d)	248.600 mm

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
2	3.3		4.0	3.2	3.2	2.8	F_α	3.4	4.1	3.5	3.4		3.6	2
2	- 1.5	0.0	- 1.2	- 1.8	- 1.6	- 1.5	fH_α	0.8	- 1.2	- 0.0	- 0.1	0.0	- 0.1	1
2	2.8		3.5	2.7	2.7	2.4	ff_α	1.8	2.1	2.7	2.1		2.2	2
	0.6	2.0	0.7	0.7	0.4	0.5	C_α	0.2	- 0.7	- 0.4	- 0.6	2.0	- 0.4	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

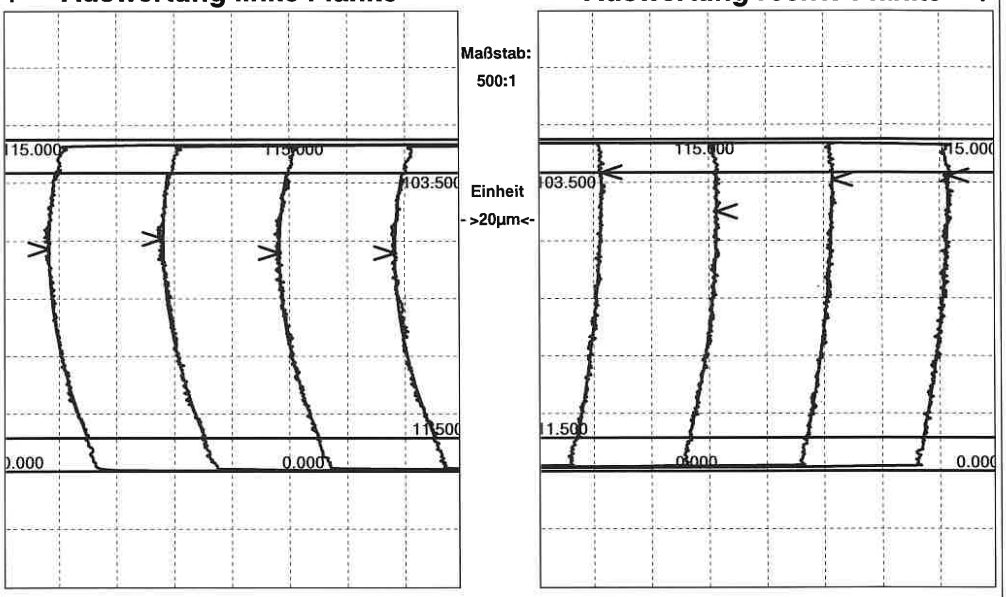
Flankenlinienmessung

Messung vom 05/11/2022 18:32:42 Dauer: 00:07:41 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.1

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	232
Schrägungswinkel	Rechtsschräg 27.000000 Grad	Meßzylinder (d)	261.256 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	115.000 mm		

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
2	4.9		4.6	5.5	4.8	4.7	Fβ	6.2	5.7	6.6	7.0		6.4	3
2	14.5	13.0	13.9	16.0	14.0	14.0	fHβ	10.7	12.0	11.2	11.0	13.0	11.2	1
1	3.5		3.4	3.8	3.4	3.6	ffβ	2.5	4.2	2.8	3.8		3.3	1
	10.5	7.0	10.1	9.9	10.9	11.0	Cβ	3.4	5.3	3.7	3.5	7.0	4.0	

Vert. Maßstab 1:2, d.h. 10 mm entspr. 20 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

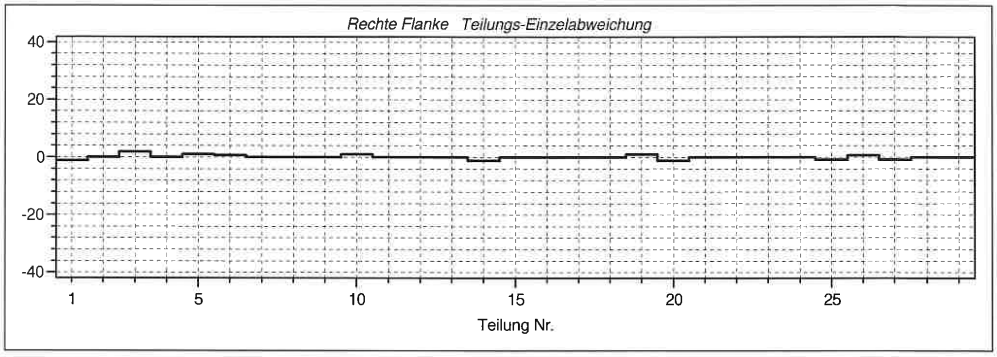
Alle Angaben in µm
Qualitäten nach DIN 3961

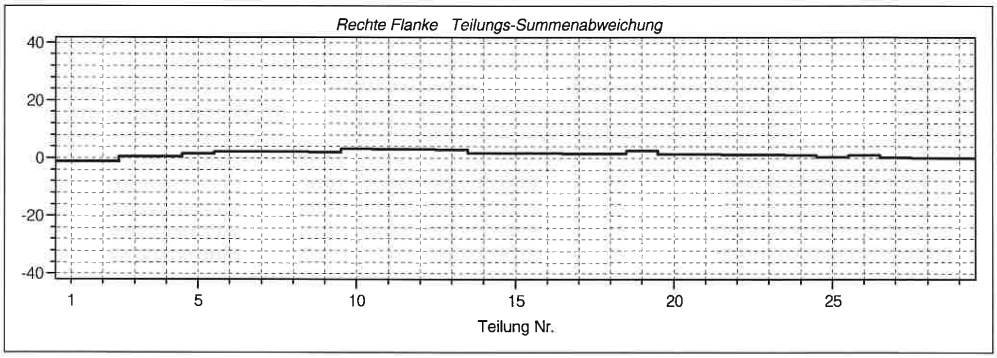
Teilungsmessung

Messung vom 05/12/2022 7:07:36 Dauer: 00:06:07 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.1

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.256 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.174		
Zahnweite (Nennmaß)	111.740 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.429 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.824 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	1.8	1	Teilungs-Schwankung (Rp)	3.0	
Teilungs-Gesamtabw. (Fp)	4.4	1	Max. Teilungssprung (fumax)	2.2	1
Teilungs-Spannenabw. (Fp(z/8))	3.5	1			

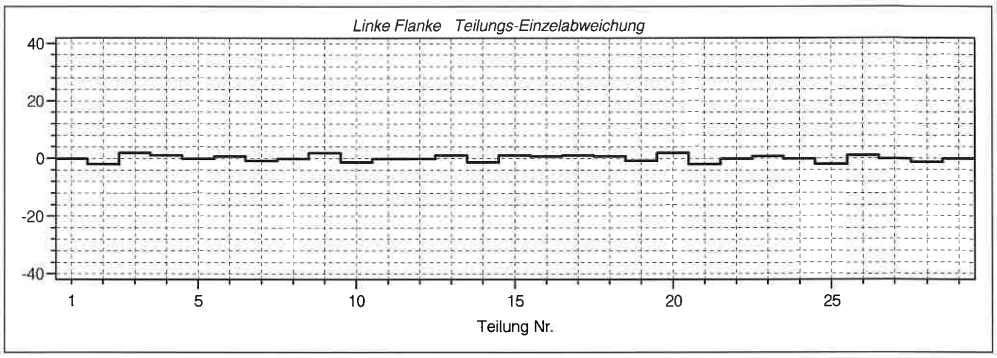
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

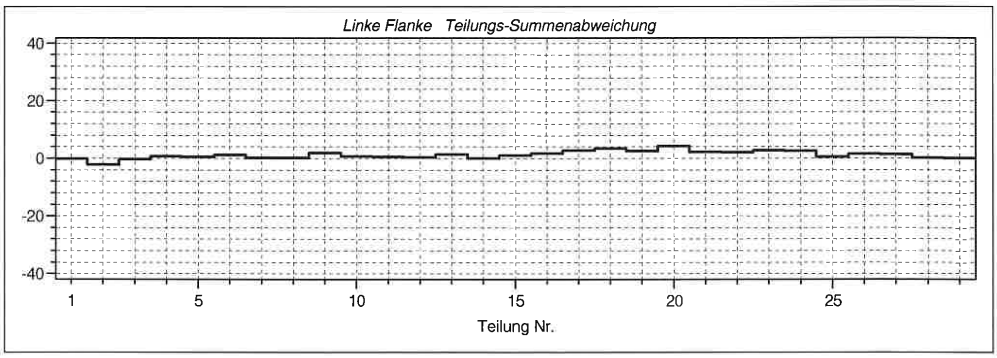
Teilungsmessung

Messung vom 05/12/2022 7:07:36 Dauer: 00:06:07 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.1

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.256 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.174		
Zahnweite (Nennmaß)	111.740 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.429 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.824 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 2.1	2	Teilungs-Schwankung (Rp)	3.9	
Teilungs-Gesamtabw. (Fp)	6.5	2	Max. Teilungssprung (fumax)	3.9	3
Teilungs-Spannenabw. (Fp(z/8))	3.6	1			

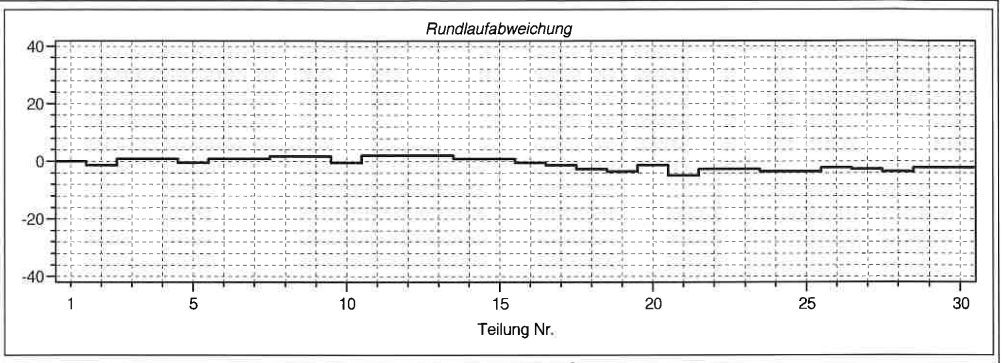
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

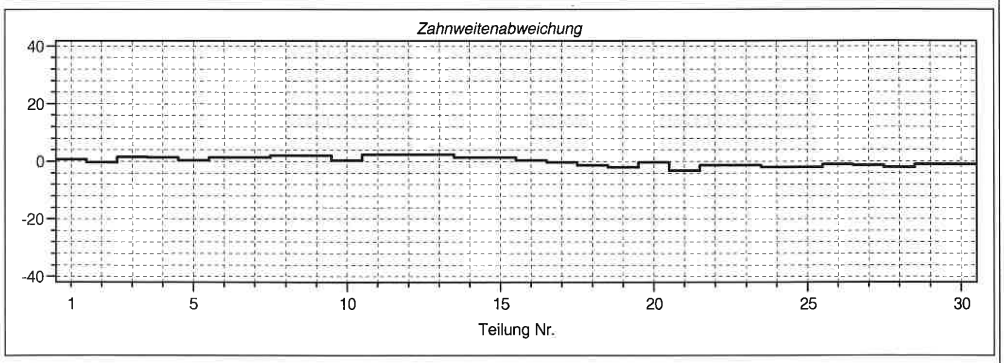
Teilungsmessung

Messung vom 05/12/2022 7:07:36 Dauer: 00:06:07 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.1

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.256 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.174		
Zahnweite (Nennmaß)	111.740 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.429 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.824 mm	Meßrollendurchmesser	14.000 mm





				Q
Min. Zahnweite (mm)	111.705	Mittl. Zahnweite (mm)	111.708	
Max. Zahnweite (mm)	111.711	Zahnweiten-Schwankung (µm)	5.5	
Anzahl Meßzähne	5			
		Rundlaufabweichung (Fr)	6.9	2
		Meßkugeldurchmesser (mm)	14.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Ritzelwelle / pinion shaft	PN-00077528.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Durchmesser	Ø 140 m6	+0,040 +0,015	140,03-140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03
Durchmesser	Ø 140 m6	+0,040 +0,015	140,03-140,04

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	18.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Ritzelwelle_pinion shaft_balancing report_PART-057680

```
*****************************************
Pekrun Getriebebau GmbH
Koebbingser Muehle 14
58640 Iserlohn/Germany
*****************************************

Operator : Ferdi Basar                          17.05.22 07:29

  Rotordaten              Fall   1              19396/10-057680

  a: 135.0 mm             b: 368.0 mm            c: 135.0 mm

  r1: 115.0 mm            Eb1/Eb2                r2: 115.0 mm

  m1: -polar                                     m2: -polar

  Tol1: 2194. gmm                                Tol2: 2194. gmm

                          N soll     : 1200.  1/Min

  Ergebnisse              Rotor: Ritzelwelle 1       17.05.22 07:29

  Lauf  3                 N ist      :  1200.  1/Min

Eb 1:        11.4  g                    Eb 2:        14.7  g

             327. Grad                               341. Grad

             in Tol                                  in Tol

Anteil in Tol.Einheiten  :
        1316. gmm                                1690. gmm
```

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057680
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Ritzelwelle / pinion shaft	PN-00077528.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Vrerzahnung und Wellenübergänge / toothing and shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	18.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Gehäuse_housing_material certificates_PART-057669

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPQ6IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : Q8S1008030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Size	Product No.	Quantity	Weight (kg)	Heat No.	Position	Tensile Test YP (N/mm²)	Tensile Test TS (N/mm²)	Tensile Test EL (%)	Impact Test V Notch -20°C Energy (Joule)	Division		C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Cu (%)	Mo (%)	N (ppm)	Nb (%)	Ti (%)	V (%)	Sol-Al (%)
6x2500x12000	PK20727091	1	1,413	SK21827	T	502	548	31	1: 104 2: 108 3: 119 A: 110		L P	0.0763 0.0751	0.241 0.249	1.547 1.551	0.0184 0.0157	0.0020 0.0017	0.024 0.023	0.014 0.014	0.006 0.008	0.005 0.001	33 31	0.026 0.026	0.0133 0.0133	0.040 0.040	0.037 0.036
*** Sub Total (1ea) ***		47	66,411 (kg)																						
*** Heat Treatment ==> Normalizing rolling ***												CEQ (%) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5													
8x3000x12000	PK20684801-4803	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110		L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.048 0.046	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
------>8x3000x12000	PK20684701-4703	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110		L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.048 0.046	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
8x3000x12000	PK20684601-4603	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108		L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.006 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20684501-4503	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108		L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.006 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20685001-5003	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108		L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.006 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test, Direction : Transversal, Gauge Length : 5.65 √A, (Rectangular),
  YP Method : Upper Point
* Impact Test, Direction : Surface Longitudinal, Sub-Size : 10mmX5.0mm
* Division - L : Ladle Analysis, P : Products Analysis
* Supply Condition : As-Rolled unless otherwise Heat Treated.

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN10025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging, improper use of product can cause safety issues.

CE 0038-14-0035-CPR-A269 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia

Copia de certificados de materiales empleados
Para el trabajo de LAN LASA
Realizado con la O.F. de OLAN Nº 120452
Su pedido N.º 66834
Ref. OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPC8IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : QBS1006030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

Product No.	Division	Total-Al (%)	CEQ (%)		
PK20727001	L P	0.036 0.037	0.348		
*** Sub Total (010) ***			47	66,411 (kg)	
PK20684601-4603	L P	0.033 0.035	0.351		
PK20684701-4703	L P	0.033 0.035	0.351		
PK20684801-4803	L P	0.035 0.034	0.348		
PK20684901-4903	L P	0.035 0.034	0.348		
PK20685001-5003	L P	0.035 0.034	0.348		

CEQ (%) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN10025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

CE 0035-14-0035-CPR-A258 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia < PAGE : 172 > Testing and Inspection Team Leader NA SEON-HA

Gehäuse_housing_material certificates_PART-057669

검 사 증 명 서

MILL TEST CERTIFICATE

HYUNDAI STEEL

0038/07

주문번호 Order No. : F171200 026

품 명 Commodity : Hot Rolled Steel Plate

제품규격 Specification : EN 10025-2 S355J2+N

고객사 Customer : OLAN

주문자 Contractor : HYUNDAI CORPORATION

증명서 번호 Certificate No. : 20171229-PS-032-020

발행일자 Date of Issue : 2017-12-29

제품사이즈 Dimension	수량 Quantity	중량 Weight (Kg)	제강번호 Heat No.	제품번호 Product No.	Position	인장시험 Tensile Test YP (N/mm²)	TS (N/mm²)	EL (%)	YP-EL (%)	RA (%)	YR (%)	yp Mid	충격시험 Impact Test V Notch -20.0℃ Energy (Joule)	SF (%)	LE (mm)	화학성분 Chemical Composition (%) Direction	C	Si	Mn	P	S	Cr	Ni	Cu	Mo	N	Nb	Ti	V	Sol Al	CEQ
20 x 2500 x 12100	1	4,749	P54850	FA0048302	T	436.0	540.3	28				U	1:214			L	1,546	199	1,176	167	44	3	1	29	0	43	43	2	1	24	353
													2:210			P	1,564	194	1,165	172	41	3	1	27	0	35	43	1		26	353
													3:233																		
													A:216																		
20 x 2500 x 12100	1	4,749	P54850	FA0048303	T	436.0	540.3	28				U	1:214			L	1,546	199	1,176	167	44	3	1	29	0	43	43	2	1	24	353
													2:210			P	1,564	194	1,165	172	41	3	1	27	0	35	43	1		26	353
													3:233																		
													A:216																		
20 x 2500 x 12100	1	4,749	P54853	FA0048401	T	436.0	534.5	28				U	1:245			L	1,546	199	1,176	167	44	3	1	29	0	43	43	2	1	24	353
													2:257			P	1,564	194	1,165	172	41	3	1	27	0	35	43	1	1	26	353
													3:242																		
													A:248																		
20 x 2500 x 12100	1	4,749	P54853	FA0048402	T	436.0	534.5	28				U	1:245			L	1,546	199	1,176	167	44	3	1	29	0	43	43	2	1	24	353
													2:257			P	1,564	194	1,165	172	41	3	1	27	0	35	43	1	1	26	353
													3:242																		
													A:248																		

NOTE
- Position – T:Top, M:Mid Side, B:Bottom
- Tensile test – Direction Transverse, Gauge length:200mm (Rectangular), Elongation is converted to elongation on gauge lenth 5.65√A, by ISO 2566-1, YP Mid : 2 (0.2% off-set),3 (0.5% underload), U (Upper yield point), L (Lower yield point)
- Impact test – Direction Longitudinal, Size:10mmX10mm, SF:Shear fracture, LE:Lateral Expansion
- Division – P:Product analysis, L:Ladle analysis

- THIS CERTIFICATE IS ISSUED ACCORDING TO EN 10204 3.1 AD2000W0(W1)
This Mill Test Certificate is issued in accordance with EN 10204 Type 3.1

상기의 제품은 검사의 결과 주문요구사항과 지정된 규격의 합격한 것을 증명합니다.
WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ORDER AND SPECIFICATION

Signature S. B. Park
Chief Of Quality Assurance Team

- 본 검사증명서는 현재의 전자(부)전자서명 정보 유효기간에서 출력된 사본입니다. 전자증서의 여부는 현대제철 고객포털에서 확인하실 수 있습니다. (https://hpc.hyundai-steel.com/cs/login.jsf)
- This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signing).
You are able to check an original electronic document at hyundaisteel's customer portal(https://hpc.hyundai-steel.com/cs/login.jsf) ※ QRcode scanner App : "Ofax"
- 사용상 주의사항] 본 검사증명서와 동기된 규격 및 사용시 제품손상 및 안전상 문제가 발생할 수 있습니다.
- Caution for Use] Damage of products and safety problems may arise if used other than to the specification stated in this Mill Test Certificate.

Copia de certificados de materiales empleados
Para el trabajo de JAN LAGA
Realizado con la O.F. de OLAN Nº 110452
Su pedido N.º 66.834
Ref. OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011094

Date : 16.10.2021

Page 7 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID.SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Arala - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Supply Condition:NORMALIZING ROLLING

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N Plate Dimension** -Thickness x Width x Length : **25.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%El *	Bend Test	Impact Value a(J) I	II	III	Avg	Temp °C	Orien
Chemical Analysis																					Mechanical Properties									
B17532	B175321100	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.019	56	0.42	419	552	27		322	334	309	321.67	-20	Lo.
B17532	B175321100	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.019	56	0.42	419	552	27		322	334	309	321.67	-20	Lo.
B17533	B175330160	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330160	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330120	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330240	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330200	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330200	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330360	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
Sub Total		17	99.246																											

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:33:32
Printing Date 18.10.2021 & Time 11:16:51

Deepak Prasad
Authorised Signatory
TSD PlateMill

Copia de certificados de materiales empleados
Para el trabajo de.....LIAN.....LADA.....
Realizado con la O.F. de OLAN Nº....120452
Su pedido N.º.....66834.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qcfab.pm@angul.jspl.com
Registered Office:Post box No. 5 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Centre,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena Cintxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

Page 15 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PL.T.A.28016 MADRID SPAIN CIF 883,SPAIN,PIN-08000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355J2+N Plate Dimension -Thickness x Width x Length : 8.000MMX3000MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/F	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at J1						
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orient.
018727	018727/009	1	2.211	L	0.180	1.33	0.004	0.016	0.21	0.050	0.007	0.001	0.021	0.002	0.0010	0.009	0.0005	0.014	58	0.40	432	589	28		94	98	107	99.670	-20	Lo
Sub Total		1	2.211																												
G Total		114	070.884																												

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3. 1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-00733A; Rev.02, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B
5. Surface Inspection: As per EN10163 class A Subclass 3
6. Flatness: As per EN10029 Class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) ,C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination :- All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2"

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
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INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

Page 16 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID-SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

11. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No:
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pre@angul.jsp1.com
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Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena Cintxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011045

Date : 14.10.2021

Page 21 of 25

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID.SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355J2+N Plate Dimension -Thickness x Width x Length : 50.00MMX2500MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																Mechanical Properties									
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value (vJ) I	II	III	Avg	Temp °C	Orient
			MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value (vJ) I	II	III	Avg	Temp °C	Orient
A136200	A136200A0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0005	0.018	56	0.42	403	536	27		126	132	144	134.00	-20	Lo
A136200	A136200B0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0005	0.018	56	0.42	403	536	27		126	132	144	134.00	-20	Lo
B17869	B17869B6A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B17869B8A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B17869A7A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B17869B7B0	3	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B17869B8A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	390	538	26		144	134	133	137.00	-20	Lo
Sub Total		7	82.075																										

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Copia de certificados de materiales empleados
Para el trabajo de.....JUAN LASA.....
Realizado con la O.F. de OLAN Nº 210452
Su pedido N.º.....06834.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:hqclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Paface, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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0045 - CPR - 1885

INSPECTION CERTIFICATE

Test Certificate No. 0000011045

Date : 14.10.2021

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLT.A.28016 MADRID SPAIN CIF 853,SPAIN,PIN-06000

OLAN SA
Pol.Ind.Asparrena Cilntxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355J2+N Plate Dimension -Thickness x Width x Length : 55.00MMX2500MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value (J) I	II	III	Avg	Temp °C	Orient
B16535	B165350 6A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.001	0.0020	0.010	0.0005	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo.
B16535	B165350 8A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.001	0.0020	0.010	0.0005	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo.
Sub Total		3	38.709																													
G Total		157	1150.149																													

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/- 00733A, Rev.2, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class B
5. Surface Inspection: As per EN10163:2005 class A Subclass 3
6. Flatness: As per EN10029:2011 table 4 class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) : C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 3-H 14.07.2021
Despatch Advice No:
Vehicle No.
* DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:(06761) 254191-95; Fax :-06761 -254141-44

CE
0045
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0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011045

Date : 14.10.2021
Page 25 of 25

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 583,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Arala - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
11. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 24H 14.07.2021
Despatch Advice No:
Vehicle No.
* DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14.26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

INSPECTION CERTIFICATE

CE

Test Certificate No. 0276
To, M/s NETWORK STEEL S.L. SPAIN
CARRENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF B83,SPAIN,PIN-00000

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling

TEST RESULTS

OLAN SA
Pol.Ind.Asparrena Cintxerdui 9
01250 Arala - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Supply Condition: Furnace Normalized
Deoxidation: Fully Killed

Material Grade : EN10025-2,2005 S355J2+N Plate Dimension -Thickness x Width x Length : [illegible]

Heat No	Plate No	No of Pcs	Wt. MT	Chemical Analysis (Ladle)																	Mechanical Properties								
				C	Mn	Si	P	S	Al	Nb	V	Ti	Cr	Mo	Ni	Cu	N	Ceq	CE	Yield	Tensile	El	Temp	I	II	III	Avg	Impact	Temp
[illegible]	[illegible]	7	[illegible]	0.18	1.46	0.042	0.02	0.22	0.021	0.005	0.003	0.043	0.033	0	0.009	0.0018	0.023	.49	0.429	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Sushat Behera

Copia de certificados de materiales empleados
Para el trabajo de.....LAN.....LAZA.....
Realizado con la O.F. de OLAN Nº.....70452.....
Su pedido N.º.....66831.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

CE

INSPECTION CERTIFICATE

Test Certificate No. 4276

To, M/s NETWORK STEEL S.L. SPAIN

CARDINAL MARCELO SPINOLA 2-8 PLTA.28016 MADRID SPAIN CIF B81,SPAIN,PIN-00000

TEST RESULTS

Supply Condition: Furnace Normalized

Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 in Class A

Remarks :

Test Certificate as per EN 10204, 2004 Type 3.1

Material manufactured above also conforms to EN10025-2:2005, S355J2+N

Material also conforms to TDC Doc. No. : JSPL/ANSB/TDC/-M1216, Rev.00, Dt. 22.01.2018

Supply Condition: Furnace Normalized at 900 ± 20°C, Cycle time: 1.4 minutes per mm thickness + 10 minutes Soaking

Surface Inspection: As per EN10163:2005 class A Subclass 3

Hardness: As per EN10025:2004 table 4 class N (L Type)

Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011

CE (IIW) : C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Marking details: Mfg. Name, & logo plate identification, specification & grade, size, customer name & UT Spec.

Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction

02, In Chemical Analysis column, 1, stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described above has manufactured and tested with satisfactory results in accordance with the requirements of the above mentioned material specification

Thickness Examination : All the above plates are ultrasonically tested as per EN10160:1999 S1/E1 and found ok

Purchase Reference & Date: PRUVA30/PL/180/18LOT 2/04.07.2018

"TWIP can be viewed at www.jindalsteelpower.com", TWIP No.: JSPL/CE/PL/535512

* Gauge Length: 5.65(S0)1/2

ISPL/AKG/PM-QA&QC/T-2M

Authorised Signatory

QA/QC Manager

Gehäuse_housing_material certificates_PART-057669

검 사 증 명 서
MILL TEST CERTIFICATE

HYUNDAI STEEL
0038/07

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Arsia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

주문번호 Order No.: P171200028
품 명 Commodity: Hot Rolled Steel Plate
제품규격 Specification: EN 10025-2 S355J2+N
고객사 Customer: OLAN
주문자 Contractor: HYUNDAI CORPORATION
증명서 번호 Certificate No.: 20180301-PS-010-003
발행일자 Date of Issue: 2018-03-01

제품치수 Dimension	수량 Quantity	중량 Weight (Kg)	제조번호 Heat No.	제품번호 Product No.	Position	인장시험 Tensile Test YP (N/mm²)	TS (N/mm²)	EL (%)	YP-EL (%)	RA (%)	YR (%)	YP Mid	충격시험 Impact Test V Notch -20.0 °C Energy (J)	SF (%)	LE (mm)	Direction	화학성분 Chemical Composition (%) C	Si	Mn	P	S	Cr	Ni	Cu	Mo	N	Nb	Ti	V	Cu+Ni	CEQ
> 65 x 2500 x 12000	1	15,306	P59185	FA0218701	T	380.6	514.1	32				U	1:283 2:312 3:255 Ave:277			L	1,152	210	1,454	147	40	2	10	62	0	41	31	16	1	30	374
																P	1,201	207	1,453	160	37	2	10	78	0	37	29	16	2	27	379
65 x 2500 x 12000	1	15,306	P59185	FA0218701	T	380.6	514.1	32				U	1:363 2:312 3:255 Ave:277			L	1,152	210	1,454	147	40	2	10	62	0	41	31	16	1	30	374
																P	1,201	207	1,453	160	37	2	10	78	0	37	29	16	2	27	379
65 x 2500 x 12000	1	15,306	P59753	FA0222801	T	384.1	503.0	32				U	1:313 2:372 3:320 Ave:302			L	1,142	198	1,455	145	38	2	9	61	1	43	29	16	2	30	374
																P	1,147	191	1,456	139	33	2	9	60	1	35	29	16	1	34	379
65 x 2500 x 12000	1	15,306	P59750	FA0223701	T	389.8	501.2	32				U	1:289 2:313 3:255 Ave:285			L	1,170	186	1,454	156	35	2	9	61	0	41	29	16	2	36	374
																P	1,247	194	1,425	154	37	2	9	73	1	36	31	16	1	31	380

NOTE
- Position – T:Top, M:Middle, B:Bottom
- Tensile test – Direction:Transverse, Gauge length:5.65√A, (Round), YP Mid : 2 [0.2% off-set],5 (0.5% underload), U (Upper yield point), L (Lower yield point)
- Impact test – Direction:Longitudinal, Size:10mm X10mm, SF:Shear fracture, LE:Lateral Expansion
- Division – P:Product analysis, L:Ladle analysis

- THIS CERTIFICATE IS ISSUED ACCORDING TO EN 10204 3.1 A52300W2W1
This Mill Test Certificate is issued in accordance with EN 10204 Type 3.1

상기의 제품은 검사치 결과 주문요구사항의 지정된 규격에 합격한 것을 증명함니다.
WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ORDER AND SPECIFICATION

Signature: S. B. Park
Chief Of Quality Assurance Team

- 본 검사증명서는 현재의 전자문서(전자서명) 원본 문서로부터 출력된 사본입니다. 전자문서를 이용한 온라인상 고객정보에서 확인하실 수 있습니다 URL: http://eh.hyundai-steel.com/kor/main.asp
- This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signing).
You are able to check all original electronic documents at hyundaisteel's customer portal(http://eh.hyundai-steel.com/eng/main.asp) ● DRoads stainless Ave / DRear
- [사용상 주의사항] 본 검사증명서의 명기된 내용 외 사용시 특정조건 및 인정성 분쟁시 형법등 주 의됩니다.
- [Caution for Use] Damage on products and safety problems may arise if used other than to the uses stated in this Mill Test Certification.

Copia de certificados de materiales empleados
Para el trabajo de.....LINA LAA.....
Realizado con la O.F. de OLAN Nº.....210652
Su pedido N.º.....66834.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

CE
0045
13
0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011096

Date : 16.10.2021

Page 1 of 2

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Aaparrena Ciintxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:FURNACE NORMALIZED

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** **Plate Dimension -**Thickness x Width x Length : **130.0MMX2200MMX8550MM**

Heat No	Plate ID	Pcs	Wt. MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orient
A13625	A1362506A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.00101	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362507A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.00101	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362508A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.00101	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362509A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.00101	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
B16551	B1655102A0	1	19.196	L	0.182	1.47	0.002	0.016	0.20	0.037	0.008	0.045	0.046	0.011	0.00101	0.011	0.0005	0.015	57	0.44	330	524	26		188	159	166	171.00	-20	Lo.
Sub Total		5	95.980																											
G Total		5	95.980																											

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-00733A; Rev.02, Dt.:09.03.2021
4. Supply Condition: Furnace Normalized at 900 ± 20°C, cycle time minimum: 1.4 minutes per mm thickness + 10 minutes.
5. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:48:20
Printing Date 18.10.2021 & Time 11:22:14

Deepak Prasad
Authorised Signatory
TSD Plate/Mill

Copia de certificados de materiales empleados
Para el trabajo de.....OLAN S.A.....
Realizado con la O.F. de OLAN Nº.....170.452.....
Su pedido N.º.....6284.....
Ref.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000011096

Date : 16.10.2021

Page 2 of 2

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:FURNACE NORMALIZED

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

6. Surface Inspection: As per EN10163 class A Subclass 3
7. Flatness: As per EN10029 Class N (L Type)
8. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
9. CE (IIW) C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
10. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
11. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
12. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No:
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:48:30
Printing Date 18.10.2021 & Time 11:22:14

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

OLAN, S.A.
PRODUCTOS METÁLICOS - CORTE A MEDIDA
OXICORTE - TRATAMIENTOS ANTICORROSIVOS

INFORME DE INSPECCIÓN POR ULTRASONIDOS
ULTRASONIC INSPECTION REPORT

Nº Informe (Report): **O.F. 170.452**

Cliente: Customer:	JUAN LASA	**Nº Pedido:** Order:	66.834	**Referencia:** Reference:	OF.8617
Descripción: Description:	Chapa	**Norma:** Standard:	UNE-EN 10160:2000	**Clase:** Grade:	S2 + E2
Tipo de material: Type of material:	Chapas de acero			**Acabado superficial:** Surface finish:	Laminación
Equipo: Equipment:	KRAUTKRAMER USM 32			**Acoplamiento:** Couplant:	AGUA

PALPADOR - PROBE				CALIBRACIÓN - CALIBRATION				
TIPO TYPE	FREC. FREQ (MHz.)	TAMAÑO SIZE (mm.)	Espesor Thickness (mm.)	PARA CAMPO FOR RANGE	CAMPO RANGE (mm.)	TALADRO REGISTRO REC. HOLD	PARA LA GANANCIA FOR GAIN	GANANCIA GAIN
SEB-4T	4	Ø 24 mm	8 / 65	Chapa	16 / 130	Ø 5 mm.	80 % ECO	42 / 56 dB
B2S-E	2	Ø 24 mm	130	Chapa	260	Ø 8 mm.	80 % ECO	46 dB

RESULTADOS (RESULTS):
Se ha efectuado la inspección por ultrasonidos según la norma UNE-EN10160:2000 según clases S2 + E2 al siguiente material / The inspection by ultrasonic test has been made in accordance with UNE-EN10160:2000 standard and S2 + E2 grade the following material:

1 chapa/*plate* 8 x 3000 x 12000 (S-355-J2+N):	PK20684701
1 chapa/*plate* 20 x 2500 x 12100 (S-355-J2+N):	FA90548303
1 chapa/*plate* 25 x 2500 x 12000 (S-355-J2+N):	B1753303A0
1 chapa/*plate* 50 x 2500 x 12000 (S-355-J2+N):	B1706906B0
1 chapa/*plate* 55 x 2500 x 12000 (S-355-J2+N):	B8370204A0
1 chapa/*plate* 65 x 2500 x 12000 (S-355-J2+N):	FA92167401
1 chapa/*plate* 130 x 2200 x 8550 (S-355-J2+N):	A1362509A0

En dicha inspección se han detectado indicaciones que NO superan el nivel de referencia, por lo que se clasifica la chapa como ACEPTABLE / In this inspection weren't found indications exceeding the reference level, so the material is classified as **ACCEPTABLE.**

CROQUIS (SKETCH):

OPERADOR (OPERATOR): José Ignacio Bañales Esparza
Nº CERTIFICADO (CERTIFICATE NR.): E-A-004397-UT-2-M-2
FECHA (DATE): 14/02/2022

OLAN, S.A.
Pol. Ind. Ascarrena - C/ Amerraga, 8
01250 ARAMA (ALAVA)
Tl. 945 31 46 84 Fax 945 31 45 89

Gehäuse_housing_material certificates_PART-057669

INTEC Inspección Técnica email: intec.era@gmail.com Tel: 696 320 618 / Lasiao, Gipuzkoa	INSPECCIÓN VISUAL *(Visual Testing)*	INFORME Nº *(ReportNr.)* 220226

CLIENTE *(Customer)*	ORDEN DE FABRICACIÓN *(Purchaseorder)*	PLANO CLIENTE *(CustomerDrwg).*
TALLERES JUAN LASA, S.A.	65.489/ OF 8617	PART-057669
DESIGNACIÓN *(Item)*	**MATERIAL** *(Material)*	**SOLDADURA** *(Welding)*
GEHÄUSE (3 piezas)	S355J2+N	FW / BW

CONDICIONES DE EXAMEN(Examination Conditions)

ILUMINACIÓN *(Ilumination)*		SOLDADURA *(Welding)*		ESTADO DE LA SUPERFICIE *(Surface status)*
				SOLDADURA EN BRUTO
Natural *(Natural)*	Artificial *(Artificial)*	Procedimiento *(Proced.)*	Tipo Junta *(Jointtype)*	PROCEDIMIENTO DE INSPECCIÓN *(Inspectionprocedure)*
	X	MAG	FW/BW	UNE EN ISO 17637

ESPECIFICACIÓN *(Specification)*	OBSERVACIONES (Observations)
S/EN5817	
GRADO *(Grade)*	**RESULTADO DEL EXAMEN** *(ExaminationResults)*
B	ACEPTABLE

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.

(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-003109-VT-2-S-2 *(Level 2 Inspector)*	FECHA *(Date)*
INTEC Inspección Técnica email: intec.era@gmail.com Tel: 696 320 618 / Lasiao, Gipuzkoa	23/02/2022

Gehäuse_housing_material certificates_PART-057669

INTEC Inspección Técnica	EXAMEN POR LÍQUIDOS PENETRANTES *(Examfor penetran liquids)*	INFORME Nº *(ReportNr.)* *220217*

CLIENTE *(Customer)*	PEDIDO CLIENTE *(Purchaseord.)*	PLANO CLIENTE *(PurchaseDrwg.)*
TALLERES JUAN LASA, S.A.	65.489/ OF 8617	PART-057669

MATERIAL *(Material)*	COLADA *(Heat)*
S355J2+N	--

DESIGNACIÓN *(Item)*
GEHÄUSE

LIMPIEZA *(Cleaning)*	TIPO DE PENETRANTE *(Type of penetrating)*	ELIMINADOR *(Eliminator)*	REVELADOR *(Revealer)*
ARDROX 9PR5	ARDROX 996 PB	ARDROX 9PR5	ARDROX LD7

MÉTODO *(Method)*
LIQUIDOS PENETRANTES COLOREADOS LAVABLES CON DISOLVENTE

ESTADO DE LA SUPERFICIE *(State of thesurface)*
SOLDADURAS EN BRUTO

OBSERVACIONES *(Observations)*

ACEPTADOS *(Accepted)*	RECHAZADOS *(Rejected)*
3 PIEZAS	--

PROCEDIMIENTO *(Specification)*	GRADO DE EXIGENCIA *(Demand grade)*
EN ISO 23277	3X

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.
(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-003109-PT-2-S	FECHA
INTEC Inspección Técnica email: intec.ena@gmail.com Tel: 695 320 618 / Lazkao, Gipuzkoa	23/02/2022

05 – PT – IT – M

Gehäuse_housing_material certificates_PART-057669

Juan Lasa	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order*	4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL*	8617- 1

Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		565		22				
2	485+D		500		23				
3	185		186		24				
4	330		331		25				
5	65		65		26				
6	Ø360-D		Ø340		27				
7	Ø330-D		Ø310		28				
8	310		309		29				
9	Ø300-D		Ø280		30				
10	Ø300-D		Ø280		31				
11	520		518		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

Responsable control final/ *Final Control responsable*

Gehäuse_housing_material certificates_PART-057669

Juan Lasa	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order* 4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL* 8617 - 2

		Valor medido *Measured Value*					Valor medido *Measured Value*		
Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		565		22				
2	485+D		497		23				
3	185		186		24				
4	330		330		25				
5	65		64		26				
6	Ø360-D		Ø340		27				
7	Ø330-D		Ø310		28				
8	310		309		29				
9	Ø300-D		Ø280		30				
10	Ø300-D		Ø280		31				
11	520		518		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

Responsable control final/ *Final Control responsable*

Gehäuse_housing_material certificates_PART-057669

Juan Lasa	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order* 4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL* 8617-3

Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		564		22				
2	485+D		499		23				
3	185		186		24				
4	330		330		25				
5	65		64		26				
6	Ø360-D		Ø339		27				
7	Ø330-D		Ø310		28				
8	310		309		29				
9	Ø380-D		Ø280		30				
10	Ø300-D		Ø280		31				
11	520		519		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

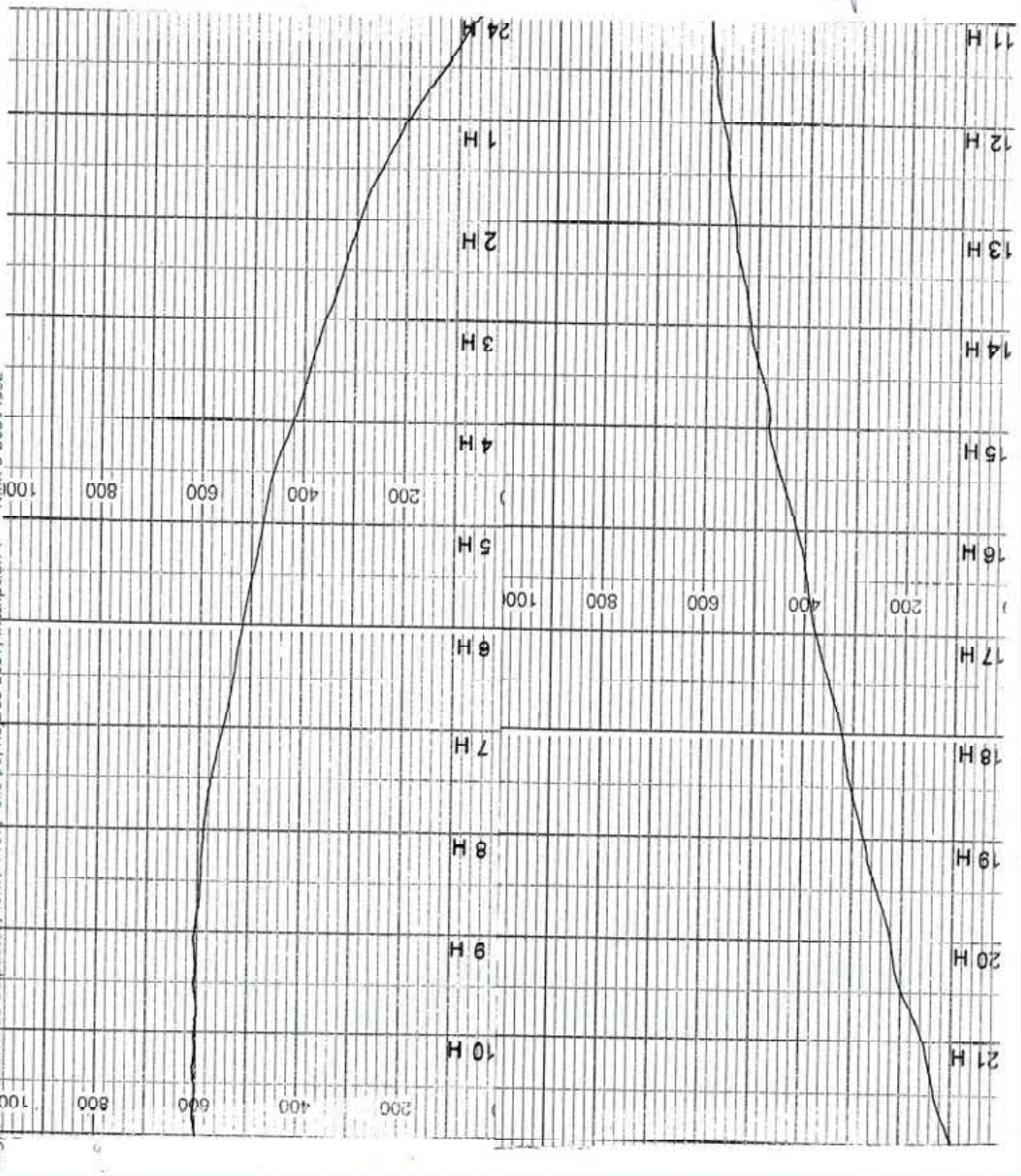
Responsable control final/ *Final Control responsable*

Gehäuse_housing_material certificates_PART-057669

muñagorri S.L.
recubrimientos

Talleres Juan Lasa, S.A.
Nº Reg. 24-02-2022
Pdo. 65.493 OF: 8617
3 carter. s/p PN 00077481.00
Estabilizado 600ºC

RECUBRIMIENTOS MUÑAGORRI, S.L.
Polígono Industrial Beotibar
20491 BELAUNTZA



Registro Mercantil de Guipúzcoa, Tomo 1107, folio 90, hoja SS-2837, inscripción 1ª - N.I.F. B-20394532

Polígono Industrial Beotibar, s/n Tel. 943 67 30 28 Fax 943 67 01 35 20491 BELAUNTZA (Gipuzkoa)

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Gehäuse / housing	PN-00077481.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagerbohrung	Ø 360 H7		360,03-360,05
Lagerbohrung	Ø 360 H7		360,03-360,05
Lagerbohrung	Ø 300 H7		300,02-300,04
Lagerbohrung	Ø 300 H7		300,03-300,04
Achshöhe	550	0 -0,2	i.O.
Ankerlöcher	Ø 42		i.O.
Lochabstand	400		i.O.
	700		i.O.
	380		i.O.
	380		

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	23.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 2

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	Projekt-Nr. 4000370 S/No. 10002289

Menge *Quantity*	Benennung *Designation*	Getriebetyp *Gearbox type*	Zeichnungs-Nr. *Drawing no.*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW	PN-00096627.001.01

Technische Daten Getriebe / *Technical data gear unit*			
Leistung/*power*	4100 kW	Übersetzung/*ratio*	i = 2,448:1
Ölmenge/*oil quantity*	270 l / 63 l/min	Drehzahl/*number of revolution*	n_1 =1493 min^{-1}
Ölviscosität/*oil viscosity*	ISO VG 320	Drehzahl/*number of revolution*	n_2 = 609,8 min^{-1}
Anordnung Antrieb *drive arrangement*	Horizontal	Anordnung Abtrieb *output arrangement*	Horizontal
Drehrichtung Abtrieb *sense of rotation (output)*	CCW	Schmierung *lubrication*	recirculation lubrication

Messprotokoll für Getriebe / *measuring data report for gear unit*

Tragbilder und Zahnspiele
meshing patterns and gear clearance of the toothing

Prüfergebnis:

Die Tragbilder und Zahnspiele der Verzahnungen wurden während der Getriebemontage nach den Zeichnungen geprüft und entsprechen den, der Konstruktion vorgegebenen, Qualitätsanforderungen.

Test result:

The meshing patterns and gear clearances of the gear toothing were checked during gear assembly according to the drawings and correspond to the quality instructions specified by the construction.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	18.05.2022	M. Hammann	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	Projekt-Nr. 4000370 S/No. 10002289

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Stirnradgetriebe /*spur gear gearbox*	PN-00096627.001.01

Maßprotokoll der Anschlussmaße
measurement report of the connection dimensions

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Antriebswelle / *Input shaft*	Ø 140 m6	+0,040 +0,015	140,03
Höhe / *height*	550	0 -0,2	i.O.
Länge / length	180	+0,5 -0,5	i.O.
Abtriebswelle / Output shaft	Ø 240 m6	+0,046 +0,017	240,035
Höhe / *height*	550	0 -0,2	i.O.
Länge / *length*	292	+0,5 -0,5	i.O.
Fußlochabstand / *distance of the Housing holes*	400/220/480	+0,8 -0,8	i.O.
Fußlochabstand / *distance of the Housing holes*	380/380	+0,8 -0,8	i.O.
Fußlöcher / *housing holes*	Ø 42	+0,3 -0,3	i.O.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	27.05.2022	J. Nenast	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
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[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 1 von 3

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10-1
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Serial-Nr.: *Serial- No.:*	10002289	Probelaufdatum: *Test run date::*	26.05.2022

Menge/*Quantity*	Benennung/*Designation*	Getriebe-Typ/*Gearbox type*
1	Getriebe	ASR 450-R-CCW

Technische Daten Getriebe / *Technical data gear unit*					
Leistung/ *power*	P [kW]	4100	Drehmoment/ *torque*	T [Nm]	-
Übersetzung/ *ratio*	i	2,4483:1	Drehzahl/ *number of revolution*	n1 [1/min]	1493
Drehrichtung/ *sense of rotation*		CCW	Drehzahl/ *number of revolution*	n2 [1/min]	609,8
Ölviscosität/ *oil viscosity*	[cST 40°C]	320	Schmierung/ *lubrication*		Circulating oil lub.
Ölmenge / *oil quantity*	[l/min]	63	Ölfüllmenge/ *oil filling quantity*	[l]	270

Probelaufprotokoll / test run report

Antriebsdrehzahl beim Probelauf *drive number of revolution during test run*	n1 [1/min]	Ist / *actual value* 1493
Abtriebsdrehzahl beim Probelauf *output number of revolution during test run*	n2 [1/min]	Ist / *actual value* 609

Temperaturen nach Laufzeit *Temperature after running time*			Lager antriebsseitig *bearing on drive side*	Lager abtriebsseitig *bearing on output side*
Antrieb/*drive*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	41	46
Abtrieb/*output*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	38	43
Öltemperatur /*oil temperature*		[°C]	42	

Separate Temperaturaufzeichnung mit Datenlogger, mit „JA“ oder „NEIN“ bestätigen *Separate temperature recording with data logger, confirm with "YES" or "NO*		Ja
Laufzeit Probelauf /*running time test run*	[h]	4
Ölfüllmenge/ *oil filling quantity*	[l]	270
Ölmenge/ *oil flow rate*	[l/min]	63
Probelauföl/ *test run oil*	[cST 40°C]	ISO VG 320

Erfassen des Öldruckes/ *recording the oil pressure*		
Öldruck bei Probelaufstart/ *oil pressure at test run start* (mit Angabe der Öltemperatur / with indication of the oil temperature)	3,3bar @ 24C°	
Öldruck bei Beharrungstemperatur (alternativ nach Laufzeit h) *Oil pressure at steady-state temperature (alternatively after running time h)*	Soll / *nominal value* bar @ C°	Ist / *actual value* 2,0bar @ 42C°

Öldichtigkeit des Getriebes, mit „i.O.“ oder „n.i.o.“ bestätigen *oil tightness of the gearbox, confirm with "i.O." or "n.i.o.*	i.O

Schwingungsmessung/ *vibration measurement*	
Schwingungsmessung gemäß Beschreibung, mit „JA“ oder „NEIN“ bestätigen *vibration measurement acc. to description, confirm with "YES" or "NO*	Ja
Messpositionen nach Vorgaben in der Maßzeichnung, mit Angabe (x) bestätigen *measuring positions acc. to specifications in the dimensional drawing, confirm with indication (x)*	x

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 2 von 3

Funktionsprüfung von Zubehörteilen/ *functional test of accessory parts*	
Zubehör auf Funktion geprüft (Durchflusswächter, Druckwächter, etc.), mit Angabe (x) bestätigen *Accessories checked for function (flow monitor, pressure monitor, etc.), confirm with indication (x)*	-

Erfassen der Serialnummern/ *recording the serial numbers*	
Erfassen aller Serialnummern des verbauten Zubehörs am Getriebe, mit Angabe (x) bestätigen *recording of all serial numbers of the installed accessories on the gearbox,/ confirm with indication (x)*	x

Prüfungen Mühlengetriebe/ *tests mill gear unit*		
Maß X/ *dimension X*	[mm]	
Anschlussflanch/ *connecting flange*		
Radialschlag/ *radial run-out*	[mm]	
Axialschlag/ *axial run-out*	[mm]	

Weitere Prüfungen/ *further tests*			
Schallpegel in 1m Entfernung *sound level at 1m distance*	[dB(A)]	Soll / *nominal value*	Ist / *Actual value*
		-	76 dB
Innenkonservierung, mit Angabe Konservierungsmittel *interior conservation,* with indication of preservative			VCI
Ölfilter gereinigt, mit Angabe (x) bestätigen *oil filter cleaned, confirm with indication (x)*			-

Bilder Probelaufaufbau / *pictures test run bench*

Bilder Öldruck bei Start /
pictures oil pressure at start

Bilder Öldruck bei Beharrungstemperatur /
Pictures oil pressure at steady-state temperature

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 3 von 3

Bilder Durchflusswächter bei Start /
Pictures flow monitor at start

Bilder Durchflusswächter bei Beharrungstemperatur /
Pictures Flow monitor at steady-state temperature

Bilder Funktionsprüfung Instrumentierung und Zubehör /
Pictures Functional test instrumentation and accessories

Bemerkung: Probelauf ohne Last. Während des Probelaufs wurden keine Undichtigkeiten am Getriebe festgestellt.

Remark : Test run without load. During the test run, no leaks were detected at the gearbox.

Prüfer / Inspector:	J. Nenast
Datum / Date:	26.05.2022

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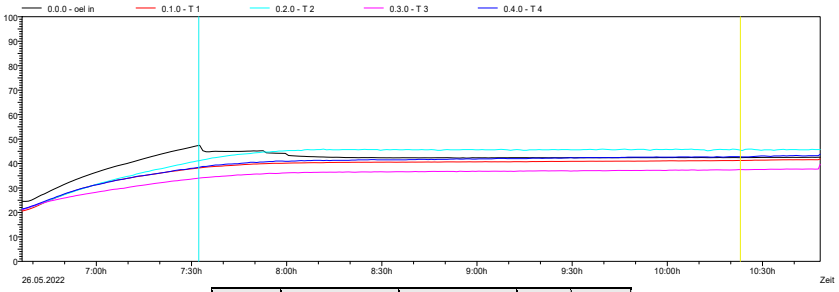
Probelaufdiagramm
test run diagram

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	Werks-Nr.: *Works no.:*	Material No. 2000064788	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-10-1
Bestell-Nr.: *Order no.:*	4500494756	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289	Artikel-Nr.: *Article no.:*	PART-060561

Temperaturverlauf / *temperature profile*



Messstelle	Linker Cursor		Rechter Cursor		Differenz		Mittelwert	
Zeit	26.05.2022, 07:32:17		26.05.2022, 10:23:01		02:50:44			
0.0.0 - oel in	47,43	°C	42,39	°C	-5,04	°C	42,828	°C
0.1.0 - T 1	38,21	°C	41,26	°C	3,05	°C	40,54	°C
0.2.0 - T 2	41,2	°C	45,6	°C	4,4	°C	45,32	°C
0.3.0 - T 3	34,08	°C	37,52	°C	3,44	°C	36,622	°C
0.4.0 - T 4	38,5	°C	42,8	°C	4,3	°C	41,69	°C

	58640 Iserlohn	26.05.2022	J. Nenast
	ORT / *INSPECTION LOCATION*	DATUM / *DATE*	PRÜFER / *INSPECTOR*

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

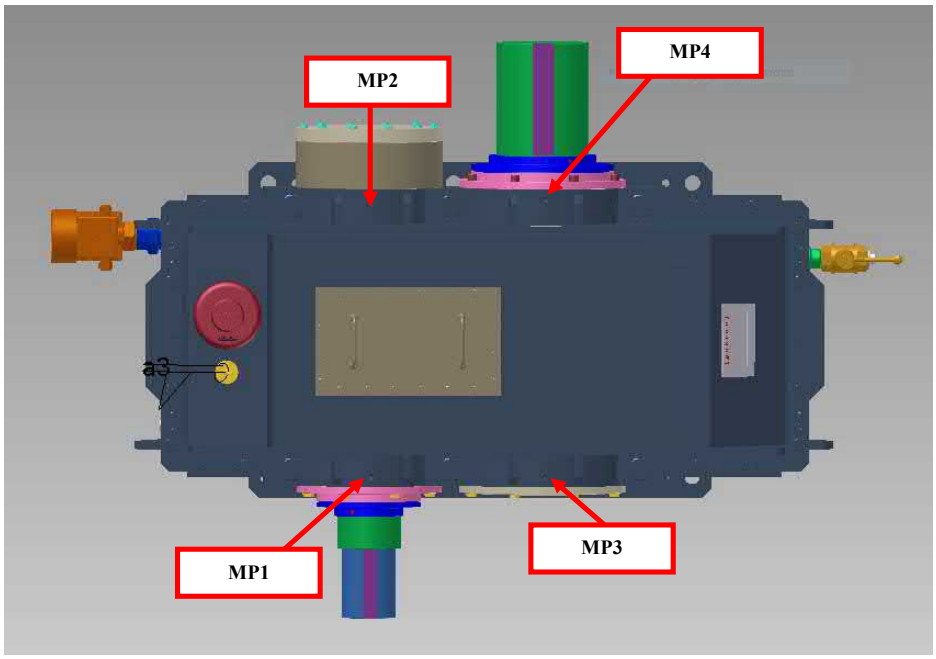
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Auftraggeber: customer:	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: PEKRUN com.-no.:	19396/10-1
Bestell-Nr.: order no.:	4500494756	Zeichnungs-Nr.: drawing no.:	PART-060561
Auftrags-Nr.: works no.:	Material-No.: 2000064788	Kennwort: code word:	Projekt-Nr. 4000370 S/No. 10002289

Menge/quantity	Benennung/designation	Getriebe-Typ/gear unit type
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW

Gearbox overview



Remarks:
Measuring points acc. to dimensional drawing.

Test result:
The results of the test run comply with the Pekrun quality specifications. The test results are listed on the second page.

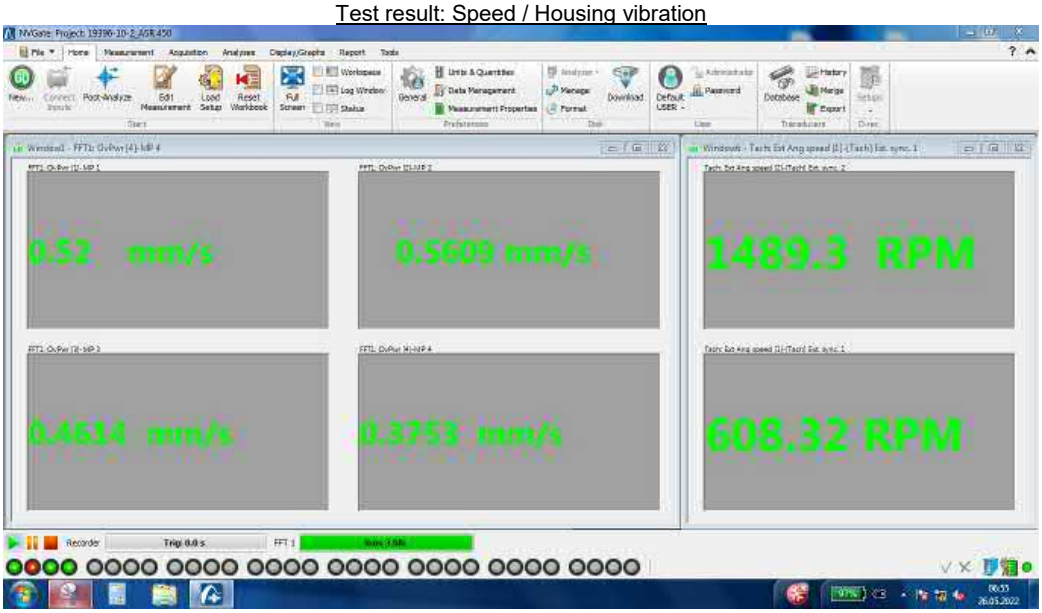
J. Nenast

Datum: 26.053.2022

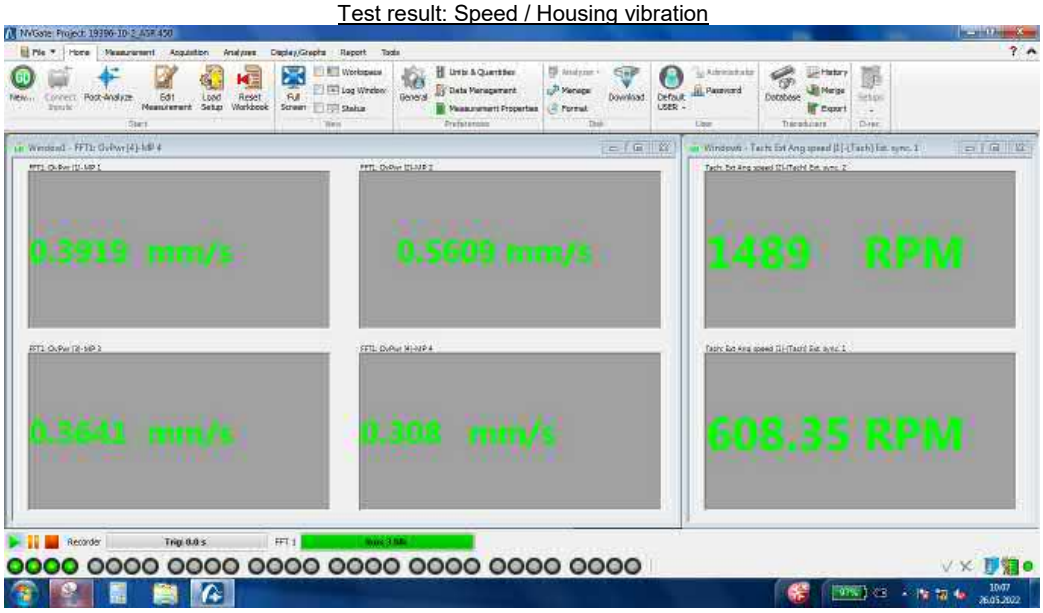
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Test result: Speed / Housing vibration



Test result: Speed / Housing vibration



Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 2

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	S/No. 10002289

Menge *Quantity*	Benennung *Designation*	Getriebe-Typ *Gearbox type:*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW

Anstrichprüfung / *coat of paint report*

Anforderungen / ***requirements:***			
Spezifikation (PEKRUN oder Kunden-Nr.): *Specification (PEKRUN or customer no.):*	QH00510B_01		
Vorbehandlung nach ISO 12944-4 *Surface preparation treatment acc to EN ISO 12944-4*	Shot blasting ☐SA 2 / ☒SA 2½ / ☐SA 3		
Oberflächenreinheit *Surface cleanliness*	Acc. to ISO 8501 (free of rust, oil, tinder and other impurities)		
Oberflächenrauheit *Surface roughness*	acc. to SA 2½		
	Grundanstrich *1st. Coat (Primary coat)*	Zwischenanstrich *2nd. Coat (Intermediate coat)*	Deckanstrich *3rd. Coat (Top coat)*
Produktname Name of Product	Vestozink 2K EP Zink	VESTOPOX 2K-EP-1.Deck EG RAPID	VESTOPUR 2K-DT-Deck – ATEX
Chargen Nr.: *Charge No.*	2200964	2200193	2200781
Farbe (RAL Nr.) *Color (RAL no.)*	graumatt	RAL 7703	RAL 5001
Trockenschichtdicke *DFT (dry film thickness)*	95 µm – 100 µm	164 µm -172 µm	230 µm – 275 µm
Lufttemperatur °C *Air temperature °C*	20 °C	22 °C	22 °C
Oberflächentemperatur °C *Surface temperature °C*	22 °C	22 °C	22 °C
Relative Luftfeuchte % *Relative air humidity %*	47 %	48 %	49 %
Datum Date	12.05.2022	27.05.2022	02.06.2022
Haftfähigkeit der Farbe nach ISO 2409 Gitterschnittkennwert: *Adhesion test acc. to ISO 2409 Parameter of grid cut test:*	ISO GT (1)		

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Bemerkungen	Schichtdickenangaben nach DIN EN ISO 12944-5

Die Sollschichtdicke gilt auch als erreicht, wenn Einzelmesswerte den Sollwert um höchstens 20% unterschreiten und der Mittelwert aller Einzelmessungen gleich oder größer der Sollschichtdicke ist.

Remarks: Layer thickness information according to DIN EN ISO 12944-5

The nominal layer thickness is also complied, to be achieved if individual measured values fall below the setpoint value by at most 20% and the mean value of all individual measurements is equal to or greater than the nominal layer thickness.

Prüfergebnis:	Die Anforderungen sind erfüllt.
Test result:	*The requirements are complied*

58640 Iserlohn	27.06.2022	Z. Acikgöz	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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[pekrun]
Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn
www.pekrun.de

PRÜFDOKUMENTATION

TESTDOCUMENTATION

ZUM AUFTRAG
TO THE ORDER

IHRE BESTELL NR. *YOUR ORDER NO.*	4500494756
KENNWORT *CODE WORD*	Projekt-Nr. 4000369 / 4000370
IHRE WERKS NR. *YOUR WORKS NO.*	Material-No.: 2000064788
PEKRUN SERIAL NR. *PEKRUN SERIAL NO*	10002290
GETRIEBE TYP *GEAR UNIT TYPE*	ASR 450-R-CCW
PEKRUN KOM. NR. *PEKRUN COM. NO.*	19396/10

PRÜFDOKUMENTATION
TESTDOCUMENTATION

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	S/No. 10002290

Inhalt nach ITP	***Contents acc. to ITP***
1. Zeugnisse Radwelle	*1. Certificates to the wheel shaft*
2. Zeugnisse Stirnrad	*2. Certificates to the bull gear*
3. Zeugnisse Baugruppe Radwelle mit Stirnrad	*3. Certificates to the assembly group, bull gear with wheel shaft*
4. Zeugnisse Ritzelwelle	*4. Certificates to the wheel shaft*
5. Zeugnisse Gehäuse	*5. Certificates to the housing*
8. Zeugnisse zur Getriebeprüfung	*8. Gear box test certificates*
9. Allg. Informationen	*9. General Information*

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
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PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

[pekrun]

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
1	**Gear shaft (LS Shaft)**										
1.1	Material verification	42CrMo4 EN 10083	Specification		Material labeling		R				
1.2	Chemical analysis	42CrMo4 EN 10083	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
1.3	Mechanical characteristics Ultrasonic test	42CrMo4 EN 10083 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
1.4	Dimensional check after mechanical processing	Drawing	All fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
1.5	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
2	**Bull gear**										
2.1	Gear shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R				
2.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
2.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
2.4	Dimensional check after mechanical processing	Drawing	Al fit measurements Accuracy of toothing	100%	Tolerance acc. to drawing	Measurement record	W	R			
2.5	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Measurement record	W	R			
3	**Assembly group, bull gear with gear shaft**										
3.1	Dimensional check of the toothing		Tooth trace, profile, pitch and runout	3 times circumference	Tolerance acc. to drawing	Test report	W	R			
3.2	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
3.3	Balance check		Acc. to drawing		Tolerance acc. to drawing	Test report	W	R			
4	**Pinion Shaft (HS Shaft)**										
4.1	Pinion shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R	R			
4.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
4.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
4.4	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Test report	R	R			
4.5	Dimensional check after mechanical processing	Drawing	Al fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
4.6	Balance check		Acc. to drawing		Tolerance acc. to drawing	Test report	W	R			
4.7	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
5	**Housing**										
5.1	Chemical analysis	P355NL1/2 EN 10028-3	Chemical composition in % by weight (% by mass) according to ladle analysis	100%	Material Standard	EN10204 3.1	R	R			
5.2	Mechanical characteristics	P355NL1/2 EN 10028-3	Tensile strength, Yield strength, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
5.3	Annealing		Stress free	100%	Material Standard	Diagram or record	R	R			
5.3	Casing leak test		Liquid penetrant inspection	all relevant welding seams	welding seams, no leakage allowed	Test report	W	R			
5.5	Dimensional check after mechanical processing	Drawing	All bearing seats and connecting dimensions	100%	Tolerance acc. to drawing	Measurement record	W	R			
8	**Gear unit**										
8.1	Backlash + contact check of the toothing	Manufacturer test instructions	Executed in job casing contact check, tape lift			Test report	W	W			
8.2	Control of assembly and conneting dimensions	Manufacturer test instructions	Al fit dimensions		Tolerance acc. to drawing	Test report	W	R			
8.3	Check at the Oil supply system bevor the test run.	Pekrun Testprocedure	Filter and cleanliness				W				
8.4	Test run main rotors	Pekrun Testprocedure	No load full speed			Test report	W	W			4 hour test run
8.5	Vibration and temperature reading during the test run	Pekrun Testprocedure	Measured with vibration probes and resistance thermometer			Test report	W	W			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

[pekrun]

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
9	**General Information**										
9.1	Machinery directive	2006/42/EG	Machinery Directive			Certificates	R	R			Part of the operating instructions.
9.2	Coating check		Surface cleanlines, Thickness of the coat, Adhesion acc. to ISO 2409		Grid cut test on test piece: ISO GT (1)	Certificates	R	R			
9.3	Documentation										

Remarks: Documentation (Quality certificates and reports) in german and english, **MRT**= Mechanical running test
R: Review. Verification of test results.
H: Hold Point. Inspection of a critical step in fabrication or testing. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer shall not continue fabrication if inspection parties are not present, except inspection has been waived by prior written notice.
W: Witness Point. Witnessing of a critical fabrication or testing step. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer may continue with work even if inspection parties are not present.

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BGH

Radwelle_wheel shaft_material certificates_PART-057585

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

BGH SL-Stahl GmbH
Chromstraße 3
30916 Isernhagen
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **412193**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **BSVF16004734TSE**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816364-010-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält / Round bars,forged,peeled
Werkstoff / Quality	1.7225 42CrMo4mod/4140mod/4145mod
Anforderungen / Requirements	SL-LV 4 Rev. 6 - 12/11 / AISI 4140 mod. + AISI 4145 mod. ,Kundenvereinbarung

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d'élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d' identification(analyse spectrale)
ohne Beanstandung / without objection	E- LF/VD	ohne Beanstandung / without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
10	2	280 mm rd. x 5715 + 5868 mm	5608 kg	733746

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Al
733746	0,430	0,29	0,98	0,006	0,0010	1,14	0,28	0,45	0,020

Wärmebehandlungszustand / Condition of heat treat: vergütet / quenched and tempered / gehärtet/quenched + 600°C 10h Luft/air

Probe-Nr. / Test-No.	Lage / Loc.	Temp. °C	Rp0,2 N/mm²		Rm N/mm²	A5 %	Z %	Kerbschlagarbeit / Impact value J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness / HB
Soll/Req.	L L	RT	>=760		>=965 <=1100	>=13	>=40	>=45 >=27			RT -30°C	>=285 <=326
503R2 503R2	L L	RT	818		965	14,3	58	103 56	110 45	100 45	RT -30°C	300-290

Stirnabschreckversuch / Jominy test - EN ISO 642:

mm	1,5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
HRC	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56

Umformgrad : 8.3 : 1
Reduction ratio:

Gefüge : Vergütungsgefüge
Microstructure: quench and temper structure

Korngröße nach ASTM E 112: 5
Grain size acc. ASTM E 112:

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	16.09.2021	**Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Radwelle_wheel shaft_material certificates_PART-057585

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

BGH SL-Stahl GmbH
Chromstraße 3
30916 Isernhagen
Deutschland

Zeugnis-Nr. **412193**
Certificate no.
No. de certificat

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes
Trade mark
Signe du fournisseur

Stempel des Werkssachverständigen
Inspector's stamp
Poincon de l'inspecteur

Kunden-Bestell-Nr. **BSVF16004734TSE**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816364-010-01**
BGH works no.
BGH référence

BGH Q 07

```
Reinheitsgrad nach ASTM E 45, Methode A  :
Degree of purity acc. ASTM E 45, method A:
Type          A     B     C     D
dünn/thin    0,0   0,8   0,5   1,0
dick/heavy   0,0   0,3   0,3   0,5

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done                 : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze
von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection
limit of 0.1 Bq/g.
```

Anlagen Encl. Annexe US-Zeugnis / UT cert.	Siegen,den Place and date Lieu et date 16.09.2021	Abnahmebeauftragter Inspector representative Inspecteur de réception **Langer**

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US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Radwelle_wheel shaft_material certificates_PART-057585

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. **BSVF16004734TSE**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816364-010-01**
BGH works no.
BGH référence

Zeugnis-Nr. **412193**
Certificate no.
No. de certificat

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.7225 42CrMo4mod/4140mod/4145mod
Abmessung/Dimension: 280 mm rd. x 5715 + 5868 mm
Anzahl/Quantity : 2 Gewicht /Weight : 5608 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
Tab.3 Typ 1a (100%) und Tab.5, QK 4 (Randzone) / QK 3 (Restbereich)
table 3 type 1a (100%) and table 5, quality class 4 (edge zone) / quality class 3 (residual area)

Prüfgerät : Deutsch Echograph 1090
Testing device

Prüfkopf : S 10 W 4 C
Search unit

Kopplungsmittel : Kleister / Wasser
Couplant glue / water

Prüfumfang : halber Umfang über gesamte Länge
Amount of inspection half circumference over total length

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0 mm
Recording threshold FBH 2.0 mm

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 16.09.21	Prüfer Testing operator Opérateur Kosch Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A BGH Q 30	Überwacher Supervisor Surveilleur

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Radwelle / wheel shaft	PN-00077353.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagersitz	Ø 240 m6	+0,046 +0,017	240,03
Fügesitz	Ø 242,48 h6	0 -0,029	242,47-242,48
Lagersitz	Ø 240 m6	+0,046 +0,017	240,03-240,035
Durchmesser	Ø 240 m6	+0,046 +0,017	240,025-240,035
Durchmesser	Ø 240 m6	+0,046 +0,017	240,025-240,035

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	02.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057585
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Radwelle / wheel shaft	PN-00077353.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	42CrMo4+QT	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Wellenübergang / shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	02.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
58640 ISERLOHN

TELEFON 02371/945-0
TELEFAX 02371/945-299
EMAIL: INFO@PEKRUN.DE

Stirnrad_spur gear_material certificates_PART-057679

Prüfbescheinigung / Type of document

Abnahmeprüfzeugnis 3.1 / Inspection Certificate 3.1 - DIN EN 10204

Schmiedewerke Gröditz GmbH Riesaer Straße 1 01609 Gröditz

Schmiedewerke Gröditz GMH GRUPPE

Besteller / Customer: Delta Qualitätsstahl GmbH

Nr. / No.: S 2578

Seite/Page 1 von/of 2

Bestell-Nr. / P.O.No.: 170443 + Nachtrag v./dd. 03.03.2021

Gegenstand / Object: geschmiedetes Rundmaterial / forged round material

Kommissions-Nr. / Commission No.:5200454255 / 5

Abmessung / Dimension [mm]: ø 675 x 1 x 5100 / Stückgewicht/Single weight: 14520 kg / Block-Nr. / block-no.: 111
ø 675 x 1 x 2530 / Stückgewicht/Single weight: 7200 kg / Block-Nr. / block-no.: 112

Werkstoff / Material: 18 CrNiMo 7-6 / 1.6587 ID-Nr./ID-No.:

Lieferzustand / Condition of delivery: vorvergütet / pre quenched and tempered, vorbearbeitet / pre machined

Anforderungen / Demands: ISO-6336-5/08.16; DIN EN ISO-683-3/04.19; LVL02 18Cr Rev.18

Erschmelzungsart / Steelmaking process: EV/EAF

Chemische Analyse / Chemical analysis (% / H_2 ; O_2 ppm)

Stück Quantity	Chargennr. Heat no.	Probe Sample		C	Si	Mn	P	S	Cr	Ni	Mo	V	Cu	Al	Ti	Sn	Nb	As	Sb	Ca	N	H2	F01*	F02*
2	GP107894	Heat		,18	,28	,59	,009	,002	1,73	1,59	,29	,009	,14	,028	,0018	,007	,002	,0052	,0016	,0006	,0095	,9	,2	2,9

F01*: Cu+(10*Sn); F02*: Al/N

Prüfergebnisse / Test results

Probe / Sample		Lage / Orientation	Zugversuch / Tensile test						Kerbschlagbiegeversuch / Impact test						Härte / Hardness
			Prüftemp. Test temp. [°C]	$R_{p0,2}$ [N/mm²]	R [N/mm²]	R_m [N/mm²]	A5 [%]	Z [%]	Prüftemp. Test temp. [°C]	KV2 [J]			$\overline{KV2}$ [J]	Zähbruch / Tough fracture	
Charge/Heat no.	Nr. /No.	L	RT	>=785	-	1120 - 1350	>=11	>=35	RT	-			40	-	-	
		L	-	-	-	-	-	-	-20	-			27	-	-	
		T	RT	>=785	-	1120 - 1350	>=8	>=25	RT	-			30	-	-	
GP107894	5151	T	23	1026		1343	10,4	34	23	53	55	63	57	Blindhärteprobe	blank hardness test	
GP107894	5153	L	23	1018		1345	13,4	58	23	67	63	69	66	Blindhärteprobe	blank hardness test	
GP107894	5153	L							-20	52	46	49	49	Blindhärteprobe	blank hardness test	

Härte Soll / Hardness required [HBW]: min - max 235

Härte Ist am Teil / Hardness measured on part [HBE] : 173; 176

Stirnrad_spur gear_material certificates_PART-057679

Prüfbescheinigung / Type of document

Abnahmeprüfzeugnis 3.1 / Inspection Certificate 3.1 - DIN EN 10204

Schmiedewerke Gröditz GmbH Riesaer Straße 1 01609 Gröditz

Schmiedewerke Gröditz GMH GRUPPE

Besteller / Customer: Delta Qualitätsstahl GmbH	Nr. / No.: S 2578 Seite/Page 2 von/of 2
Bestell-Nr. / P.O.No.: 170443 + Nachtrag v./dd. 03.03.2021	Gegenstand / Object: geschmiedetes Rundmaterial / forged round material
Kommissions-Nr. / Commission No.:5200454255 / 5	Abmessung / Dimension [mm]: ø 675 x 1 x 5100 / Stückgewicht/Single weight: 14520 kg / Block-Nr. / block-no.: 111 ø 675 x 1 x 2530 / Stückgewicht/Single weight: 7200 kg / Block-Nr. / block-no.: 112

Anmalung / paint-marking: 88995
O2 Gehalt / O2 content: 12 ppm
mechanische Werte an Blindhärteprobe / mechanical properties on blank hardened test ø 30 mm, Wärmebehandlung / heat treatment: 870°C/2h/Öl/oil, 180°C/2h/Luft/air
Verschmiedungsgrad / forging ratio: 3,8
auf Materialverwechslung geprüft - keine Beanstandung / material mix up tested - satisfactory
Radioaktivität innerhalb gesetzlicher Vorgaben wird gewährleistet / radioactivity within legal requirements guaranteed
Restmagnetismus max. 5 Gauss- wird gewährleistet / residual magnetism max. 5 Gauß - guaranteed
Reinheitsgrad gemäß DIN 50602: K4 = 0 / micropurity acc. to DIN 50602: K4 = 0
Reinheitsgrad nach / micropurity acc. to ISO 4967 Meth. A - A 0,3/0,7; B 0/0; C 0/0,3; D 0/0,5; DS 1,5
austenitische Korngröße gemäß DIN EN ISO 643 nach Wärmebehandlung 950°C 50 h: G = 5 und feiner, max. 2% gröber 5 erfüllt
austenitic grain size acc. to DIN EN ISO 643 after heat treatment 950°C 50 h: G = 5 and finer , max. 2% rougher 5 fulfilled

Anlagen / annex: - Ultraschallprüfbericht / ultrasonic test report
- Jominy Prüfprotokoll / Jominy report

Die gestellten Anforderungen sind erfüllt. Besichtigung und Ausmessungen: o.B.
The a.m. results meet requirements. Visual and dimensional inspection: satisfactory

Herstellerzeichen, Manufacturer's brand qu	Stempel des Sachverständigen Inspector's stamp	Datum / Date: 05.08.2021 Abnahmebeauftragter Hersteller Manufacturers authorized representative

Stirnrad_spur gear_material certificates_PART-057679

Ultraschallprüfbericht Ultrasonic test report gemäß / acc. to DIN EN 10204 3.1	Nr./No.: 8/21/32-UT FA 520488995 Seite/page 1 von/of 1	Schmiedewerke Gröditz GMH GRUPPE

Besteller Customer Delta Qualitätsstahl GmbH Hamm	**Gegenstand** Rundmaterial Item round material
Bestell-Nr. Order-No 170443 + Nachtrag	**Werkstoff** Material 18 CrNiMo 7-6
Wärmebehandlung vergütet Heat treatment quenched and tempered	**Oberflächenzustand** mech. bearbeitet Surface condition mech. processed
Kennwort Code word -	**Lfd.-Nr.** Part-No -
Zeichnungs-Nr./Abmessung Liefermaß/delivery dimension: Dmr./dia. 1x 675 x 5100 Drawing-No./Dimensions Dmr./dia. 1x 675 x 2530	

Kommission Job No. 5200454255/5	**Chargen-Nr.** Charge No. GP107894	**Stückzahl** Pieces 2

Spezifikation Specification DELTA LVL 02 18Cr Rev. 18	**Prüfumfang** gemäß Vorschrift Scope of test acc. to specification

Fertigungs- und Prüffolgeplan Fabrication and Inspection plan ☐ Nr/No:	**Prüf- und Abnahmeplan** Test and Inspection plan ☐ Nr/No:	**Prüfanweisung** test procedure ☒ Nr/No: QP-ZFP-A-01 Rev. B

Prüfdaten / Test data

Prüfgerät Test unit EPOCH650 - 190783502	**Koppelmittel** Couplant Tapetenleim / wallpaper paste

Prüfer Falkenberg Tested by ISO9712 Stufe 2/level 2	**Prüfdatum** Date of testing 20.07.2021	**Prüfort** Place of testing Gröditz

Registriergrenze
Registration level gemäß Vorschrift / acc. to specification

Prüfkopf / Probe | **Justierung** / Calibration

Nr. No.	Typ Type	Fre-quenz Fre-quency	Winkel Angel	Justierbe-reich Calibration range	Methode Method	s_j	s_{max}	V_j	ΔV	ΔV_T ☐ ΔV_A ☐	ΔV_κ	ΔV_K	V_R
		MHz	°	mm		mm	mm	dB	dB	dB	dB	dB	dB
1	B2S	2	0	850	AVG/BI DGS/RI	677	677	32	50	-	-	-	82

s_{max} - Bewertungsschallweg/evaluated sound distance, s_j-Justierschallweg/Calibration distance, V_j-Justierverstärkung/ Calibration Gain, Δ V-Verstärkungszuschlag/Additional Gain, ΔV_T-Transferkorrektur/ Transfer correction, ΔV_A-Ankopplungskorrektur/ Coupling correction, ΔV_κ -Schallschwächungskorrektur/Soundattenuation correction, ΔV_K - Kontrollkörperkorrektur für Winkelprüfköpfe bzw. Krümmungskorrektur für Senkrechtprüfköpfe/Adjusting block correction for angle beam probes or curvature correction for straight beam probes, V_R -Bewertungsverstärkung Evaluation Gain

Ergebnisse - Results:

Es wurden keine registrierpflichtigen Anzeigen festgestellt.
No recordable indications were found.

Beurteilung gemäß Spezifikation/ Evaluation acc. to specification :

ERFÜLLT ☒ PASSED	**NICHT ERFÜLLT** ☐ NOT PASSED	**ERGEBNIS S. ANLAGE** ☐ RESULT L. ANNEX
Datum / Date 05.08.2021	**Prüfaufsicht**/ Supervisor i.V. Knobloch ISO9712 Stufe 3/level 3	

Stirnrad_spur gear_material certificates_PART-057679

Schmiedewerke Gröditz
GMH GRUPPE

Jominy- Protokoll / Jominy - Report

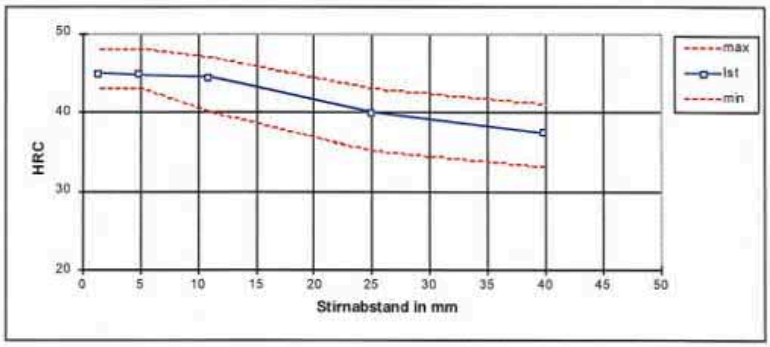
gem. ISO 642 / acc. to ISO 642
Berechnung nach/ calc. acc. to SEP 1664,Tafel 12 - 2. Ausgabe Juni 2004

Gegenstand/Item: Stabstahl / steel bar
Stahlmarke/Steel grade: 18 CrNiMo 7-6
Charge/Heat-No.: GP107894

Austenit.bedingungen/
Austen. conditions: 860°C/30min

mm	1,5	5	11	25	40
Ist	44,9	44,7	44,4	39,9	37,4
max	48	48	47	43	41
min	43	43	40	35	33

* Sollwerte nach / Limits acc. to DELTA LVL02 18Cr Rev. 18



Freigabe durch:
Released by: gez. Rink
TQW

21.07.2021

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Stirnrad / spur gear	PN-00077527.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Fügesitz	Ø 242 H7	+0,046 0	242,02-242,04
Verzahnung Vorfräsen			i.O.

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	04.03.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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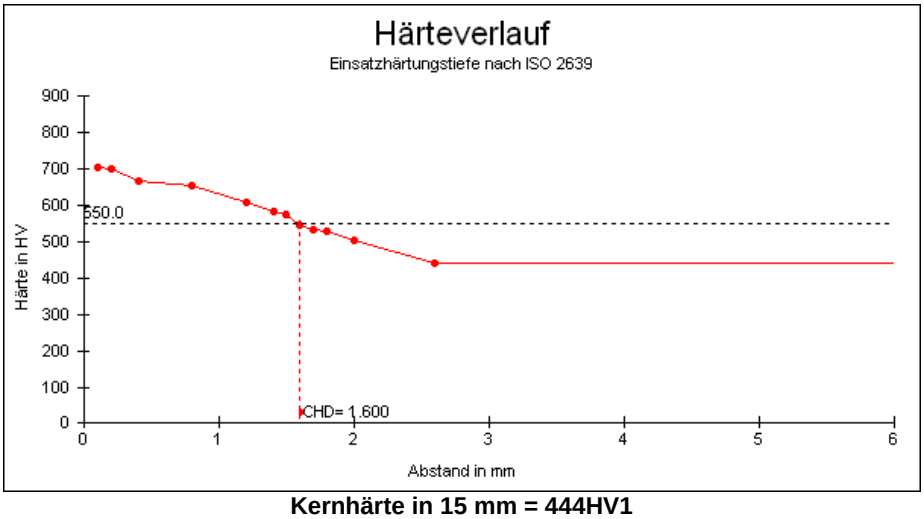
PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

DOK-QS-121	Härteverlauf Hardness profile	REINTJES POWERTRAIN SOLUTIONS

Abnahmeprüfzeugnis gemäß DIN/EN 10204 – 3.1
Inspection certificate according to DIN/EN 10204 - 3.1

Kunde: Customer:	**Pekrun**	**Benennung:** Object:	**Stirnrad 71**
FAUF: Production No.:		**Bestell Nr. /Pos:** Purchase Order No./Item:	**4500058759**
Zeichnungs Nr.: Drawing No.:	**PN-00077527**	**Auftrags Nr.:** Order No.:	**2053592**
Werkstoff: Material:	**18 CrNiMo 7-6**	**Proben Nr.:** Sample No.:	**09215**
Stückzahl: No. of pieces:	**3**	**Ofencharge:** Oven batch:	**C22-21935**

CHD 550H V1 = 1.60 mm



Kernhärte in 15 mm = 444HV1

Oberfl.-Härte IST: Surface hardness actual:	**60**	HRC	**EHT IST:** Penetration depth actual:	**1,60**	mm
Oberfl.-Härte SOLL: Surface hardness nominal:	**60 +- 2**	HRC	**EHT SOLL:** Penetration depth nominal:	**1,4 + 0,2**	mm
Martensit IST: Martensit actual:		%	**Restaustenit IST:** Resodual austenite:		%
Randoxidation IST: Surface oxidation actual:		µm	**Randentkohlung IST:** Surface dicarborising actual:	---	µm
Karbidanteil IST: Katbit actual:	---	%	**Rand C-Gehalt IST:** Surface-C actual:		%
Bemerkungen: Remark:					

Prüfer / Workinspector i.A. V.Gärtner Prüfdatum / Work date: 02.03.22

Dieses Zeugnis wurde maschinell erstellt und ist OHNE Unterschrift gültig.
This certificate was provided by machine and is valid also without signature.

Prozessverantwortlicher:	QS / Hr. Dr. Reso / 17.01.2018	Revisions-Nr.:	02

Seite 1 von 1

PEKRUN

Teilung **DIN3962**

Auftrag: 71Z 8M-P-057679

19396/10-P-057679-2 L.V.UNTEN ZW=656.155-655.945

Maschine: #945 09.05.2022 06:29:20 21.4°C

z	71	β [Grad]	-27.0000	da [mm]	652.8000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	621.2000
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
D⟷● Ø [mm]	2.0	Messhöhe [mm]	0.0000	Messkreis [mm]	637.4810

[µm]		Q Soll	Q Ist	[..]	Istwert	Min	Max
20.0 µm	fp	6	5	11.0	8.5	52	56
	fu	6	6	14.0	14.0		56
20.0 µm	fp	6	4	11.0	5.0	3	5
	fu	6	4	14.0	7.5		60
20.0 µm	Fp	6	3	45.0	13.0	52	60
20.0 µm	Fp	6	3	45.0	14.5	61	4
20.0 µm	Fr	6	4	36.0	16.0	17	58

Zweikugelmaß für Kugeldurchmesser 14.00 mm Soll: 656.050 mm / Ist: 656.043 mm

GearPro V3.17.97 2 / 2

PEKRUN

Profil / Flankenlinie — **DIN3962**

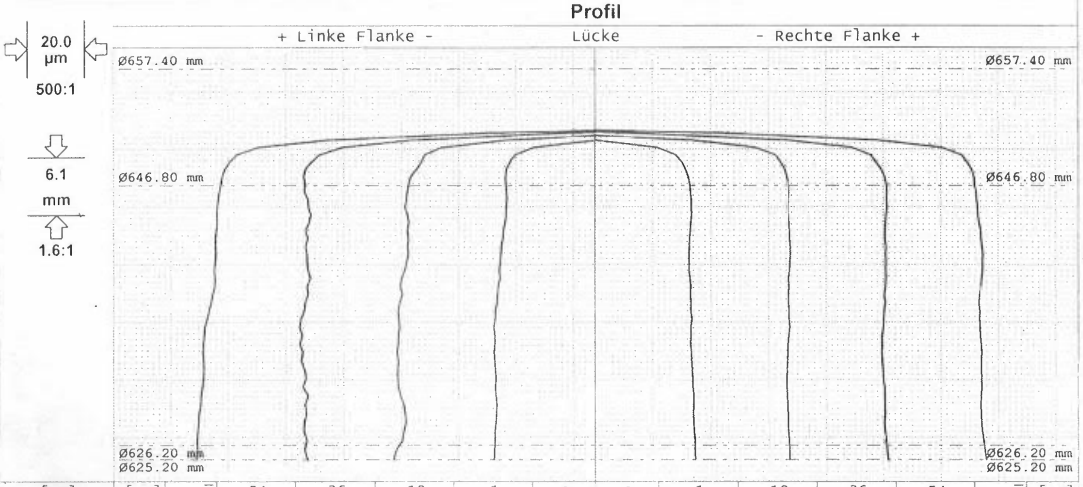
Auftrag: 71Z 8M-P-057679

19396/10-P-057679-2 R.V.OBEN ZW=656.155-655.945

Maschine: #945 — 09.05.2022 11:16:08 22.2°C

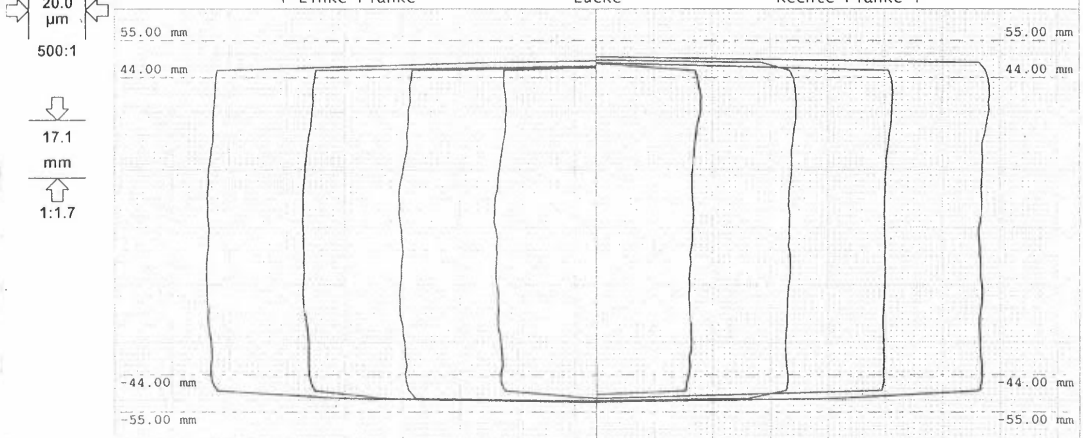
z	71	β [Grad]	27.0000	da [mm]	652.7000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	620.9500
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
Ø [mm]	2.0	Messhöhe [mm]	0.0000	Lα [mm]	27.6532
		Messkreis [mm]	637.4810	Lβ [%]	80.0

Profil



[µm]	[..]	x̄	54	36	18	1	Q	Q	1	18	36	54	x̄	[..]
Fα	16.0	5.1	8.0	4.0	4.0	4.5	4	1	2.0	1.5	2.0	2.5	2.0	16.0
ffα	14.0	2.9	2.0	3.5	3.5	2.5	2	1	1.0	1.0	2.0	2.0	1.5	14.0
fHα	9.0	-4.3	-8.5	-1.5	-2.5	-4.5	6	1	-1.5	0.5	1.0	-1.5	-0.4	9.0
Q Soll / Q Ist							6/ 6	6/ 1						

Flankenlinie



[µm]	[..]	x̄	54	36	18	1	Q	Q	1	18	36	54	x̄	[..]
Fβ	16.0	4.1	3.5	4.5	4.0	4.5	1	1	4.5	4.0	3.5	4.0	4.0	16.0
ffβ	12.0	3.5	2.5	3.5	4.0	4.0	1	1	2.5	1.5	1.5	2.5	2.0	12.0
fHβ	11.0	-2.0	-2.0	-2.0	-2.0	-2.0	1	2	3.5	3.5	3.0	3.0	3.3	11.0
Q Soll / Q Ist							6/ 1	6/ 2						

GearPro V3.17.97 — 1 / 1

PEKRUN

Teilung DIN3962

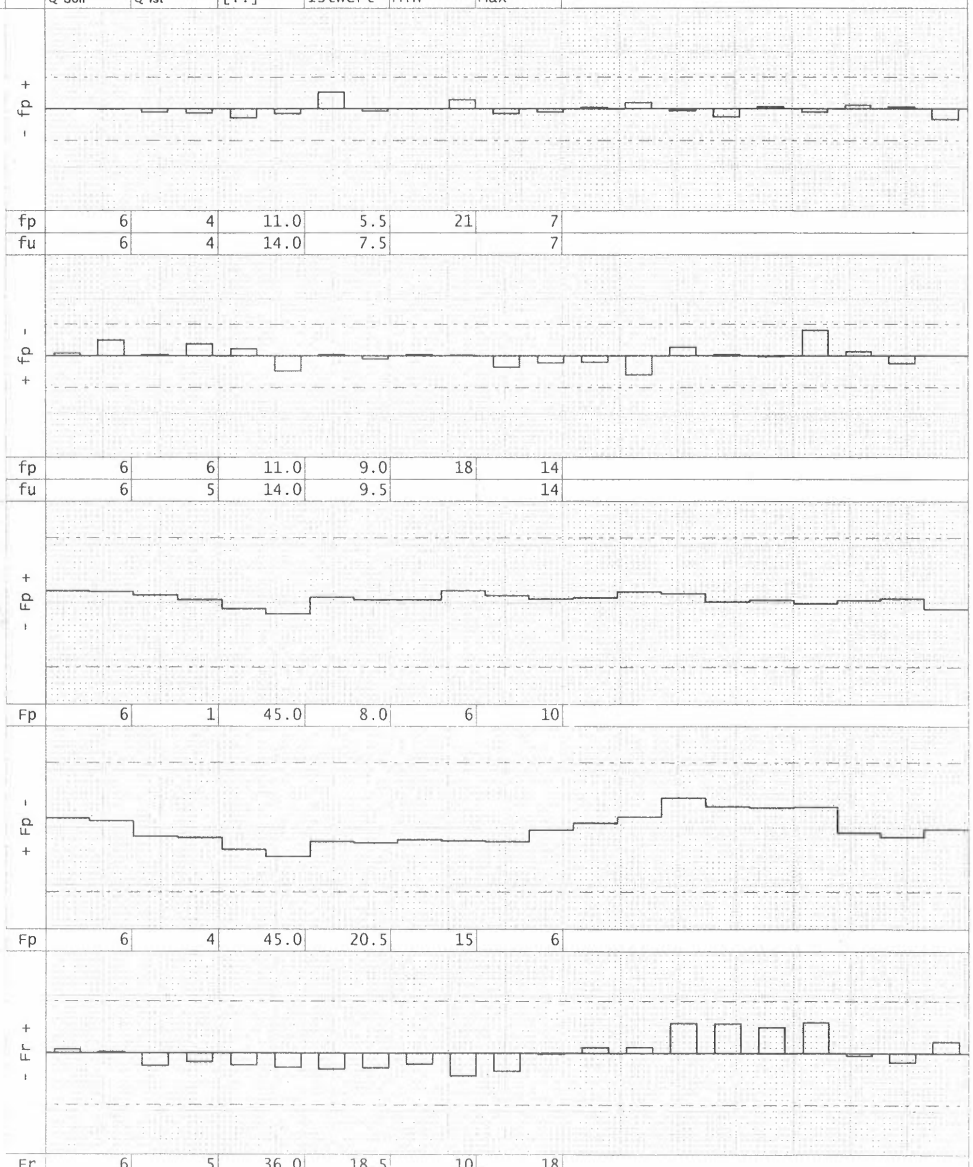
Auftrag: 71Z 8M-P-057679

19396/10-P-057679-2 R.V.OBEN ZW=656.155-655.945

Maschine: #945 09.05.2022 11:55:03 22.6°C

z	71	β [Grad]	27.0000	da [mm]	652.7000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	620.9500
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
D⟹● Ø [mm]	2.0	Messhöhe [mm]	0.0000	Messkreis [mm]	637.4810

[µm]		Q Soll	Q Ist	[..]	Istwert	Min	Max
20.0 µm	fp	6	4	11.0	5.5	21	7
	fu	6	4	14.0	7.5		7
20.0 µm	fp	6	6	11.0	9.0	18	14
	fu	6	5	14.0	9.5		14
20.0 µm	Fp	6	1	45.0	8.0	6	10
20.0 µm	Fp	6	4	45.0	20.5	15	6
20.0 µm	Fr	6	5	36.0	18.5	10	18



Zweikugelmaß für Kugeldurchmesser 14.00 mm Soll: 656.050 mm / Ist: 656.072 mm

GearPro V3.17.97 1 / 1

PEKRUN

Profil / Flankenlinie — **DIN3962**

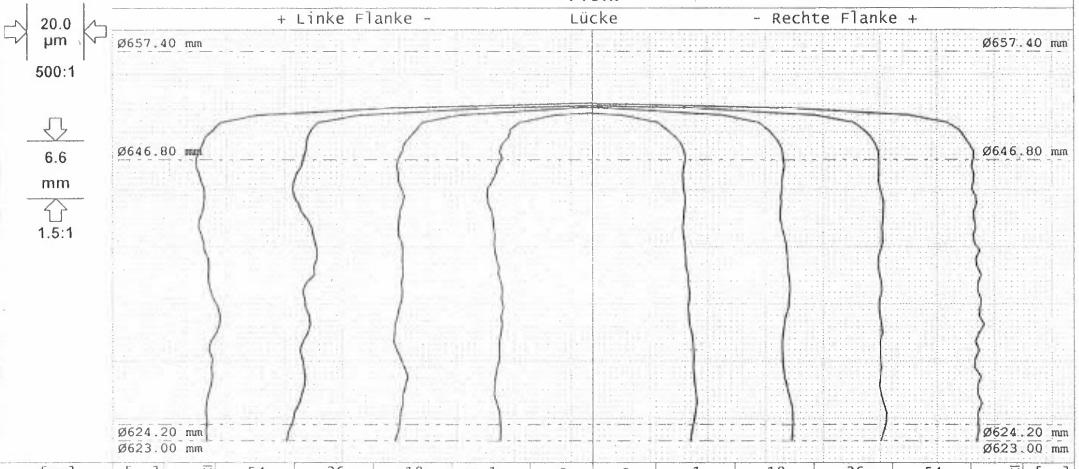
Auftrag: 71z 8M-P-057679

19396/10-P-057679-2 L.V.UNTEN ZW=656.155-655.945

Maschine: #945 — 09.05.2022 06:11:12 21.3°C

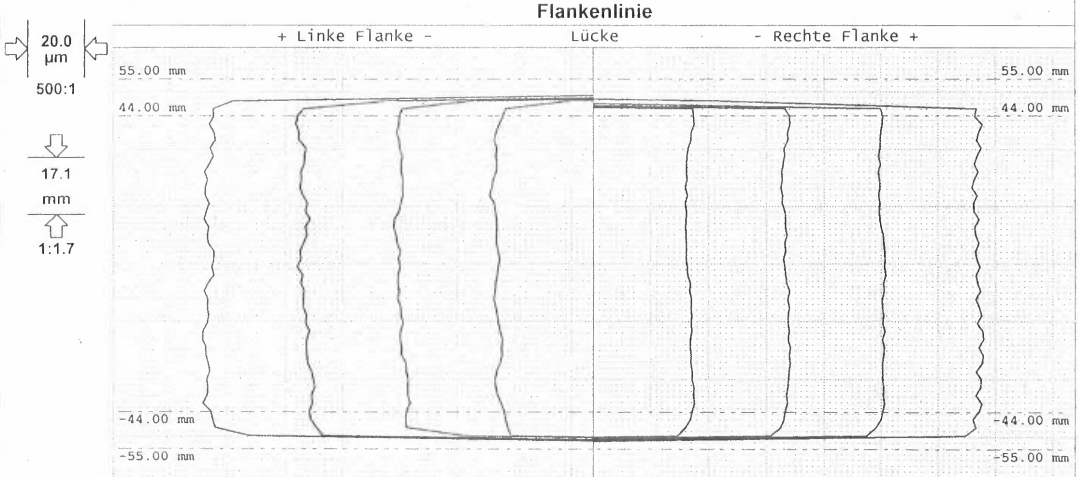
z	71	β [Grad]	-27.0000	da [mm]	652.8000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	621.2000
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
Ø [mm]	2.0	Messhöhe [mm]	0.0000	Lα [mm]	30.6824
		Messkreis [mm]	637.4810	Lβ [%]	80.0

Profil



[µm]	[..]	X̄	54	36	18	1	Q	Q	1	18	36	54	X̄	[..]
Fα	16.0	6.9	8.5	8.5	5.0	5.5	5	3	5.0	4.0	3.0	4.5	4.1	16.0
ffα	14.0	6.1	6.5	8.5	5.0	4.5	5	2	2.0	3.0	2.5	3.5	2.8	14.0
fHα	9.0	1.8	4.5	-0.5	0.5	2.5	4	4	-5.0	-2.5	-0.5	-2.0	-2.5	9.0
Q Soll / Q Ist							6/ 5	6/ 4						

Flankenlinie



[µm]	[..]	X̄	54	36	18	1	Q	Q	1	18	36	54	X̄	[..]
Fβ	16.0	5.4	4.5	6.5	5.5	5.0	3	1	3.0	3.5	2.5	4.0	3.3	16.0
ffβ	12.0	4.5	4.0	5.0	4.0	5.0	2	1	3.5	3.5	2.0	4.0	3.3	12.0
fHβ	11.0	1.6	-1.5	4.0	2.5	1.5	3	1	-1.5	-1.5	-1.5	-1.5	-1.5	11.0
Q Soll / Q Ist							6/ 3	6/ 1						

GearPro V3.17.97 — 1 / 2

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057679
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Stirnrad / spur gear	PN-00077527.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo 7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Verzahnungsbereich / toothing area*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	12.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

```
*****************************************************
Pektun Getriebebau GmbH
Koebbingser Muehle 14
58640 Iserlohn/Germany
*****************************************************
Operator : Ferdi Basar                    10.05.22 06:45
Rotordaten                Fall   1        19396/10-057585
a: 178.5 mm               b: 311.0 mm      c: 162.5 mm
r1: 280.0 mm              Eb1/Eb2          r2: 280.0 mm
m1: -polar                                 m2: -polar
Tol1: 9999. gmm                            Tol2: 9999. gmm
                          N soll   :  400.  1/Min
Ergebnisse                Rotor: Radwelle 2        10.05.22 06:45
Lauf  2                   N ist    :  401.  1/Min
Eb 1:      2.30  g                Eb 2:      20.8  g
           313. Grad                         286. Grad
           in Tol                            in Tol
Anteil in Tol.Einheiten  :
           644.9 gmm                         5835. gmm
```

BG Radwelle_assembly group wheel shaft_balancing report_PART-057682

Seite / Page 1 / 3

Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat 414819

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-005-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält Round bars,forged,peeled
Werkstoff / Quality	1.6587 18CrNiMo7-6
Anforderungen / Requirements	LVL- 02 18Cr Rev.18 - 07/20 1.6587 18CrNiMo7-6 ,ISO 6336 -5 Third ed. 2016-08-15 1.6587 18CrNiMo7-6 ,DIN EN ISO 683 -3 April 2019 Lieferzustand: Vorvergütet Die Werkstoffqualität "MQ/ME" nach ISO 6336-5 wird bestätigt. Diese Bestätigung gilt nur für die Eigenschaften, die vom Stahlhersteller beeinflußt werden können. Für Eigenschaften, die von der konstruktiven Gestaltung, der Endwärmebehandlung und der Einsatzbedingungen abhängig sind, kann der Stahlhersteller keinerlei Garantie und Gewährleistung übernehmen. The material quality "MQ/ME" acc. ISO 6336-5 will be confirmed. This confirmation is only valid for the properties, which can be affected by the steel producer. The steel producer cannot provide any guarantee for properties, which are dependent on the constructional design, the final heat treatment and the application conditions.

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d´élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d´identification(analyse spectrale)
ohne Beanstandung without objection	E- LF/VD	ohne Beanstandung without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
5	4	290 mm rd. x 3751 - 3860 mm	8006 kg	735116

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb	V	Ti
735116	0,175	0,28	0,54	0,007	0,0010	1,71	0,32	1,52	0,102	0,003	0,009	0,001

Al	N	H(ppm)	O	Sn	Sb	Ca	Al/N	Cu+10xSn
0,023	0,0110	1,50	0,0014	0,004	0,003	0,0004	2,091	0,142

Wärmebehandlungszustand / Condition of heat treat: vergütet / quenched and tempered

Probe-Nr. / Test-No.	Lage / Loc.	Temp. °C	Rp0,2 N/mm²		Rm N/mm²	A5 %	Z %	Kerbschlagarbeit / Impact value J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness / HB
Soll/Req.	T	RT	>=785		>=1120 <=1450	>=8	>=25	>=30			RT	<=238
332W2	T	RT	923		1321	8,2	36	63	64	66	RT	192
332W2	T							49	50	50	-20°C	am Material

Die mechanischen Kennwerte wurden an einer Referenzprobe (30 mm rd.) ermittelt:
The mechanical properties were tested at a reference block (30 mm dia.) :
870°C 2h Oel/oil, 180°C 2h Luft/air

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	06.12.2021	Langer

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

This certificate was generated by data system and it is valid without signature as well.
Ce certificat a été établi sur système informatique et est valable sans signature aussi.

Seite / Page 2 /3

Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **414819**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
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Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-005-01**

```
Stirnabschreckversuch / Jominy test - EN ISO 642:
mm     1,5   5     11    25    40
HRC    45    44    43    38    36

Umformgrad      : 4.8 : 1
Reduction ratio:

Korngröße  nach ASTM E 112: 6
Grain size acc. ASTM E 112:

Korngröße  nach ISO 643 (950°C 50h Oel): 6
Grain size acc. ISO 643 (950°C 50h oil):

Reinheitsgrad nach DIN 50602   : K4 = 2 (Ox + S)
Degree of purity acc. DIN 50602:

Reinheitsgrad nach ISO 4967, Methode A  : DS = 1,5
Degree of purity acc. ISO 4967, method A:
Type            A      B      C      D
Dünn/fine      0,0    0,8    0,5    1,0
Dick/thick     0,0    0,5    0,3    0,5

Restmagnetismus   : < 8 A/cm
Residual magnetism:

Das Material wurde gemäß der Spezifikation hergestellt.
The Material was produced in compliance with the Specification.

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done                  : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze
von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection
limit of 0.1 Bq/g.
```

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	06.12.2021	**Langer**

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BGH

Ritzelwelle_pinion shaft_material certificates_PART-057680

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BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-005-01**

Bei Überschreitung der regelwerksseitigen Abmessungsgrenze sind im Zweifelsfall die Vorgaben
des Regelwerks vom Bauteilhersteller zu verifizieren. Seitens des Werkstoffherstellers werden
nur die, an der von ihm produzierten Geometrie, überprüften Eigenschaften bestätigt.
In case of doubt, the specifications of the regulations must be verified by the component manufacturer
if the dimensional limit of the regulations is exceeded. On the part of the material manufacturer,
only the properties verified on the geometry, produced by him, are confirmed.

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	06.12.2021	**Langer**

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Page

US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. **171472**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816888-005-01**
BGH works no.
BGH référence

Zeugnis-Nr. **414819**
Certificate no.
No. de certificat

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.6587 18CrNiMo7-6
Abmessung/Dimension: 290 mm rd. x 3751 - 3860 mm
Anzahl/Quantity : 4 Gewicht /Weight : 8006 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
DIN EN 10228-3 Tab. 3 Typ 1a (100%)und
Tab. 5 Qualitätsklasse 4 für Randzone (1/3 D, min. 60mm)
Tab. 5 Qualitätsklasse 3 für Restbereich
DIN EN 10228-3 Tab.3 typ 1a (100%)and
Tab.5 quality class 4 for surface zone (1/3 D, min. 60 mm)
Tab.5 quality class 3 for remaining area

Prüfrichtlinie : DIN EN 10228-3 Tab. 3 & 4 (vollständig 360°)
Specification

Prüfgerät : K.Deutsch RPT.S 1156
Deutsch Echopraph 1090
Testing device

Prüfkopf : STS32.20P4L150C, STSE18/16P4
S 24 W4, SE 18/16 PB4
Search unit

Kopplungsmittel : Wasser / Kleister
Couplant water / glue

Prüfumfang : 360°
Amount of inspection

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0
Recording threshold FBH 2.0 mm

Schallschwächung : < 6 dB/m
Wave attenuation

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 06.12.21	Prüfer Testing operator Opérateur Drobin Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A BGH Q 30	Überwacher Supervisor Surveilleur

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EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Abnahmeprüfzeugnis

gemäß DIN EN 10204-3.1

Belegnr	**PZ-2022-0097335**
Auftragsnr	**2022-0238565-2**
Kundennr	1011419
Ausgeber	Virzi, Laura
Telefon	0234/903660
Datum	25.03.2022
Seite	1/1

Teile/Verfahren	Stück	Gewicht
Ihre Auftragsnr: 19396/Pos.10	3	---

Ihre Liefers.Nr: Abholung vom 17.03.2022
Ihre Bestellnr: 4500060199-P / 20 vom 17.03.2022
Uns. Auftragsnr: 2022-0238565-2 von 2 vom 21.03.2022
Bezeichnung: Ritzelwelle
Teilenummer: PART-057680
Zeichnungsnr: PN00077528
Fr. Feld: 2053591
WE-Nummer: WE-000096728
Werkstoff: 1.6587/18CrNiMo7-6/17CrNiMo6
Vorschrift: Isolieren, Einsatzhärten, Strahlen, Richten, Zeugnis

Soll-Vorgaben

Randhärte	58-62 HRC
Einsatzhärtetiefe	1,4-1,6 mm

Ergebnisse	Prüfer	Prüfdatum
RH:59-60 HRC EHT:1,60 mm	Rainer Theuer	25.03.2022

Die CHD haben wir an unserer Chargenbegleitprobe aus 18CrNiMo7-6 ermittelt.

Hiermit bestätigen wir, dass obige Teile gemäß den Vereinbarungen bei der Bestellannahme auf der Grundlage der Ihnen bekannten Allgemeinen Geschäftsbedingungen der Härterei Reese Bochum GmbH, Stand: Juli 2018 behandelt wurden.

Dieses Dokument wurde elektronisch erstellt und ist daher ohne Unterschrift gültig.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/9036-0
Fax +49 (0) 234/9036-96

Oberscheidstr. 25 · 44807 Bochum
bochum@haerterei.com
Handelsregister: HRB 1717
Ust-ID-Nr.: DE257486215
Steuer-Nr.: 306/5709/0368

National-Bank Essen BIC: NBAGDE3EXXX IBAN: DE89 3602 0030 0006 3781 29
VB Bochum Witten eG BIC: GENODEM1BOC IBAN: DE83 4306 0129 0123 2073 00
Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

www.haerterei.com

EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Inspection certificate

according to DIN EN 10204-3.1

Document #	PZ-2022-0097335
Job #	2022-0238565-2
Customer #	1011419
Issuer	Virzi, Laura
Telephone	0234/903660
Date	25.03.2022
Page	1/1

Parts/Process		Quantity	Weight
Your Job #:	19396/Pos.10	3	---
Your P/S. #:	Abholung vom 17.03.2022		
Your P.O. #:	4500060199-P / 20 from 17.03.2022		
Our Job #:	2022-0238565-2 of 2 from 21.03.2022		
Description:	pinion shaft		
Serial #:	PART-057680		
Drawing #:	PN00077528		
Free Field:	2053591		
RG-No.:	WE-000096728		
Material:	1.6587/18CrNiMo7-6/17CrNiMo6		
Process:	protection, case hardening, shot blasting, straightening, certificate		

Hardness requirements

Surface hardness	58-62 HRC
Case hardening depth	1,4-1,6 mm

Results	Auditor	Test date
EH:59-60 HRC CHD:1,60 mm	Rainer Theuer	25.03.2022

CHD was tested on our test-piece 18CrNiMo7-6 from the same batch.

We hereby confirm that the above parts will be treated and examined in accordance with the agreements applying on acceptance of order and based on the familiar General terms and conditions of business of Härterei Reese Bochum GmbH Edition: July 2018.

This document automatically generated valid without signature.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/9036-0
Fax +49 (0) 234/9036-96

Oberscheidstr. 25 · 44807 Bochum
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Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

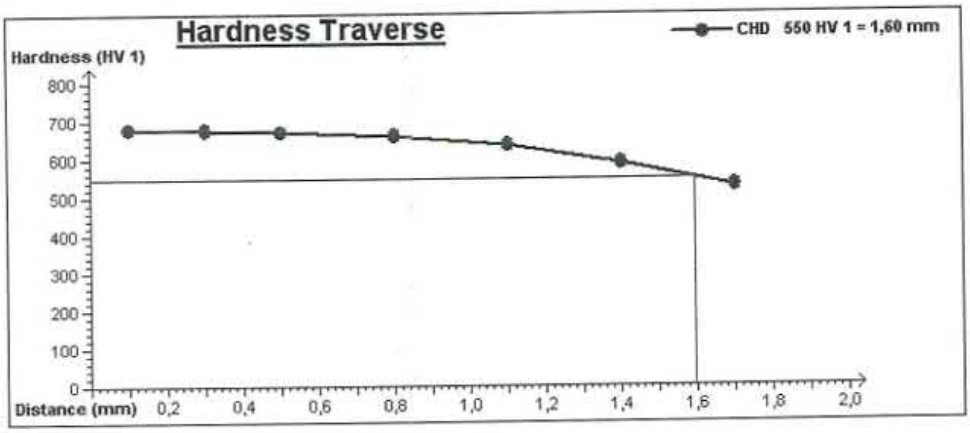
www.haerterei.com

REESE HÄRTEREI

Härterei Reese
Bochum GmbH
Oberscheidstrasse 25
44807 Bochum

Chargen-Nr.: .
Datum: 25.03.2022
Auftrags-Nr.: 2022-0238565-2
Prüfer: Labor

Kunde: Pekrun
Proben-Nr.: 18 CrNiMo7-6
H.R.Probe



Ergebnis

CHD 550 HV 1 = 1,60 mm

Reihe 1

Punkt	Abstand	Härte	Kommentar
1	0.100	680 HV 1	
2	0.300	678 HV 1	
3	0.500	672 HV 1	
4	0.800	661 HV 1	
5	1.100	637 HV 1	
6	1.400	589 HV 1	
7	1.700	529 HV 1	

QUALITÄTSWESEN HÄRTEREI REESE BOCHUM

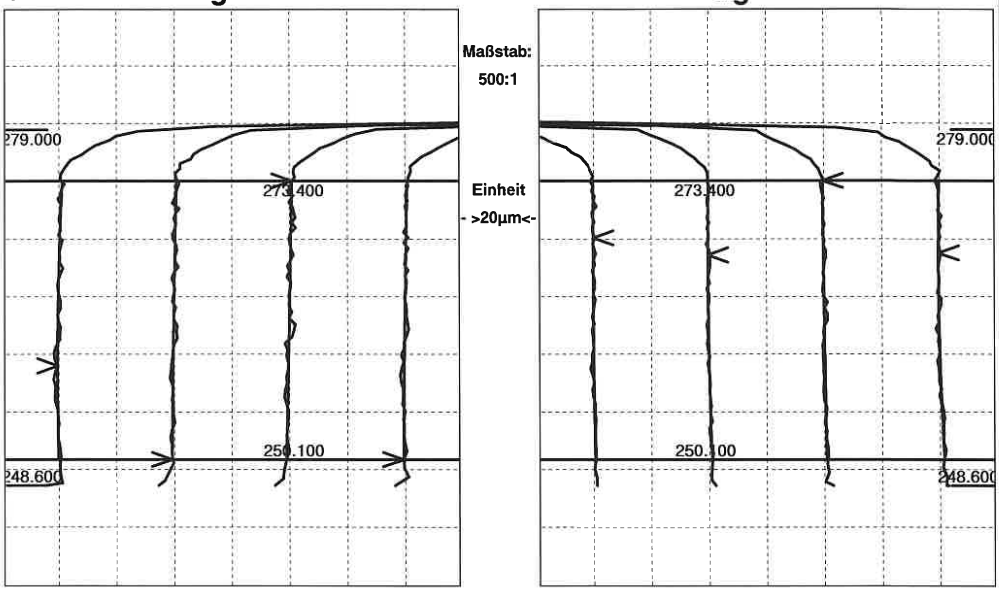
Profilmessung

Messung vom 05/11/2022 16:18:03 Dauer: 00:03:27 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.2

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Rechtsschräg 27.000000 Grad	Meßbreite	57.500 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	279.000 mm	Fußformkreis (d)	248.600 mm

+ Auswertung linke Flanke - / - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
2	3.5		3.2	3.2	4.4	3.1	F_α	3.4	3.4	3.0	4.5		3.6	2
2	- 1.6	0.0	- 1.3	- 1.6	- 2.0	- 1.4	fH_α	- 0.6	- 1.1	- 1.2	- 1.7	0.0	- 1.1	2
2	2.9		2.9	2.5	3.5	2.7	ff_α	2.4	1.5	2.0	2.5		2.1	1
	0.3	2.0	0.9	0.2	- 0.1	0.2	C_α	- 0.3	- 0.6	- 0.1	- 0.9	2.0	- 0.5	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

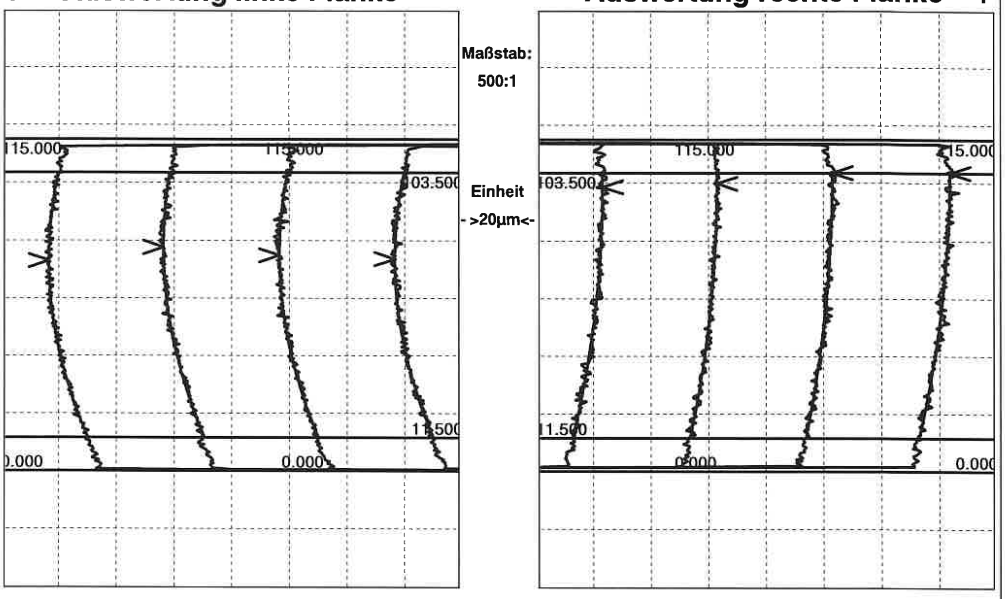
Flankenlinienmessung

Messung vom 05/11/2022 16:11:35 Dauer: 00:05:58 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.2

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	219
Schrägungswinkel	Rechtsschräg 27.000000 Grad	Meßzylinder (d)	261.218 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	115.000 mm		

+ Auswertung linke Flanke - | - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
2	5.7		5.6	5.6	5.9	5.6	Fβ	5.3	5.4	5.8	6.8		5.8	3
1	13.5	13.0	12.8	15.1	13.5	12.8	fHβ	13.1	11.8	11.7	13.5	13.0	12.5	1
2	4.5		3.9	5.1	4.9	4.3	ffβ	4.1	3.5	3.9	5.3		4.2	2
	11.3	7.0	11.7	10.8	11.1	11.5	Cβ	4.6	4.0	3.6	4.0	7.0	4.1	

Vert. Maßstab 1:2, d.h. 10 mm entspr. 20 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

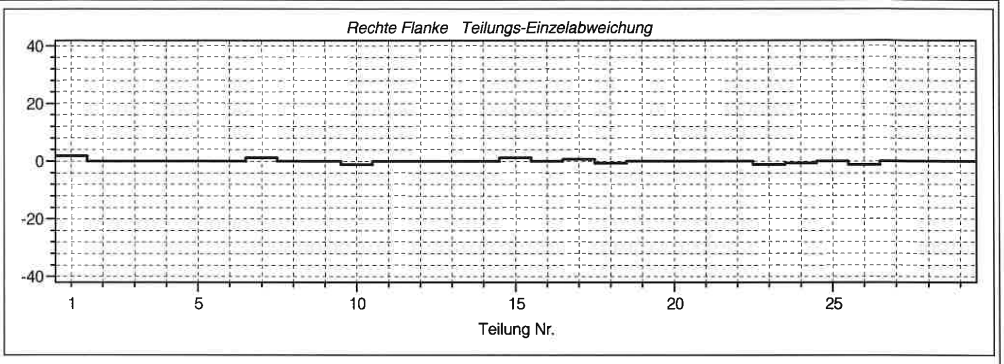
Alle Angaben in µm
Qualitäten nach DIN 3961

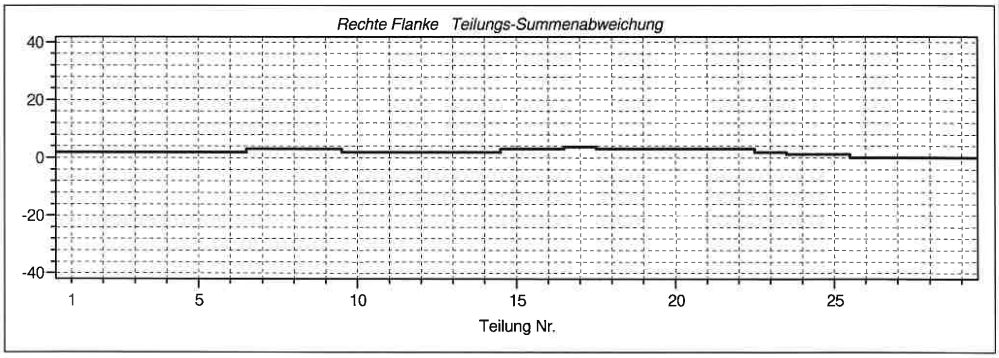
Teilungsmessung

Messung vom 05/11/2022 16:21:58 Dauer: 00:06:07 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.2

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.218 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.171		
Zahnweite (Nennmaß)	111.720 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.379 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.774 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	1.9	1	Teilungs-Schwankung (Rp)	3.0	
Teilungs-Gesamtabw. (Fp)	3.8	1	Max. Teilungssprung (fumax)	1.9	1
Teilungs-Spannenabw. (Fp(z/8))	3.0	1			

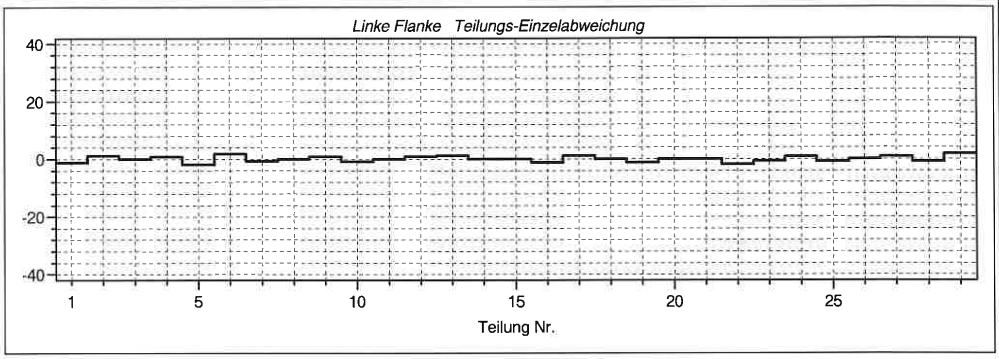
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

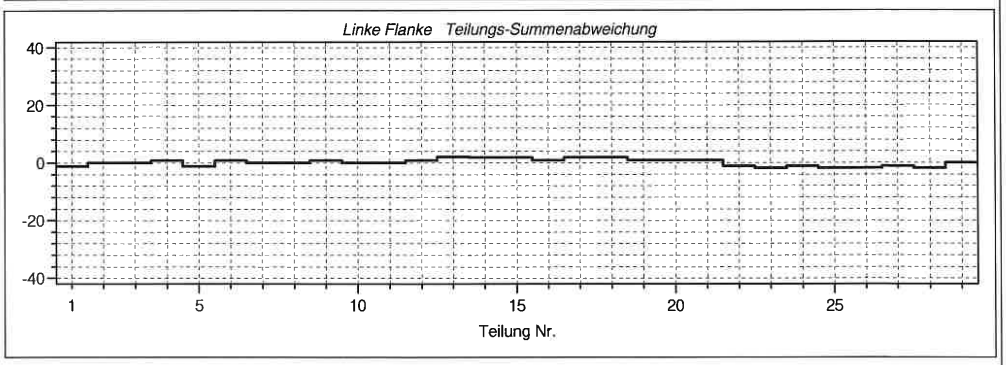
Teilungsmessung

Messung vom 05/11/2022 16:21:58 Dauer: 00:06:07 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.2

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.218 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.171		
Zahnweite (Nennmaß)	111.720 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.379 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.774 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 1.9	1	Teilungs-Schwankung (Rp)	3.9	
Teilungs-Gesamtabw. (Fp)	3.9	1	Max. Teilungssprung (fumax)	3.9	3
Teilungs-Spannenabw. (Fp(z/8))	3.1	1			

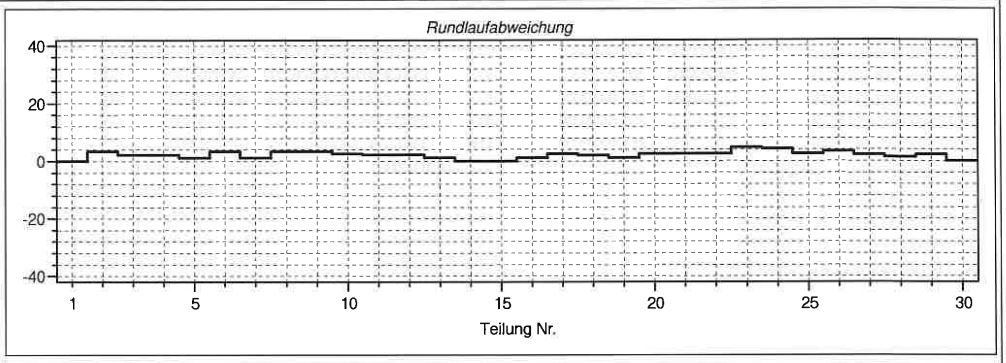
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

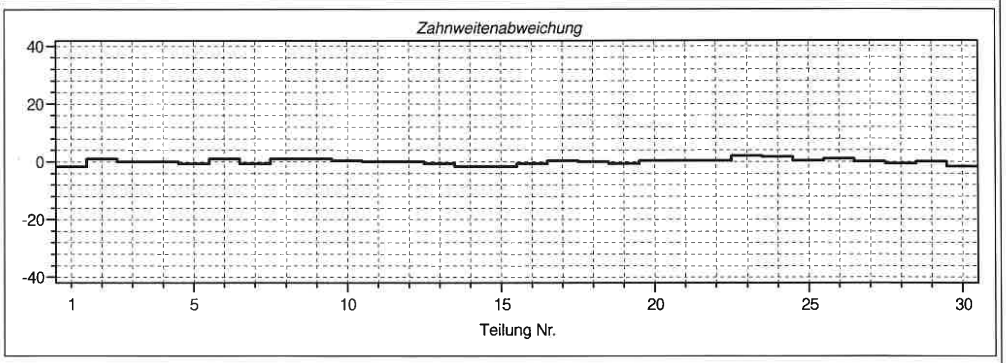
Teilungsmessung

Messung vom 05/11/2022 16:21:58 Dauer: 00:06:07 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.2

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.218 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.171		
Zahnweite (Nennmaß)	111.720 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.379 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.774 mm	Meßrollendurchmesser	14.000 mm





				Q
Min. Zahnweite (mm)	111.729	Mittl. Zahnweite (mm)	111.731	
Max. Zahnweite (mm)	111.733	Zahnweiten-Schwankung (µm)	3.8	
Anzahl Meßzähne	5			
		Rundlaufabweichung (Fr)	4.8	1
		Meßkugeldurchmesser (mm)	14.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

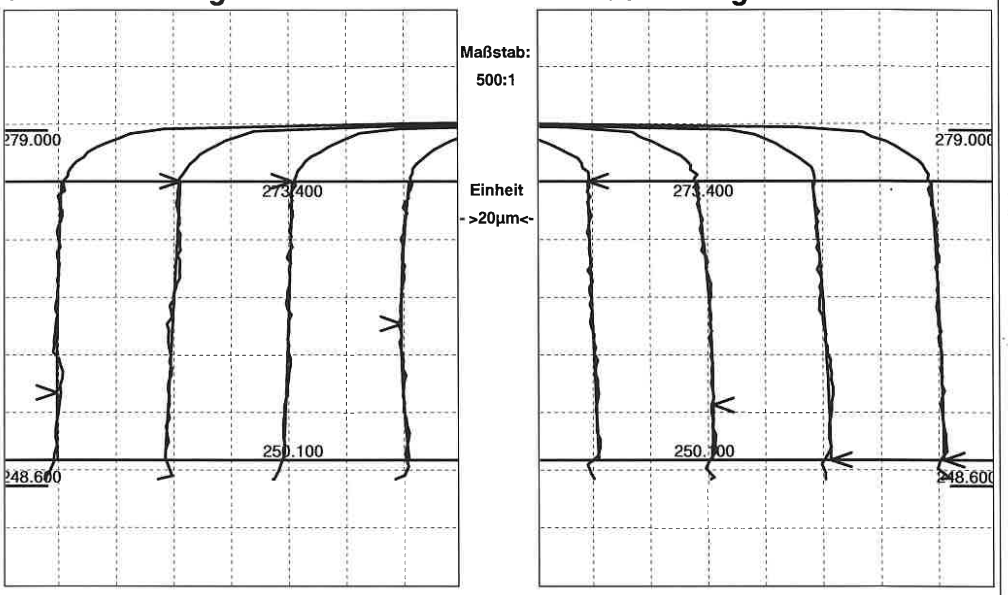
Profilmessung

Messung vom 05/11/2022 12:38:34 Dauer: 00:03:06 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.2

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Linksschräg 27.000000 Grad	Meßbreite	57.500 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	279.000 mm	Fußformkreis (d)	248.600 mm

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
4	5.5		5.7	7.2	5.9	3.3	F_α	5.7	6.2	6.4	5.9		6.0	4
5	- 2.6	0.0	- 1.5	- 5.4	- 3.0	- 0.3	fH_α	- 3.7	- 5.6	- 6.1	- 4.3	0.0	- 4.9	5
3	3.0		3.4	3.6	2.5	2.5	ff_α	3.2	2.4	4.1	2.4		3.0	3
	0.8	4.0	0.7	- 0.0	- 0.3	2.8	C_α	- 0.3	2.3	0.9	0.7	4.0	0.9	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

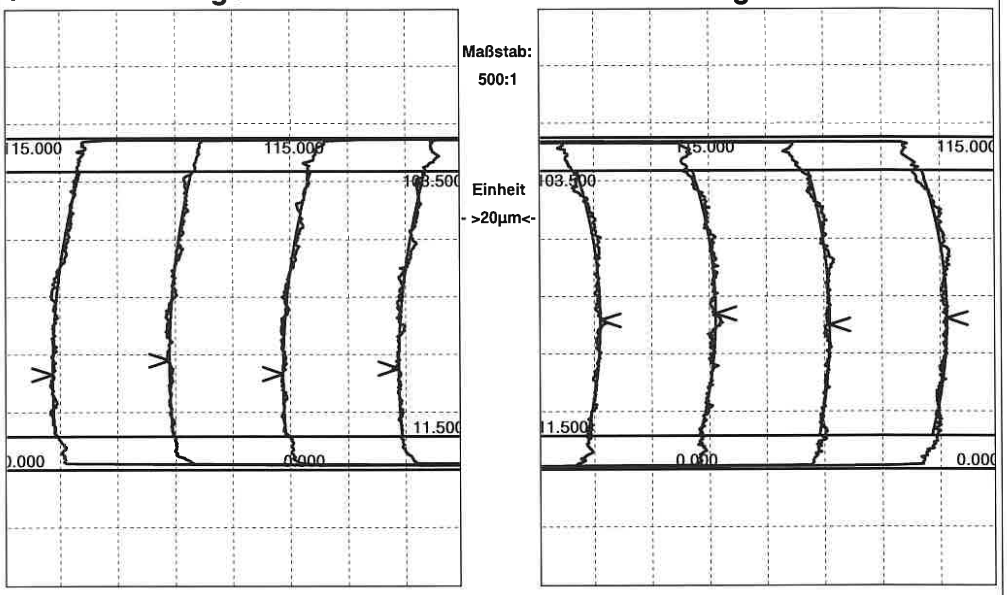
Flankenlinienmessung

Messung vom 05/11/2022 14:07:37 Dauer: 00:07:47 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.2

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	232
Schrägungswinkel	Linksschräg 27.000000 Grad	Meßzylinder (d)	261.218 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	115.000 mm		

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
3	5.8		5.9	4.5	6.2	6.7	Fβ	7.1	7.5	6.5	8.1		7.3	4
4	- 10.0	-5.0	- 10.8	- 8.2	- 11.0	- 10.2	fHβ	- 4.1	- 2.6	- 4.4	- 4.0	-5.0	- 3.8	1
2	4.7		4.5	4.2	5.3	4.8	ffβ	6.6	7.2	5.2	6.0		6.3	4
	6.3	6.0	6.3	5.9	6.4	6.5	Cβ	9.8	10.6	8.5	10.6	6.0	9.9	

Vert. Maßstab 1:2, d.h. 10 mm entspr. 20 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

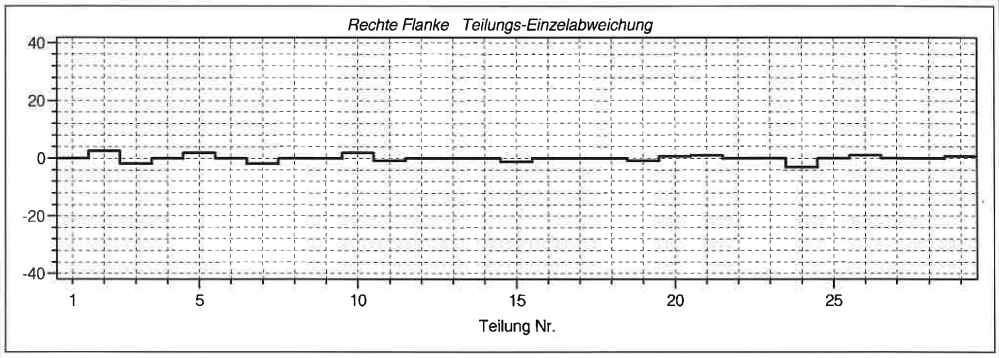
Alle Angaben in µm
Qualitäten nach DIN 3961

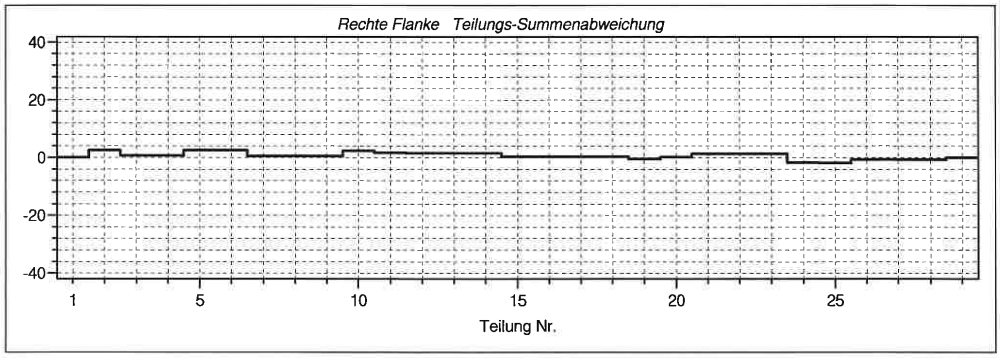
Teilungsmessung

Messung vom 05/11/2022 13:56:18 Dauer: 00:06:08 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.2

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.218 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.176		
Zahnweite (Nennmaß)	111.750 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.454 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.849 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 3.1	3	Teilungs-Schwankung (Rp)	5.7	
Teilungs-Gesamtabw. (Fp)	4.4	1	Max. Teilungssprung (fumax)	4.5	3
Teilungs-Spannenabw. (Fp(z/8))	3.3	1			

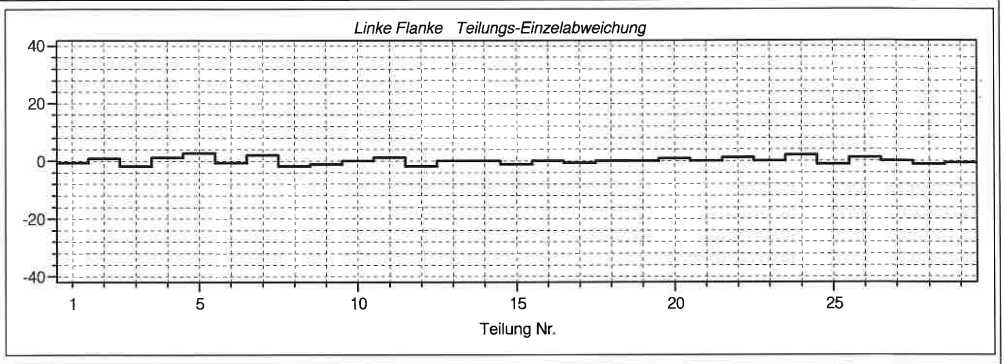
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

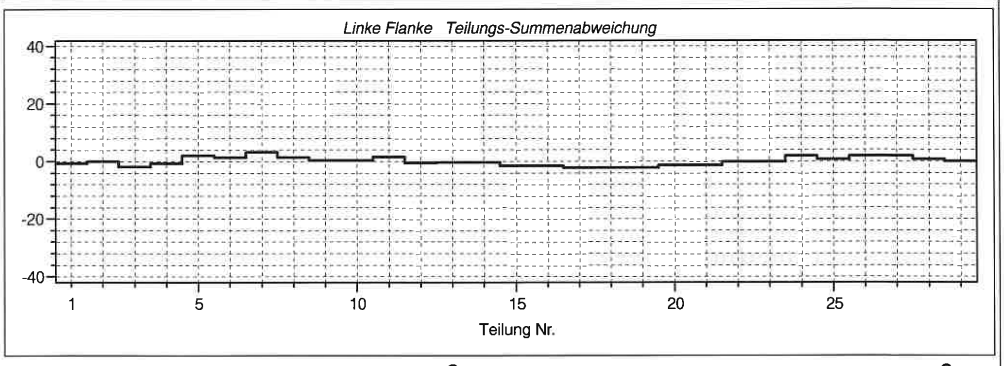
Teilungsmessung

Messung vom 05/11/2022 13:56:18 Dauer: 00:06:08 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.2

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.218 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.176		
Zahnweite (Nennmaß)	111.750 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.454 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.849 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	2.7	2	Teilungs-Schwankung (Rp)	4.7	
Teilungs-Gesamtabw. (Fp)	5.5	1	Max. Teilungssprung (fumax)	3.8	3
Teilungs-Spannenabw. (Fp(z/8))	5.1	2			

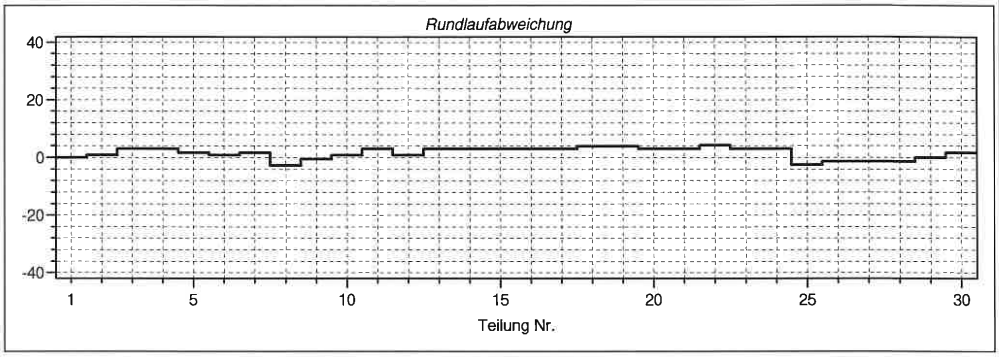
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

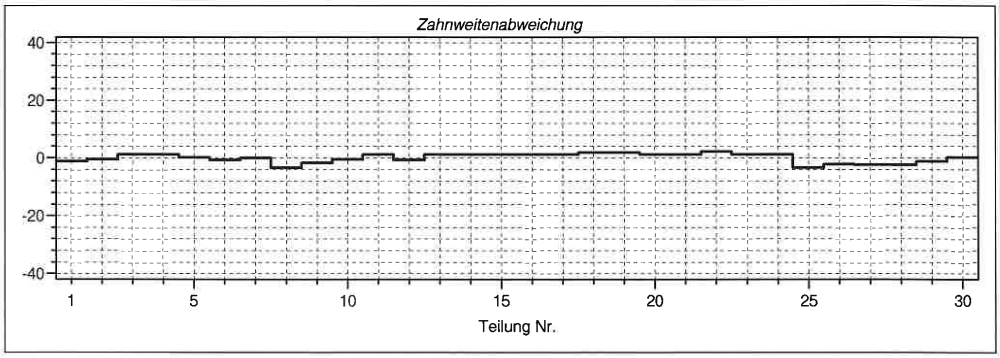
Teilungsmessung

Messung vom 05/11/2022 13:56:18 Dauer: 00:06:08 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.2

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.218 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.176		
Zahnweite (Nennmaß)	111.750 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.454 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.849 mm	Meßrollendurchmesser	14.000 mm





				Q
Min. Zahnweite (mm)	111.724	Mittl. Zahnweite (mm)	111.727	
Max. Zahnweite (mm)	111.729	Zahnweiten-Schwankung (µm)	5.5	
Anzahl Meßzähne	5			
		Rundlaufabweichung (Fr)	6.9	2
		Meßkugeldurchmesser (mm)	14.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Ritzelwelle / pinion shaft	PN-00077528.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Durchmesser	Ø 140 m6	+0,040 +0,015	140,03-140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03
Durchmesser	Ø 140 m6	+0,040 +0,015	140,03-140,04

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	18.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Ritzelwelle_pinion shaft_balancing report_PART-057680

```
*****************************************
Pekrun Getriebebau GmbH
Koebbingser Muehle 14
58640 Iserlohn/Germany
*****************************************
Operator : Ferdi Basar                          17.05.22 05:54
  Rotordaten              Fall   1              19396/10-057680
  a: 135.0 mm             b: 368.0 mm            c: 135.0 mm
  r1: 115.0 mm            Eb1/Eb2                r2: 115.0 mm
  m1: -polar                                     m2: -polar
  Tol1: 2194. gmm                                Tol2: 2194. gmm
                          N soll    : 1200.  1/Min
  Ergebnisse              Rotor: Ritzelwelle 2       17.05.22 05:54
  Lauf  3                 N ist     :  1200.  1/Min
Eb 1:       13.1  g                   Eb 2:       14.4  g
            136. Grad                             142. Grad
            in Tol                                in Tol
Anteil in Tol.Einheiten  :
        1504. gmm                               1653. gmm
```

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057680
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Ritzelwelle / pinion shaft	PN-00077528.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Vrerzahnung und Wellenübergänge /* *toothing and shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	18.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Gehäuse_housing_material certificates_PART-057669

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160914-FPQ6IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : Q6S1006030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Arana - Alava - Spain
Telf: 945 314 550 FAX: 945 314 598
olan@olan.es

Size	Product No.	Quantity	Weight (kg)	Heat No.	Position	Tensile Test YP (N/mm²)	Tensile Test TS (N/mm²)	Tensile Test EL (%)	Impact Test V Notch -20°C Energy (Joule)	Division	Chemical Composition C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Cu (%)	Mo (%)	N (ppm)	Nb (%)	Ti (%)	V (%)	Sol.Al (%)
6x2000x12000	PK20727091	1	1,413	SK21827	T	502	548	31	1: 104 2: 108 3: 119 A: 110	L P	0.0762 0.0751	0.241 0.249	1.547 1.551	0.0104 0.0107	0.0020 0.0017	0.024 0.023	0.034 0.034	0.006 0.006	0.009 0.001	33 31	0.026 0.026	0.0133 0.0133	0.040 0.040	0.031 0.030
*** Sub Total (010) ***		47	66,411 (kg)																					
*** Heat Treatment ===> Normalizing rolling ***											CEQ (%) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5													
8x3000x12000	PK20684801-4803	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110	L P	0.0832 0.0832	0.259 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.048 0.048	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
------>8x3000x12000	PK20684701-4703	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110	L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.048 0.048	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
8x3000x12000	PK20694801-4803	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 106 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.006 0.006	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20694701-4703	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 106 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.006 0.006	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20685001-5003	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 106 A: 108	L P	0.0761 0.0741	0.258 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.006 0.006	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test, Direction : Transversal, Gauge Length : 5.65 √A, (Rectangular), YP Method : Upper Point
* Impact Test, Direction : Surface Longitudinal, Sub-Size : 10mmX5.0mm
* Division - L : Ladle Analysis, P : Products Analysis
* Supply Condition : As-Rolled unless otherwise Heat Treated.

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
The material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN10025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

CE 0036 14 0035-CPR-A258 Surveyor To :

NA SEONHA
Quality Control and Inspection Team Leader NA SEONHA

KRAKATAU POSCO JL Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia

Copia de certificados de materiales empleados
Para el trabajo de: LANA LASA
Realizado con la O.F. de OLAN Nº: 100452
Su pedido N.º: 66824
Ref.: OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPQ8IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : QBS1006030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

Product No.	Division	Total-Al (%)	CEQ (%)		
PK20727001	L P	0.036 0.037	0.348		
*** Sub Total (010) ***			47	65,411 (kg)	
PK20684601-4603	L P	0.033 0.035	0.351		
PK20684701-4703	L P	0.033 0.035	0.351		
PK20684801-4803	L P	0.035 0.034	0.348		
PK20684901-4903	L P	0.035 0.034	0.348		
PK20685001-5003	L P	0.035 0.034	0.348		

CEQ (%) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN10025-2:
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

CE 0035-14-003S-CPR-A258 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia < PAGE : 173 > Testing and Inspection Team Leader NA SEON-HA

Gehäuse_housing_material certificates_PART-057669

검 사 증 명 서
MILL TEST CERTIFICATE

HYUNDAI STEEL

0038/07

주문번호 Order No. : F171220C026

품 명 Commodity : Hot Rolled Steel Plate

제품규격 Specification : EN 10025-2 S355J2+N

고객사 Customer : O.JAN

주문자 Contractor : HYUNDAI CORPORATION

증명서 번호 Certificate No. : 20171229-PS-032-020

발행일자 Date of Issue : 2017-12-29

제품사이즈 Dimension	수량 Quantity	중량 Weight (Kg)	제강번호 Heat No.	제품번호 Product No.	Position	인장시험 Tensile Test YP	TS	EL	YP-EL	RA	YR	yp MIZ	충격시험 Impact Test V-Notch -20.0℃ Energy	SF	LE	화학성분 Chemical Composition(%) Direction	C	Si	Mn	P	S	Cr	Ni	Cu	Mo	V	Nb	Ti	N	Sol Al	CEQ
						(N/mm²)		(%)	(%)	(%)	(%)		(Joule)	(%)	(mm)																
20 x 2500 x 12100	1	4,749	P54893	FA0054832	T	436.0	540.3	26				U	1: 214 2: 210 3: 223 A: 216			L F	1,546 1,564	199 194	1,176 1,169	167 172	44 41	3 3	1 1	29 27	0 0	43 35	43 43	2 1	1 1	24 26	353 363
20 x 2500 x 12100	1	4,749	P54893	FA0054833	T	436.0	540.3	26				U	1: 214 2: 210 3: 223 A: 216			L F	1,546 1,564	199 194	1,176 1,169	167 172	44 41	3 3	1 1	29 27	0 0	43 35	43 43	2 1	1 1	24 26	359 363
20 x 2500 x 12100	1	4,749	P54893	FA0054840	T	436.0	534.5	26				U	1: 245 2: 257 3: 242 A: 248			L F	1,546 1,564	199 194	1,176 1,169	167 172	44 41	3 3	1 1	29 27	0 0	43 35	43 43	2 1	1 1	24 26	353 363
20 x 2500 x 12100	1	4,749	P54893	FA0054842	T	436.0	534.5	26				U	1: 245 2: 257 3: 242 A: 248			L F	1,546 1,564	199 194	1,176 1,169	167 172	44 41	3 3	1 1	29 27	0 0	43 35	43 43	2 1	1 1	24 26	353 363

NOTE
- Position – T:Top, M:Middle, B:Bottom
- Tensile test – Direction Transverse, Gauge length:200mm (Rectangular), Elongation is converted to elongation on gauge length 5.65√A, by ISO 2566-1, YP Mid : 2 (0.2% off-set),3 (0.5% undefined), U (Upper yield point), L (Lower yield point)
- Impact test – Direction Longitudinal, Size:10mmX10mm, SF:Shear fracture, LE:Lateral Expansion
- Division – P:Product analysis, L:Ladle analysis

- THIS CERTIFICATE IS ISSUED ACCORDING TO EN 10204 3.1 AD2000W0(W1)
This Mill Test Certificate is issued in accordance with EN 10204 Type 3.1

상기와 제품은 검사서 결과 주문조구사항과 지정된 규격의 요약된 요구사항에 합격함을 증명합니다.
WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ORDER AND SPECIFICATION

Signature S. B. Park
Chief Of Quality Assurance Team

- 본 검사증명서는 홈페이지 고객지원 정보 메뉴얼에서 출력한 사본입니다. 전자유서와 이용은 현대제철 고객지원실에서 확인하실 수 있습니다. (http://hyundai-steel.com/customer/customer.jsp)
- This Mill Test Certificate is a copy that has been printed from original electronic documentation digital signed.
You are able to check an original electronic document at hyundaisteel's customer portal (http://hyundai-steel.com/customer/customer.jsp) ▸ QRcode scanner App : "Other"
- [사용상 주의사항] 본 검사증명서는 열거된 규격 및 사용시 제품성분 및 인장성 범위가 명시됨 수 있습니다.
- [Caution for Use] Damage on products and safety problems may arise if used other than to the steel listed in this Mill Test Certification.

Copia de certificados de materiales empleados
Para el trabajo de JAN LASA
Realizado con la O.F. de OLAN Nº 110452
Su pedido N.º 66.834
Ref. OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qslab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000011094

Date : 16.10.2021

Page 7 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID.SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Arala - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** Plate Dimension -Thickness x Width x Length 25.00MMX2500MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL *	Bend Test	Impact Value x(J)					
																			mm		Mpa	Mpa			I	II	III	Ave	Temp °C	Orim
B17532	B175321100	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.018	56	0.42	419	552	27		322	334	309	321.67	-20	Ln
B17532	B175321100	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.018	56	0.42	419	552	27		322	334	309	321.67	-20	Ln
B17533	B175330160	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Ln
B17533	B175330180	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Ln
B17533	B175330100	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Ln
B17533	B175330A60	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Ln
B17533	B175330200	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Ln
B17533	B175330220	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Ln
B17533	B175330A60	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Ln
B17533	B175330180	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Ln
Sub Total		17	99.246																													

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:33:12
Printing Date 18.10.2021 & Time 11:16:51

Deepak Prasad
Authorised Signatory
TSD PlateMill

Copia de certificados de materiales empleados
Para el trabajo de LIAN LASA
Realizado con la O.F. de OLAN Nº 120452
Su pedido N.º 66834
Ref.: OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.proj@angul.jspl.com
Registered Office:Post box No. 5 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

Page 15 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF B83,SPAIN,PIN-08000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355J2+N Plate Dimension -Thickness x Width x Length : 8.000MMX3000MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/T	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value (J)						
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orient
816737	816737/009	1	2.211	L	0.189	1.33	0.004	0.016	0.21	0.050	0.007	0.001	0.021	0.002	0.0010	0.009	0.0005	0.014	58	0.40	432	589	28		94	98	107	99.670	-20	Lo
Sub Total		1	2.211																												
G Total		316	670.884																												

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to UOC Doc. No. : JSPL/ANGUL/TDC/-00733A: Rev.02, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B
5. Surface Inspection: As per EN10163 class A Subclass 3
6. Flatness: As per EN10029 Class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) :C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No:
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

CE
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0045 - CPR - 1835

INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

Page 16 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

J1. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclsh.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O.P.Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena Cintxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011045

Date : 14.10.2021

Page 21 of 25

To. M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF B83,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355J2+N Plate Dimension -Thickness x Width x Length : 50.00MMX2500MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties									
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value (vJ) I	II	III	Avg	Temp °C	Orient
			MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value (vJ) I	II	III	Avg	Temp °C	Orient
A13620	A136200A0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0003	0.018	56	0.42	405	536	27		128	132	144	134.00	-20	Lo
A13620	A136200B0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0003	0.018	56	0.42	405	536	27		128	132	144	134.00	-20	Lo
B17869	B176906A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B176906B0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B176907A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B176907B0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B176908A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	390	538	26		148	134	132	137.00	-20	Lo
Sub Total		7	82.075																											

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD Plate/Mill

Copia de certificados de materiales empleados
Para el trabajo de.....JUAN.....
Realizado con la O.F. de OLAN Nº.....210452
Su pedido N.º.....06834.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011045

Date : 14.10.2021

Page 24 of 25

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLT.A,28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** **Plate Dimension** -Thickness x Width x Length : **55.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%El.*	Bend Test	Impact Value (J) I	II	III	Avg	Temp °C	Orien
					Chemical Analysis																**Mechanical Properties**									
B16535	B16535B6A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.003	0.0020	0.010	0.0005	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo
B16535	B16535B8A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.003	0.0020	0.010	0.0005	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo
Sub Total		3	38.709																											
G Total		357	1150.149																											

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to JDC Doc. No. : JSPL/ANGUL/TDC/- 00733A, Rev 2, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class B
5. Surface Inspection: As per EN10163:2005 class A Subclass 3
6. Flatness: As per EN10029:2011 table 4 class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) : C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.jmo@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

OLAN SA
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01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011045

Date : 14.10.2021
Page 25 of 25

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
11. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 24H 14.07.2021
Despatch Advice No:
Vehicle No.
* DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR_BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14.26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

INSPECTION CERTIFICATE

CE

Test Certificate No. 0276

To, M/s NETWORK STEEL S.L. SPAIN

C ARSENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF B83,SPAIN,FIN-00000

TEST RESULTS

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Arala - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling

Supply Condition: Furnace Normalized
Destination: Fully Killed

Material Grade : EN10025-2:2005 S355J2+N Plate Dimension -Thickness x Width x Length : [illegible]

Heat No	Plate No	No of Pcs	Wt MT	Chemical Analysis (Ladle)																Mechanical Properties									
				[illegible]																[illegible]				[illegible]					
[illegible]	[illegible]	7	[illegible]	0.18	1.46	0.012	0.02	0.22	0.021	0.165	0.063	0.043	0.023	0	0.068	0.0020	0.023	.48	0.420	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	10	[illegible]	0.170	1.45	0.012	0.019	.42	0.024	0.167	0.063	0.046	0.018	0	0.066	0.0095	0.020	.51	0.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	12M	1	12.953	0.181	1.45	0.012	0.015	0.18	0.021	0.166	0.063	0.045	0.018	0.0001	0.066	0.0025	0.022	.55	0.430	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Sridhar Behera

Copia de certificados de materiales empleados
Para el trabajo de.....LIAN LASA.....
Realizado con la O.F. de OLAN Nº.....70452
Su pedido N.º.....66834.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

INSPECTION CERTIFICATE

CE

Test Certificate No. 4276
To, M/s NETWORK STEEL S.L. SPAIN
CANDIDAL MARCELO SPINOLA 2-8 PLTA.28016 MADRID SPAIN CIF B81,SPAIN,PIN-00000

TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling

Supply Condition: Furnace Normalized
Deoxidation :Fully Killed

Remarks :

Date :

Authorised Signatory
QA/QC Engineer

Gehäuse_housing_material certificates_PART-057669

검 사 증 명 서
MILL TEST CERTIFICATE

HYUNDAI STEEL

0038/07

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

주문번호 Order No.: P171200026
품 명 Commodity: Hot Rolled Steel Plate
제품규격 Specification: EN 10025-2 S355J2+N
고객사 Customer: OLAN
주문자 Contractor: HYUNDAI CORPORATION
증명서 번호 Certificate No.: 20180301-PS-010-003
발행일자 Date of Issue: 2018-02-01

제품치수 Dimension	수량 Quantity	중량 Weight (kg)	제강번호 Heat No.	제품번호 Product No.	Position	인장시험 Tensile Test YP	TS	EL	YP-EL	RA	YR	YP Mod	충격시험 Impact Test V Notch-20.0 °C Energy	SF	LE	Origin	화학성분 Chemical Composition(%) C	Si	Mn	P	S	Cr	Ni	Cu	Mo	N	Nb	Ti	V	Cu+Ni	CEQ
						(N/mm²)		(%)	(%)	(%)	(%)		(Joule)	(%)	(mm)		4	3	3	4	4	2	2	3	3	4	3	3	3	3	3
> 65 x 2600 x 12000	1	15,306	P69185	FA0215401	T	380.6	514.1	32					U				L 1,152	210	1,454	147	40	2	10	63	0	41	31	16	1	30	374
													2:313				P 1,201	207	1,453	160	37	2	10	79	0	37	29	16	2	27	379
													3:255																		
													A:277																		
65 x 2600 x 12000	1	15,306	P69185	FA0215501	T	380.6	514.1	32					U				L 1,152	210	1,454	147	40	2	10	62	0	41	31	16	1	30	374
													2:312				P 1,201	207	1,453	160	37	2	10	78	0	37	29	16	2	27	379
													3:255																		
													A:277																		
65 x 2600 x 12000	1	15,306	P69751	FA0222601	T	384.1	520.0	32					U				L 1,142	198	1,455	145	38	2	9	61	1	43	29	15	2	30	378
													1:310				P 1,147	197	1,456	118	33	2	9	60	1	35	29	16	1	34	379
													2:372																		
													3:320																		
													A:302																		
65 x 2600 x 12000	1	15,306	P69750	FA0222701	T	388.8	501.2	32					U				L 1,170	186	1,454	156	35	2	8	61	0	41	29	16	2	36	374
													1:288				P 1,247	194	1,429	134	37	2	9	79	1	36	31	16	1	31	380
													2:313																		
													3:255																		
													A:285																		

NOTE
- Position – T:Top, M:Middle, B:Bottom
- Tensile test – Direction:Transverse, Gauge length:5.65√A, (Round), YP Mod : 2 [0.2% off-set],5 (0.5% underload), U (Upper yield point), L (Lower yield point)
- Impact test – Direction:Longitudinal, Size:10mmX10mm, SF:Shear fracture, LE:Lateral Expansion
- Division – P:Product analysis, L:Ladle analysis

- THE CERTIFICATE IS ISSUED ACCORDING TO EN 10204 3.1 AS2000WCIW1
The Mill Test Certificate is issued in accordance with EN 10204 Type 3.1

상기의 제품은 검사치 결과 주문요구사항의 규격에 합격한 것을 증명합니다.
WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ORDER AND SPECIFICATION

Signature: S. B. Park
Chief Of Quality Assurance Team

- 본 검사증명서는 해당 전자문서(전자서명 포함 문서)로부터 출력된 사본입니다. 전자문서를 이용한 추고자할 고객님께서 확인하실 수 있습니다 (http://kr.hyundai-steel.com/cs/cs/login.jsp)
- This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signed).
You are able to check an original electronic document at hyundai steel's customer portal(http://kr.hyundai-steel.com/cs/cs/login.jsp) • DRcode scanner App : "DRea"
- [사용상 주의사항] 본 검사증명서의 명기된 이외 타 사용시 품질문제 및 인명상 분쟁시 책임없음. ※ 정밀보기.
- [Caution for Use] Damage on products and safety problems may arise if used other than to the uses stated in this Mill Test Certificate.

Copia de certificados de materiales empleados
Para el trabajo de.....OLAN, S.A.
Realizado con la O.F. de OLAN Nº 270452
Su pedido N.º.....68834
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:jjslab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000011096

Date : 16.10.2021

Page 1 of 2

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Aaparrena Ciintxerdui 9
01250 Arala - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:FURNACE NORMALIZED

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355J2+N Plate Dimension -Thickness x Width x Length : 130.0MMX2200MMX8550MM

Heat No	Plate ID	Pcs	Wt. MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orient
A13625	A1362506A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362507A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362508A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362509A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
B16551	B165510Z4A0	1	19.196	L	0.182	1.47	0.002	0.016	0.20	0.037	0.008	0.045	0.046	0.011	0.0010	0.011	0.0003	0.015	57	0.44	330	524	26		188	159	166	171.00	-20	Lo.
Sub Total		5	95.980																											
G Total		5	95.980																											

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-00733A; Rev 02, Dt.:09.03.2021
4. Supply Condition: Furnace Normalized at 900 ± 20°C, cycle time minimum: 1.4 minutes per mm thickness + 10 minutes.
5. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:48:30
Printing Date 18.10.2021 & Time 11:22:14

Deepak Prasad
Authorised Signatory
TSD PlateMill

Copia de certificados de materiales empleados
Para el trabajo de.....OLAN LASA.....
Realizado con la O.F. de OLAN Nº.....170452.....
Su pedido N.º.....68824.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclsh.pm@angul.jspl.com
Registered Office:Post box No.6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-06761) 254191-95; Fax :-06761 -254141-44

CE
0045
13
0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011096

Date : 16.10.2021

Page 2 of 2

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN.PIN-00000

TEST RESULTS

Supply Condition:FURNACE NORMALIZED

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF = Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM = Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

6. Surface Inspection: As per EN10163 class A Subclass 3
7. Flatness: As per EN10029 Class N (L Type)
8. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
9. CE (IIW) :C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
10. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
11. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
12. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification, The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:48:30
Printing Date 18.10.2021 & Time 11:22:14

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

OLAN, S.A.
PRODUCTOS METÁLICOS · CORTE A MEDIDA
OXICORTE · TRATAMIENTOS ANTICORROSIVOS

INFORME DE INSPECCIÓN POR ULTRASONIDOS
ULTRASONIC INSPECTION REPORT

Nº Informe (Report): **O.F. 170.452**

Cliente: Customer:	JUAN LASA	**Nº Pedido:** Order:	66.834	**Referencia:** Reference:	OF.8617
Descripción: Description:	Chapa	**Norma:** Standard:	UNE-EN 10160:2000	**Clase:** Grade:	S2 + E2
Tipo de material: Type of material:	Chapas de acero			**Acabado superficial:** Surface finish:	Laminación
Equipo: Equipment:	KRAUTKRAMER USM 32			**Acoplamiento:** Couplant:	AGUA

PALPADOR - PROBE				CALIBRACIÓN - CALIBRATION				
TIPO TYPE	FREC. FREQ (MHz.)	TAMAÑO SIZE (mm.)	Espesor Thickness (mm.)	PARA CAMPO FOR RANGE	CAMPO RANGE (mm.)	TALADRO REGISTRO REC. HOLD	PARA LA GANANCIA FOR GAIN	GANANCIA GAIN
SEB-4T	4	Ø 24 mm	8 / 65	Chapa	16 / 130	Ø 5 mm.	80 % ECO	42 / 56 dB
B2S-E	2	Ø 24 mm	130	Chapa	260	Ø 8 mm.	80 % ECO	46 dB

RESULTADOS (RESULTS):
Se ha efectuado la inspección por ultrasonidos según la norma UNE-EN10160:2000 según clases S2 + E2 al siguiente material / The inspection by ultrasonic test has been made in accordance with UNE-EN10160:2000 standard and S2 + E2 grade the following material:

1 chapa/*plate* 8 x 3000 x 12000 (S-355-J2+N):	PK20684701
1 chapa/*plate* 20 x 2500 x 12100 (S-355-J2+N):	FA90548303
1 chapa/*plate* 25 x 2500 x 12000 (S-355-J2+N):	B1753303A0
1 chapa/*plate* 50 x 2500 x 12000 (S-355-J2+N):	B1706906B0
1 chapa/*plate* 55 x 2500 x 12000 (S-355-J2+N):	B8370204A0
1 chapa/*plate* 65 x 2500 x 12000 (S-355-J2+N):	FA92167401
1 chapa/*plate* 130 x 2200 x 8550 (S-355-J2+N):	A1362509A0

En dicha inspección se han detectado indicaciones que NO superan el nivel de referencia, por lo que se clasifica la chapa como ACEPTABLE / In this inspection weren't found indications exceeding the reference level, so the material is classified as **ACCEPTABLE.**

CROQUIS (SKETCH):

OPERADOR (OPERATOR): José Ignacio Bañales Esparza
Nº CERTIFICADO (CERTIFICATE NR.): E-A-004397-UT-2-M-2
FECHA (DATE): 14/02/2022

OLAN, S.A.
Pol. Ind. Ascamino · C/ Amezaga, 9
01250 ARAYA (ALAVA)
Tl.: 945 31 46 84 · Fax: 945 31 45 89

Gehäuse_housing_material certificates_PART-057669

INTEC Inspección Técnica	INSPECCIÓN VISUAL *(Visual Testing)*	INFORME Nº *(ReportNr.)* 220226

CLIENTE *(Customer)*	ORDEN DE FABRICACIÓN *(Purchaseorder)*	PLANO CLIENTE *(CustomerDrwg).*
TALLERES JUAN LASA, S.A.	65.489/ OF 8617	PART-057669
DESIGNACIÓN *(Item)*	**MATERIAL** *(Material)*	**SOLDADURA** *(Welding)*
GEHÄUSE (3 piezas)	S355J2+N	FW / BW

CONDICIONES DE EXAMEN(Examination Conditions)

ILUMINACIÓN *(Ilumination)*		SOLDADURA *(Welding)*		ESTADO DE LA SUPERFICIE *(Surface status)*
				SOLDADURA EN BRUTO
Natural *(Natural)*	Artificial *(Artificial)*	Procedimiento *(Proced.)*	Tipo Junta *(Jointtype)*	PROCEDIMIENTO DE INSPECCIÓN *(Inspectionprocedure)*
	X	MAG	FW/BW	UNE EN ISO 17637

ESPECIFICACIÓN *(Specification)*	OBSERVACIONES (Observations)
S/EN5817	
GRADO *(Grade)*	**RESULTADO DEL EXAMEN** *(ExaminationResults)*
B	ACEPTABLE

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.

(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-003109-VT-2-S-2 *(Level 2 Inspector)*	FECHA *(Date)*
INTEC Inspección Técnica email: intec.era@gmail.com Tel: 696 320 618 / Lezkoa, Gipuzkoa	23/02/2022

Gehäuse_housing_material certificates_PART-057669

INTEC Inspección Técnica	EXAMEN POR LÍQUIDOS PENETRANTES *(Examfor penetran liquids)*	INFORME Nº *(ReportNr.)* 220217

CLIENTE *(Customer)*	PEDIDO CLIENTE *(Purchaseord.)*	PLANO CLIENTE *(PurchaseDrwg.)*
TALLERES JUAN LASA, S.A.	65.489/ OF 8617	PART-057669

MATERIAL *(Material)*	COLADA *(Heat)*
S355J2+N	--

DESIGNACIÓN *(Item)*
GEHÄUSE

LIMPIEZA *(Cleaning)*	TIPO DE PENETRANTE *(Type of penetrating)*	ELIMINADOR *(Eliminator)*	REVELADOR *(Revealer)*
ARDROX 9PR5	ARDROX 996 PB	ARDROX 9PR5	ARDROX LD7

MÉTODO *(Method)*
LIQUIDOS PENETRANTES COLOREADOS LAVABLES CON DISOLVENTE

ESTADO DE LA SUPERFICIE *(State of thesurface)*
SOLDADURAS EN BRUTO

OBSERVACIONES *(Observations)*

ACEPTADOS *(Accepted)*	RECHAZADOS *(Rejected)*
3 PIEZAS	--

PROCEDIMIENTO *(Specification)*	GRADO DE EXIGENCIA *(Demand grade)*
EN ISO 23277	3X

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.
(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-003109-PT-2-S3 INTEC Inspección Técnica email: intec.una@gmail.com Tel: 695 320 618 / Lazkao Gipuzkoa	FECHA
	23/02/2022

05 – PT – IT – M

Gehäuse_housing_material certificates_PART-057669

Juan Lasa	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order* 4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL* 8617-1

		Valor medido *Measured Value*					Valor medido *Measured Value*		
Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		565		22				
2	485+D		500		23				
3	185		186		24				
4	330		331		25				
5	65		65		26				
6	Ø360-D		Ø340		27				
7	Ø330-D		Ø310		28				
8	310		309		29				
9	Ø300-D		Ø280		30				
10	Ø300-D		Ø280		31				
11	520		518		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

Responsable control final/ *Final Control responsable*

Gehäuse_housing_material certificates_PART-057669

Juan Lasa	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order*	4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL*	8617 - 2

		Valor medido *Measured Value*					Valor medido *Measured Value*		
Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		565		22				
2	485+D		497		23				
3	185		186		24				
4	330		330		25				
5	65		64		26				
6	Ø360-D		Ø340		27				
7	Ø330-D		Ø310		28				
8	310		309		29				
9	Ø380-D		Ø280		30				
10	Ø300-D		Ø280		31				
11	520		518		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

Responsable control final/ *Final Control responsable*

Gehäuse_housing_material certificates_PART-057669

Juan Lasa	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order* 4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL* 8617-3

		Valor medido *Measured Value*					Valor medido *Measured Value*		
Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		564		22				
2	485+D		499		23				
3	185		186		24				
4	330		330		25				
5	65		64		26				
6	Ø360-D		Ø359		27				
7	Ø330-D		Ø310		28				
8	310		309		29				
9	Ø300-D		Ø280		30				
10	Ø300-D		Ø280		31				
11	520		519		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

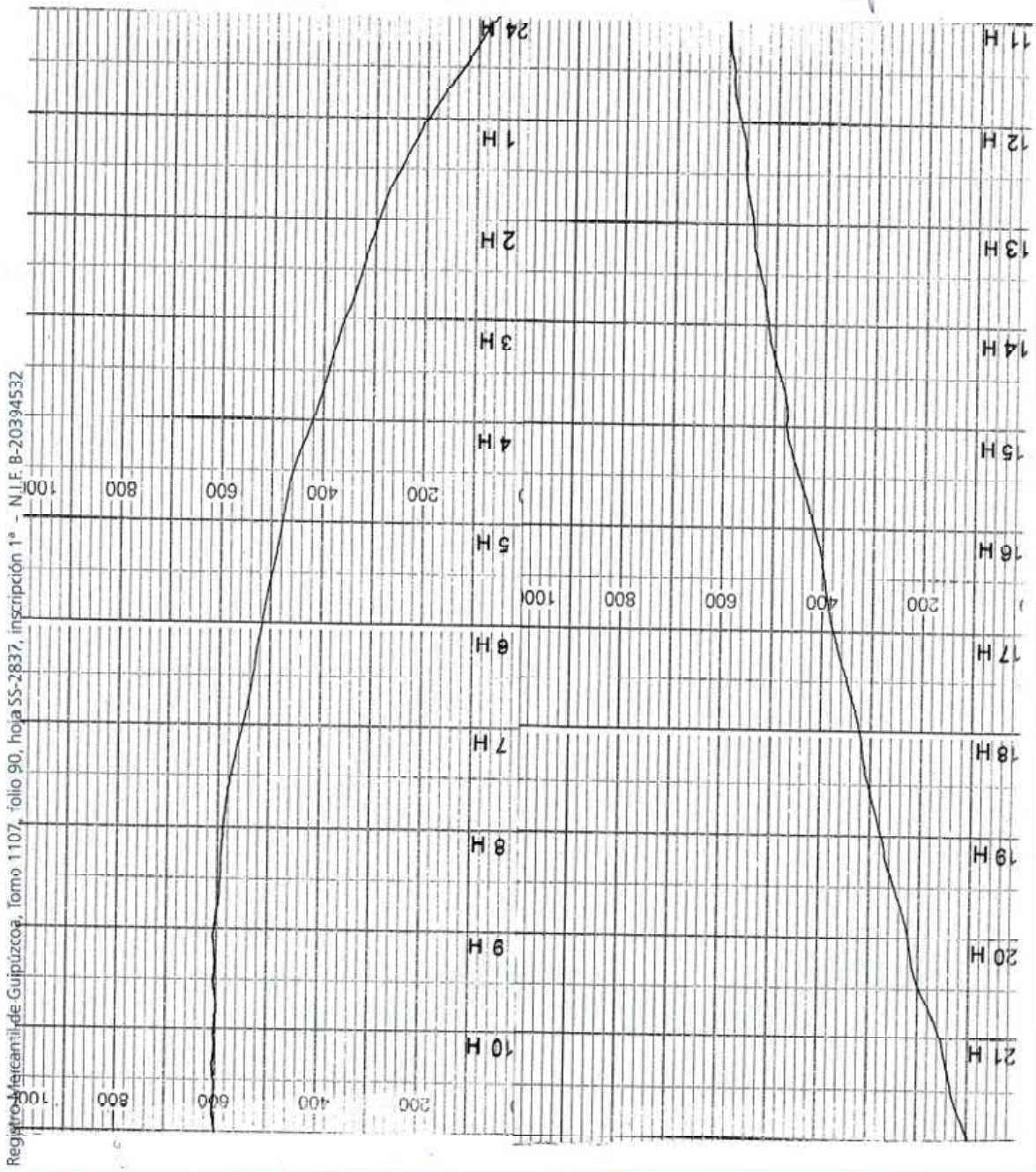
Responsable control final/ *Final Control responsable*

Gehäuse_housing_material certificates_PART-057669

muñagorri S.L.
recubrimientos

Talleres Juan Lasa, S.A.
Nº Reg. 24-02-2022
Pdo. 65.493 OF: 8617
3 carter. s/p PN 00077481.00
Estabilizado 600ºC

RECUBRIMIENTOS MUÑAGORRI, S.L.
Polígono Industrial Beotibar
20491 BELAUNTZA



Registro Mercantil de Guipúzcoa, Tomo 1107, folio 90, hoja SS-2837, inscripción 1ª - N.I.F. B-20394532

Polígono Industrial Beotibar, s/n Tel. 943 67 30 28 Fax 943 67 01 35 20491 BELAUNTZA (Gipuzkoa)

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Gehäuse / housing	PN-00077481.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagerbohrung	Ø 360 H7		360,03-360,05
Lagerbohrung	Ø 360 H7		360,03-360,05
Lagerbohrung	Ø 300 H7		300,02-300,04
Lagerbohrung	Ø 300 H7		300,03-300,04
Achshöhe	550	0 -0,2	i.O.
Ankerlöcher	Ø 42		i.O.
Lochabstand	400		i.O.
	700		i.O.
	380		i.O.
	380		

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	23.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 2

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	Projekt-Nr. 4000370 S/No. 10002290

Menge *Quantity*	Benennung *Designation*	Getriebetyp *Gearbox type*	Zeichnungs-Nr. *Drawing no.*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW	PN-00096627.001.01

Technische Daten Getriebe / *Technical data gear unit*			
Leistung/*power*	4100 kW	Übersetzung/*ratio*	i = 2,448:1
Ölmenge/*oil quantity*	270 l / 63 l/min	Drehzahl/*number of revolution*	n_1 =1493 min^{-1}
Ölviscosität/*oil viscosity*	ISO VG 320	Drehzahl/*number of revolution*	n_2 = 609,8 min^{-1}
Anordnung Antrieb *drive arrangement*	Horizontal	Anordnung Abtrieb *output arrangement*	Horizontal
Drehrichtung Abtrieb *sense of rotation (output)*	CCW	Schmierung *lubrication*	recirculation lubrication

Messprotokoll für Getriebe / *measuring data report for gear unit*

Tragbilder und Zahnspiele
meshing patterns and gear clearance of the toothing

Prüfergebnis:

Die Tragbilder und Zahnspiele der Verzahnungen wurden während der Getriebemontage nach den Zeichnungen geprüft und entsprechen den, der Konstruktion vorgegebenen, Qualitätsanforderungen.

Test result:

The meshing patterns and gear clearances of the gear toothing were checked during gear assembly according to the drawings and correspond to the quality instructions specified by the construction.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	18.05.2022	M. Hammann	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 2 / 2

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	Projekt-Nr. 4000370 S/No. 10002290

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Stirnradgetriebe /*spur gear gearbox*	PN-00096627.001.01

Maßprotokoll der Anschlussmaße
measurement report of the connection dimensions

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Antriebswelle / *Input shaft*	Ø 140 m6	+0,040 +0,015	140,04
Höhe / *height*	550	0 -0,2	i.O.
Länge / length	180	+0,5 -0,5	i.O.
Abtriebswelle / Output shaft	Ø 240 m6	+0,046 +0,017	240,03
Höhe / *height*	550	0 -0,2	i.O.
Länge / *length*	292	+0,5 -0,5	i.O.
Fußlochabstand / *distance of the Housing holes*	400/220/480	+0,8 -0,8	i.O.
Fußlochabstand / *distance of the Housing holes*	380/380	+0,8 -0,8	i.O.
Fußlöcher / *housing holes*	Ø 42	+0,3 -0,3	i.O.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	27.05.2022	J. Nenast	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate* : 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 1 von 3

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10-2
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Serial-Nr.: *Serial- No.:*	10002290	Probelaufdatum: *Test run date::*	24.05.2022

Menge/*Quantity*	Benennung/*Designation*	Getriebe-Typ/*Gearbox type*
1	Getriebe	ASR 450-R-CCW

Technische Daten Getriebe / *Technical data gear unit*					
Leistung/ *power*	P [kW]	4100	Drehmoment/ *torque*	T [Nm]	-
Übersetzung/ *ratio*	i	2,4483:1	Drehzahl/ *number of revolution*	n1 [1/min]	1493
Drehrichtung/ *sense of rotation*		CCW	Drehzahl/ *number of revolution*	n2 [1/min]	609,8
Ölviscosität/ *oil viscosity*	[cST 40°C]	320	Schmierung/ *lubrication*		Circulating oil lub.
Ölmenge / *oil quantity*	[l/min]	63	Ölfüllmenge/ *oil filling quantity*	[l]	270

Probelaufprotokoll / test run report

Antriebsdrehzahl beim Probelauf *drive number of revolution during test run*	n1 [1/min]	Ist / *actual value* 1493
Abtriebsdrehzahl beim Probelauf *output number of revolution during test run*	n2 [1/min]	Ist / *actual value* 609

Temperaturen nach Laufzeit *Temperature after running time*			Lager antriebsseitig *bearing on drive side*	Lager abtriebsseitig *bearing on output side*
Antrieb/*drive*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	40 C°	42 °C
Abtrieb/*output*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	34 °C	43 °C
Öltemperatur /*oil temperature*		[°C]	42	

Separate Temperaturaufzeichnung mit Datenlogger, mit „JA“ oder „NEIN“ bestätigen *Separate temperature recording with data logger, confirm with "YES" or "NO*		Ja
Laufzeit Probelauf /*running time test run*	[h]	4
Ölfüllmenge/ *oil filling quantity*	[l]	270
Ölmenge/ *oil flow rate*	[l/min]	63
Probelauföl/ *test run oil*	[cST 40°C]	ISO VG 320

Erfassen des Öldruckes/ *recording the oil pressure*		
Öldruck bei Probelaufstart/ *oil pressure at test run start* (mit Angabe der Öltemperatur / with indication of the oil temperature)	3,4bar @ 24C°	
Öldruck bei Beharrungstemperatur (alternativ nach Laufzeit h) *Oil pressure at steady-state temperature (alternatively after running time h)*	Soll / *nominal value* bar @ C°	Ist / *actual value* 2,0bar @ 42C°

Öldichtigkeit des Getriebes, mit „i.O.“ oder „n.i.o.“ bestätigen *oil tightness of the gearbox, confirm with "i.O." or "n.i.o.*	i.O

Schwingungsmessung/ *vibration measurement*	
Schwingungsmessung gemäß Beschreibung, mit „JA“ oder „NEIN“ bestätigen *vibration measurement acc. to description, confirm with "YES" or "NO*	Ja
Messpositionen nach Vorgaben in der Maßzeichnung, mit Angabe (x) bestätigen *measuring positions acc. to specifications in the dimensional drawing, confirm with indication (x)*	x

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 2 von 3

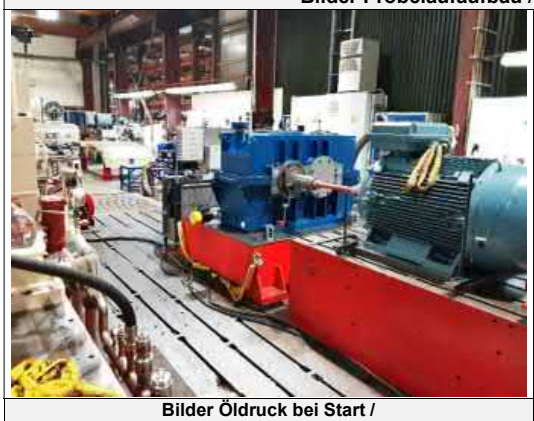
Funktionsprüfung von Zubehörteilen/ *functional test of accessory parts*	
Zubehör auf Funktion geprüft (Durchflusswächter, Druckwächter, etc.), mit Angabe (x) bestätigen *Accessories checked for function (flow monitor, pressure monitor, etc.), confirm with indication (x)*	-

Erfassen der Serialnummern/ *recording the serial numbers*	
Erfassen aller Serialnummern des verbauten Zubehörs am Getriebe, mit Angabe (x) bestätigen *recording of all serial numbers of the installed accessories on the gearbox,/ confirm with indication (x)*	x

Prüfungen Mühlengetriebe/ *tests mill gear unit*		
Maß X/ *dimension X*	[mm]	
Anschlussflanch/ *connecting flange*		
Radialschlag/ *radial run-out*	[mm]	
Axialschlag/ *axial run-out*	[mm]	

Weitere Prüfungen/ *further tests*			
Schallpegel in 1m Entfernung *sound level at 1m distance*	[dB(A)]	Soll / *nominal value*	Ist / *Actual value*
		-	75 dB
Innenkonservierung, mit Angabe Konservierungsmittel *interior conservation,* with indication of preservative			VCI
Ölfilter gereinigt, mit Angabe (x) bestätigen *oil filter cleaned, confirm with indication (x)*			-

Bilder Probelaufaufbau / *pictures test run bench*



Bilder Öldruck bei Start /
pictures oil pressure at start

Bilder Öldruck bei Beharrungstemperatur /
Pictures oil pressure at steady-state temperature

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 3 von 3

Bilder Durchflusswächter bei Start /
Pictures flow monitor at start

Bilder Durchflusswächter bei Beharrungstemperatur /
Pictures Flow monitor at steady-state temperature

Bilder Funktionsprüfung Instrumentierung und Zubehör /
Pictures Functional test instrumentation and accessories

Bemerkung: Probelauf ohne Last. Während des Probelaufs wurden keine Undichtigkeiten am Getriebe festgestellt.

Remark : Test run without load. During the test run, no leaks were detected at the gearbox.

Prüfer / Inspector:	J. Nenast
Datum / Date:	24.05.2022

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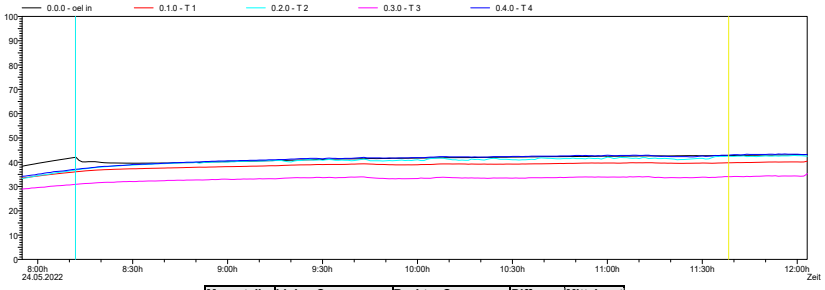
Probelaufdiagramm
test run diagram

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	Werks-Nr.: *Works no.:*	Material No. 2000064788	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-10-2
Bestell-Nr.: *Order no.:*	4500494756	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002290	Artikel-Nr.: *Article no.:*	PART-060561

Temperaturverlauf / *temperature profile*



Messstelle	Linker Cursor		Rechter Cursor		Differenz		Mittelwert	
Zeit	24.05.2022, 08:11:55		24.05.2022, 11:38:19		03:26:24			
0.0.0 - oel in	42,05	°C	42,75	°C	0,7	°C	41,391	°C
0.1.0 - T 1	36,06	°C	39,78	°C	3,72	°C	38,802	°C
0.2.0 - T 2	36,8	°C	42,5	°C	5,7	°C	40,65	°C
0.3.0 - T 3	30,91	°C	34,08	°C	3,17	°C	33,271	°C
0.4.0 - T 4	37,1	°C	42,9	°C	5,8	°C	41,39	°C

58640 Iserlohn	24.05.2022	J. Nenast
ORT / *INSPECTION LOCATION*	DATUM / *DATE*	PRÜFER / *INSPECTOR*

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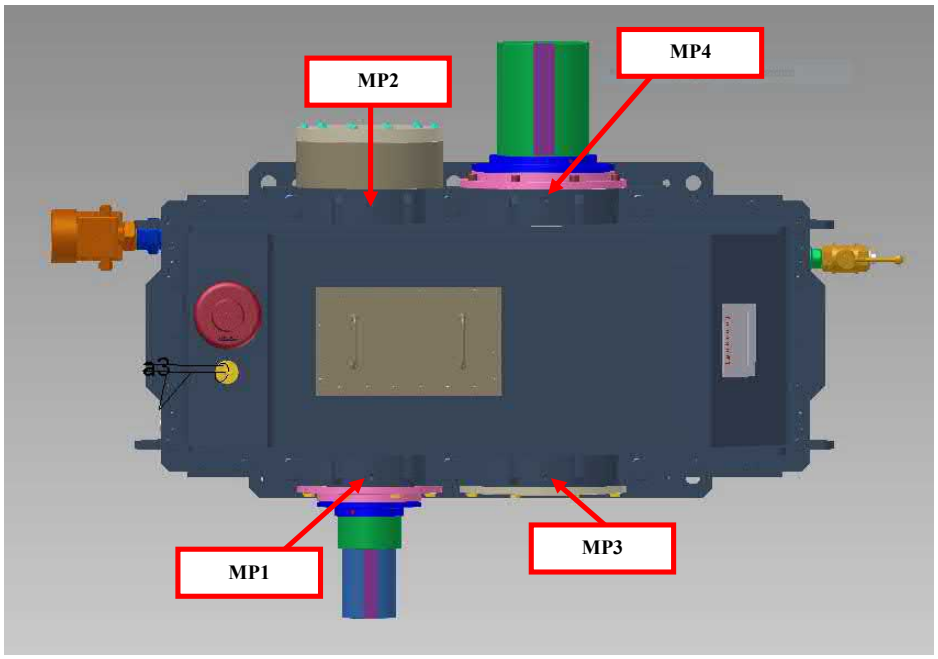
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Auftraggeber: customer:	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: PEKRUN com.-no.:	19396/10-2
Bestell-Nr.: order no.:	4500494756	Zeichnungs-Nr.: drawing no.:	PART-060561
Auftrags-Nr.: works no.:	Material-No.: 2000064788	Kennwort: code word:	Projekt-Nr. 4000370 S/No. 10002290

Menge/quantity	Benennung/designation	Getriebe-Typ/gear unit type
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW

Gearbox overview



Remarks:
Measuring points acc. to dimensional drawing.

Test result:
The results of the test run comply with the Pekrun quality specifications. The test results are listed on the second page.

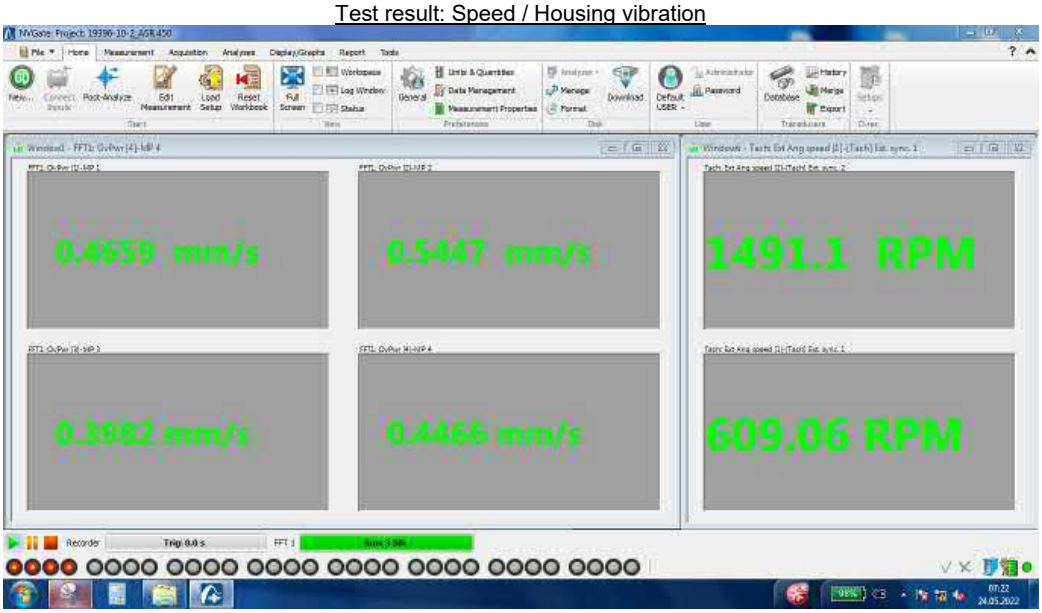
J. Nenast

Datum: 24.05.2022

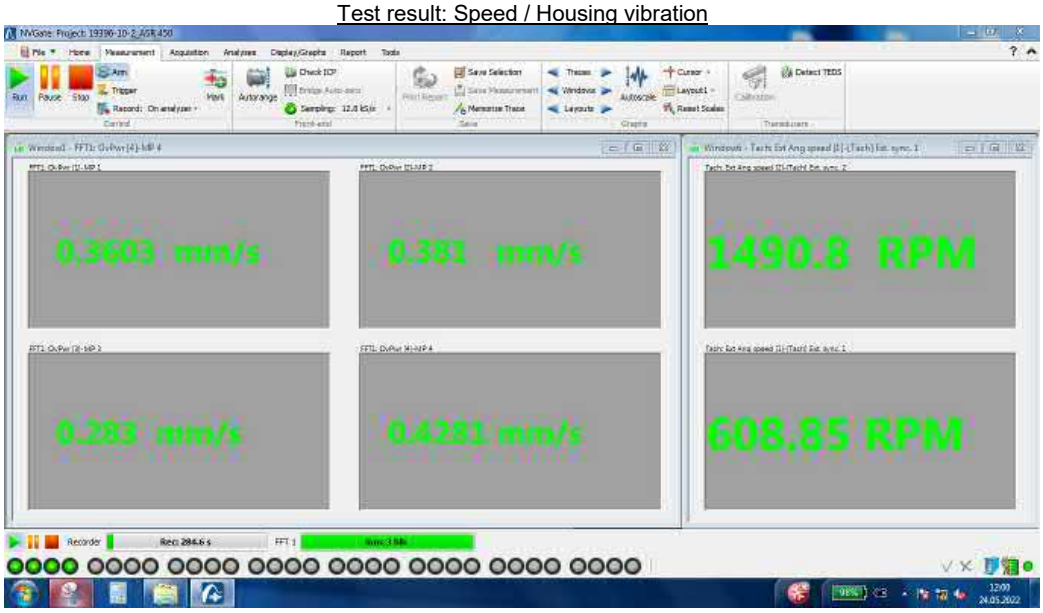
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Test result: Speed / Housing vibration



Test result: Speed / Housing vibration



Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 2

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	S/No. 10002290

Menge *Quantity*	Benennung *Designation*	Getriebe-Typ *Gearbox type:*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW

Anstrichprüfung / *coat of paint report*

Anforderungen / ***requirements:***			
Spezifikation (PEKRUN oder Kunden-Nr.): *Specification (PEKRUN or customer no.):*		QH00510B_01	
Vorbehandlung nach ISO 12944-4 *Surface preparation treatment acc to EN ISO 12944-4*		Shot blasting ☐SA 2 / ☒SA 2½ / ☐SA 3	
Oberflächenreinheit *Surface cleanliness*		Acc. to ISO 8501 (free of rust, oil, tinder and other impurities)	
Oberflächenrauheit *Surface roughness*		acc. to SA 2½	
	Grundanstrich *1st. Coat (Primary coat)*	Zwischenanstrich *2nd. Coat (Intermediate coat)*	Deckanstrich *3rd. Coat (Top coat)*
Produktname *Name of Product*	Vestozink 2K EP Zink	VESTOPOX 2K-EP-1.Deck EG RAPID	VESTOPUR 2K-DT-Deck – ATEX
Chargen Nr.: *Charge No.*	2200964	2200193	2200781
Farbe (RAL Nr.) *Color (RAL no.)*	graumatt	RAL 7703	RAL 5001
Trockenschichtdicke *DFT (dry film thickness)*	80 µm – 100 µm	162 µm -183 µm	230 µm – 270 µm
Lufttemperatur °C *Air temperature °C*	20 °C	21 °C	22 °C
Oberflächentemperatur °C *Surface temperature °C*	22 °C	22 °C	22 °C
Relative Luftfeuchte % *Relative air humidity %*	47 %	50 %	49 %
Datum *Date*	12.05.2022	28.05.2022	02.06.2022
Haftfähigkeit der Farbe nach ISO 2409 Gitterschnittkennwert: *Adhesion test acc. to ISO 2409 Parameter of grid cut test:*		ISO GT (1)	

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Bemerkungen	Schichtdickenangaben nach DIN EN ISO 12944-5

Die Sollschichtdicke gilt auch als erreicht, wenn Einzelmesswerte den Sollwert um höchstens 20% unterschreiten und der Mittelwert aller Einzelmessungen gleich oder größer der Sollschichtdicke ist.

Remarks: *Layer thickness information according to DIN EN ISO 12944-5*

The nominal layer thickness is also complied, to be achieved if individual measured values fall below the setpoint value by at most 20% and the mean value of all individual measurements is equal to or greater than the nominal layer thickness.

Prüfergebnis:	Die Anforderungen sind erfüllt.
Test result:	*The requirements are complied*

58640 Iserlohn	27.06.2022	Z. Acikgöz	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn
www.pekrun.de

PRÜFDOKUMENTATION

TESTDOCUMENTATION

ZUM AUFTRAG
TO THE ORDER

IHRE BESTELL NR. *YOUR ORDER NO.*	4500494756
KENNWORT *CODE WORD*	Projekt-Nr. 4000369 / 4000370
IHRE WERKS NR. *YOUR WORKS NO.*	Material-No.: 2000064788
PEKRUN SERIAL NR. *PEKRUN SERIAL NO*	10002291
GETRIEBE TYP *GEAR UNIT TYPE*	ASR 450-R-CCW
PEKRUN KOM. NR. *PEKRUN COM. NO.*	19396/10

PRÜFDOKUMENTATION
TESTDOCUMENTATION

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	S/No. 10002291

Inhalt nach ITP	***Contents acc. to ITP***
1. Zeugnisse Radwelle	*1. Certificates to the wheel shaft*
2. Zeugnisse Stirnrad	*2. Certificates to the bull gear*
3. Zeugnisse Baugruppe Radwelle mit Stirnrad	*3. Certificates to the assembly group, bull gear with wheel shaft*
4. Zeugnisse Ritzelwelle	*4. Certificates to the wheel shaft*
5. Zeugnisse Gehäuse	*5. Certificates to the housing*
8. Zeugnisse zur Getriebeprüfung	*8. Gear box test certificates*
9. Allg. Informationen	*9. General Information*

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PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
1	**Gear shaft (LS Shaft)**										
1.1	Material verification	42CrMo4 EN 10083	Specification		Material labeling		R				
1.2	Chemical analysis	42CrMo4 EN 10083	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
1.3	Mechanical characteristics Ultrasonic test	42CrMo4 EN 10083 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
1.4	Dimensional check after mechanical processing	Drawing	All fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
1.5	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
2	**Bull gear**										
2.1	Gear shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R				
2.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
2.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
2.4	Dimensional check after mechanical processing	Drawing	Al fit measurements Accuracy of toothing	100%	Tolerance acc. to drawing	Measurement record	W	R			
2.5	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Measurement record	W	R			
3	**Assembly group, bull gear with gear shaft**										
3.1	Dimensional check of the toothing		Tooth trace, profile, pitch and runout	3 times circumference	Tolerance acc. to drawing	Test report	W	R			
3.2	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
3.3	Balance check		Acc. to drawing		Tolerance acc. to drawing	Test report	W	R			
4	**Pinion Shaft (HS Shaft)**										
4.1	Pinion shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R	R			
4.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

[pekrun]

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
4.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
4.4	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Test report	R	R			
4.5	Dimensional check after mechanical processing	Drawing	Al fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
4.6	Balance check		Acc. to drawing		Tolerance acc. to drawing	Test report	W	R			
4.7	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
5	**Housing**										
5.1	Chemical analysis	P355NL1/2 EN 10028-3	Chemical composition in % by weight (% by mass) according to ladle analysis	100%	Material Standard	EN10204 3.1	R	R			
5.2	Mechanical characteristics	P355NL1/2 EN 10028-3	Tensile strength, Yield strength, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
5.3	Annealing		Stress free	100%	Material Standard	Diagram or record	R	R			
5.3	Casing leak test		Liquid penetrant inspection	all relevant welding seams	welding seams, no leakage allowed	Test report	W	R			
5.5	Dimensional check after mechanical processing	Drawing	All bearing seats and connecting dimensions	100%	Tolerance acc. to drawing	Measurement record	W	R			
8	**Gear unit**										
8.1	Backlash + contact check of the toothing	Manufacturer test instructions	Executed in job casing contact check, tape lift			Test report	W	W			
8.2	Control of assembly and conneting dimensions	Manufacturer test instructions	Al fit dimensions		Tolerance acc. to drawing	Test report	W	R			
8.3	Check at the Oil supply system bevor the test run.	Pekrun Testprocedure	Filter and cleanliness				W				
8.4	Test run main rotors	Pekrun Testprocedure	No load full speed			Test report	W	W			4 hour test run
8.5	Vibration and temperature reading during the test run	Pekrun Testprocedure	Measured with vibration probes and resistance thermometer			Test report	W	W			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
9	**General Information**										
9.1	Machinery directive	2006/42/EG	Machinery Directive			Certificates	R	R			Part of the operating instructions.
9.2	Coating check		Surface cleanlines, Thickness of the coat, Adhesion acc. to ISO 2409		Grid cut test on test piece: ISO GT (1)	Certificates	R	R			
9.3	Documentation										

Remarks: Documentation (Quality certificates and reports) in german and english, **MRT**= Mechanical running test
R: Review. Verification of test results.
H: Hold Point. Inspection of a critical step in fabrication or testing. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer shall not continue fabrication if inspection parties are not present, except inspection has been waived by prior written notice.
W: Witness Point. Witnessing of a critical fabrication or testing step. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer may continue with work even if inspection parties are not present.

Seite / Page 1 / 2

BGH

Radwelle_wheel shaft_material certificates_PART-057585

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

BGH SL-Stahl GmbH
Chromstraße 3
30916 Isernhagen
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **412193**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **BSVF16004734TSE**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816364-010-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält Round bars,forged,peeled
Werkstoff / Quality	1.7225 42CrMo4mod/4140mod/4145mod
Anforderungen / Requirements	SL-LV 4 Rev. 6 - 12/11 AISI 4140 mod. + AISI 4145 mod. ,Kundenvereinbarung

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d´élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d´identification(analyse spectrale)
ohne Beanstandung without objection	E- LF/VD	ohne Beanstandung without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
10	2	280 mm rd. x 5715 + 5868 mm	5608 kg	733746

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Al
733746	0,430	0,29	0,98	0,006	0,0010	1,14	0,28	0,45	0,020

Wärmebehandlungszustand / Condition of heat treat: vergütet / quenched and tempered / gehärtet/quenched + 600°C 10h Luft/air

Probe-Nr. / Test-No.	Lage / Loc.	Temp. °C	Rp0,2 N/mm²		Rm N/mm²	A5 %	Z %	Kerbschlagarbeit / Impact value J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness HB
Soll/Req.	L L	RT	>=760		>=965 <=1100	>=13	>=40	>=45 >=27			RT -30°C	>=285 <=326
503R2 503R2	L L	RT	818		965	14,3	58	103 56	110 45	100 45	RT -30°C	300-290

Stirnabschreckversuch / Jominy test - EN ISO 642:

mm	1,5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
HRC	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56

Umformgrad : 8.3 : 1
Reduction ratio:

Gefüge : Vergütungsgefüge
Microstructure: quench and temper structure

Korngröße nach ASTM E 112: 5
Grain size acc. ASTM E 112:

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	16.09.2021	**Langer**

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Radwelle_wheel shaft_material certificates_PART-057585

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

BGH SL-Stahl GmbH
Chromstraße 3
30916 Isernhagen
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat 412193

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **BSVF16004734TSE**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816364-010-01**

Reinheitsgrad nach ASTM E 45, Methode A :
Degree of purity acc. ASTM E 45, method A:

Type	A	B	C	D
dünn/thin	0,0	0,8	0,5	1,0
dick/heavy	0,0	0,3	0,3	0,5

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection limit of 0.1 Bq/g.

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	16.09.2021	**Langer**

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Page

US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Radwelle_wheel shaft_material certificates_PART-057585

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. **BSVF16004734TSE**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816364-010-01**
BGH works no.
BGH référence

Zeugnis-Nr. **412193**
Certificate no.
No. de certificat

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.7225 42CrMo4mod/4140mod/4145mod
Abmessung/Dimension: 280 mm rd. x 5715 + 5868 mm
Anzahl/Quantity : 2 Gewicht /Weight : 5608 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
Tab.3 Typ 1a (100%) und Tab.5, QK 4 (Randzone) / QK 3 (Restbereich)
table 3 type 1a (100%) and table 5, quality class 4 (edge zone) / quality class 3 (residual area)

Prüfgerät : Deutsch Echograph 1090
Testing device

Prüfkopf : S 10 W 4 C
Search unit

Kopplungsmittel : Kleister / Wasser
Couplant glue / water

Prüfumfang : halber Umfang über gesamte Länge
Amount of inspection half circumference over total length

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0 mm
Recording threshold FBH 2.0 mm

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 16.09.21	Prüfer Testing operator Opérateur Kosch Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A	BGH Q 30	Überwacher Supervisor Surveilleur

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Radwelle / wheel shaft	PN-00077353.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagersitz	Ø 240 m6	+0,046 +0,017	240,03
Fügesitz	Ø 242,48 h6	0 -0,029	242,47-242,48
Lagersitz	Ø 240 m6	+0,046 +0,017	240,03-240,035
Durchmesser	Ø 240 m6	+0,046 +0,017	240,025-240,035
Durchmesser	Ø 240 m6	+0,046 +0,017	240,025-240,035

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	02.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057585
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Radwelle / wheel shaft	PN-00077353.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	42CrMo4+QT	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Wellenübergang / shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	02.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
58640 ISERLOHN

TELEFON 02371/945-0
TELEFAX 02371/945-299
EMAIL: INFO@PEKRUN.DE

Stirnrad_spur gear_material certificates_PART-057679

Prüfbescheinigung / Type of document

Abnahmeprüfzeugnis 3.1 / Inspection Certificate 3.1 - DIN EN 10204

Schmiedewerke Gröditz GmbH Riesaer Straße 1 01609 Gröditz

Schmiedewerke Gröditz GMH GRUPPE

Besteller / Customer: Delta Qualitätsstahl GmbH

Nr. / No.: S 2578

Seite/Page 1 von/of 2

Bestell-Nr. / P.O.No.: 170443 + Nachtrag v./dd. 03.03.2021

Gegenstand / Object: geschmiedetes Rundmaterial / forged round material

Kommissions-Nr. / Commission No.:5200454255 / 5

Abmessung / Dimension [mm]: ø 675 x 1 x 5100 / Stückgewicht/Single weight: 14520 kg / Block-Nr. / block-no.: 111
ø 675 x 1 x 2530 / Stückgewicht/Single weight: 7200 kg / Block-Nr. / block-no.: 112

Werkstoff / Material: 18 CrNiMo 7-6 / 1.6587 ID-Nr./ID-No.:

Lieferzustand / Condition of delivery: vorvergütet / pre quenched and tempered, vorbearbeitet / pre machined

Anforderungen / Demands: ISO-6336-5/08.16; DIN EN ISO-683-3/04.19; LVL02 18Cr Rev.18

Erschmelzungsart / Steelmaking process: EV/EAF

Chemische Analyse / Chemical analysis (% / H_2 ; O_2 ppm)

Stück Quantity	Chargennr. Heat no.	Probe Sample		C	Si	Mn	P	S	Cr	Ni	Mo	V	Cu	Al	Ti	Sn	Nb	As	Sb	Ca	N	H2	F01*	F02*
2	GP107894	Heat		,18	,28	,59	,009	,002	1,73	1,59	,29	,009	,14	,028	,0018	,007	,002	,0052	,0016	,0006	,0095	,9	,2	2,9

F01*: Cu+(10*Sn); F02*: Al/N

Prüfergebnisse / Test results

Probe / Sample		Lage / Orientation	Zugversuch / Tensile test						Kerbschlagbiegeversuch / Impact test							Härte / Hardness
			Prüftemp. Test temp. [°C]	$R_{p0,2}$ [N/mm²]	R [N/mm²]	R_m [N/mm²]	A5 [%]	Z [%]	Prüftemp. Test temp. [°C]	KV2 [J]			$\overline{KV2}$ [J]		Zähbruch / Tough fracture	
Charge/Heat no.	Nr. /No.	L	RT	>=785	-	1120 - 1350	>=11	>=35	RT	-			40	-	-	
		L	-	-	-	-	-	-	-20	-			27	-	-	
		T	RT	>=785	-	1120 - 1350	>=8	>=25	RT	-			30	-	-	
GP107894	5151	T	23	1026		1343	10,4	34	23	53	55	63	57	Blindhärteprobe	blank hardness test	
GP107894	5153	L	23	1018		1345	13,4	58	23	67	63	69	66	Blindhärteprobe	blank hardness test	
GP107894	5153	L							-20	52	46	49	49	Blindhärteprobe	blank hardness test	

Härte Soll / Hardness required [HBW]: min - max 235

Härte Ist am Teil / Hardness measured on part [HBE] : 173; 176

Stirnrad_spur gear_material certificates_PART-057679

Prüfbescheinigung / Type of document

Abnahmeprüfzeugnis 3.1 / Inspection Certificate 3.1 - DIN EN 10204

Schmiedewerke Gröditz GMH GRUPPE

Schmiedewerke Gröditz GmbH Riesaer Straße 1 01609 Gröditz

Besteller / Customer: Delta Qualitätsstahl GmbH	Nr. / No.: S 2578 Seite/Page 2 von/of 2
Bestell-Nr. / P.O.No.: 170443 + Nachtrag v./dd. 03.03.2021	Gegenstand / Object: geschmiedetes Rundmaterial / forged round material
Kommissions-Nr. / Commission No.:5200454255 / 5	Abmessung / Dimension [mm]: ø 675 x 1 x 5100 / Stückgewicht/Single weight: 14520 kg / Block-Nr. / block-no.: 111 ø 675 x 1 x 2530 / Stückgewicht/Single weight: 7200 kg / Block-Nr. / block-no.: 112

Anmalung / paint-marking: 88995
O2 Gehalt / O2 content: 12 ppm
mechanische Werte an Blindhärteprobe / mechanical properties on blank hardened test ø 30 mm, Wärmebehandlung / heat treatment: 870°C/2h/Öl/oil, 180°C/2h/Luft/air
Verschmiedungsgrad / forging ratio: 3,8
auf Materialverwechslung geprüft - keine Beanstandung / material mix up tested - satisfactory
Radioaktivität innerhalb gesetzlicher Vorgaben wird gewährleistet / radioactivity within legal requirements guaranteed
Restmagnetismus max. 5 Gauss- wird gewährleistet / residual magnetism max. 5 Gauß - guaranteed
Reinheitsgrad gemäß DIN 50602: K4 = 0 / micropurity acc. to DIN 50602: K4 = 0
Reinheitsgrad nach / micropurity acc. to ISO 4967 Meth. A - A 0,3/0,7; B 0/0; C 0/0,3; D 0/0,5; DS 1,5
austenitische Körngröße gemäß DIN EN ISO 643 nach Wärmebehandlung 950°C 50 h: G = 5 und feiner, max. 2% gröber 5 erfüllt
austenitic grain size acc. to DIN EN ISO 643 after heat treatment 950°C 50 h: G = 5 and finer , max. 2% rougher 5 fulfilled

Anlagen / annex: - Ultraschallprüfbericht / ultrasonic test report
- Jominy Prüfprotokoll / Jominy report

Die gestellten Anforderungen sind erfüllt. Besichtigung und Ausmessungen: o.B.
The a.m. results meet requirements. Visual and dimensional inspection: satisfactory

Herstellerzeichen, Manufacturer's brand qu	Stempel des Sachverständigen Inspector's stamp	Datum / Date: 05.08.2021 Abnahmebeauftragter Hersteller Manufacturers authorized representative

Stirnrad_spur gear_material certificates_PART-057679

Ultraschallprüfbericht Ultrasonic test report gemäß / acc. to DIN EN 10204 3.1	Nr./No.: 8/21/32-UT FA 520488995 Seite/page 1 von/of 1	Schmiedewerke Gröditz GMH GRUPPE

Besteller Customer Delta Qualitätsstahl GmbH Hamm	**Gegenstand** Rundmaterial Item round material
Bestell-Nr. Order-No 170443 + Nachtrag	**Werkstoff** Material 18 CrNiMo 7-6
Wärmebehandlung vergütet Heat treatment quenched and tempered	**Oberflächenzustand** mech. bearbeitet Surface condition mech. processed
Kennwort Code word -	**Lfd.-Nr.** Part-No -
Zeichnungs-Nr./Abmessung Liefermaß/delivery dimension: Dmr./dia. 1x 675 x 5100 Drawing-No./Dimensions Dmr./dia. 1x 675 x 2530	

Kommission Job No. 5200454255/5	**Chargen-Nr.** Charge No. GP107894	**Stückzahl** Pieces 2

Spezifikation Specification DELTA LVL 02 18Cr Rev. 18	**Prüfumfang** gemäß Vorschrift Scope of test acc. to specification

Fertigungs- und Prüffolgeplan Fabrication and Inspection plan ☐ Nr/No:	**Prüf- und Abnahmeplan** Test and Inspection plan ☐ Nr/No:	**Prüfanweisung** test procedure ☒ Nr/No: QP-ZFP-A-01 Rev. B

Prüfdaten / Test data

Prüfgerät Test unit EPOCH650 - 190783502		**Koppelmittel** Couplant Tapetenleim / wallpaper paste
Prüfer Falkenberg Tested by ISO9712 Stufe 2/level 2	**Prüfdatum** Date of testing 20.07.2021	**Prüfort** Place of testing Gröditz

Registriergrenze
Registration level gemäß Vorschrift / acc. to specification

Prüfkopf / Probe | **Justierung** / Calibration

Nr. No.	Typ Type	Fre-quenz Fre-quency	Winkel Angel	Justierbe-reich Calibration range	Methode Method	s_j	s_{max}	V_j	ΔV	ΔV_T ☐ ΔV_A ☐	ΔV_κ	ΔV_K	V_R
		MHz	°	mm		mm	mm	dB	dB	dB	dB	dB	dB
1	B2S	2	0	850	AVG/BI DGS/RI	677	677	32	50	-	-	-	82

s_{max} - Bewertungsschallweg/evaluated sound distance, s_j-Justierschallweg/Calibration distance, V_j-Justierverstärkung/ Calibration Gain, Δ V-Verstärkungszuschlag/Additional Gain, ΔV_T-Transferkorrektur/ Transfer correction, ΔV_A -Ankopplungskorrektur/ Coupling correction, ΔV_κ -Schallschwächungskorrektur/Soundattenuation correction, ΔV_K - Kontrollkörperkorrektur für Winkelprüfköpfe bzw. Krümmungskorrektur für Senkrechtprüfköpfe/Adjusting block correction for angle beam probes or curvature correction for straight beam probes, V_R -Bewertungsverstärkung Evaluation Gain

Ergebnisse - Results:

Es wurden keine registrierpflichtigen Anzeigen festgestellt.
No recordable indications were found.

Beurteilung gemäß Spezifikation/ Evaluation acc. to specification :

ERFÜLLT ☒ PASSED	**NICHT ERFÜLLT** ☐ NOT PASSED	**ERGEBNIS S. ANLAGE** ☐ RESULT L. ANNEX
Datum / Date 05.08.2021	**Prüfaufsicht**/ Supervisor i.V. Knobloch ISO9712 Stufe 3/level 3	

Stirnrad_spur gear_material certificates_PART-057679

Schmiedewerke Gröditz
GMH GRUPPE

Jominy- Protokoll / Jominy - Report

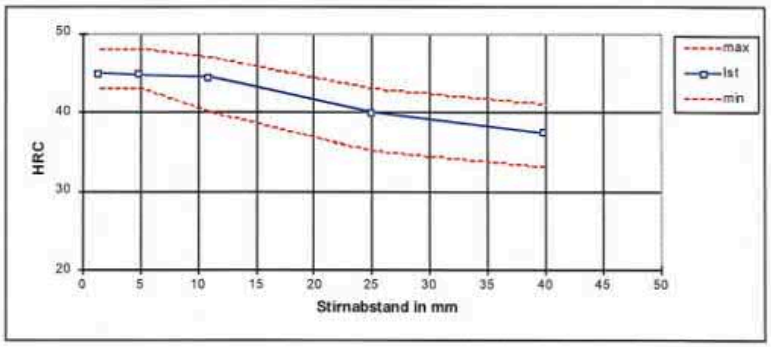
gem. ISO 642 / acc. to ISO 642
Berechnung nach/ calc. acc. to SEP 1664, Tafel 12 - 2. Ausgabe Juni 2004

Gegenstand/Item: Stabstahl / steel bar
Stahlmarke/Steel grade: 18 CrNiMo 7-6
Charge/Heat-No.: GP 107894

Austenit.bedingungen/
Austen. conditions: 860°C/30min

mm	1,5	5	11	25	40
Ist	44,9	44,7	44,4	39,9	37,4
max	48	48	47	43	41
min	43	43	40	35	33

* Sollwerte nach / Limits acc. to DELTA LVL02 18Cr Rev. 18



Freigabe durch:
Released by: gez. Rink
TQW

21.07.2021

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Stirnrad / spur gear	PN-00077527.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Fügesitz	Ø 242 H7	+0,046 0	242,02-242,04
Verzahnung Vorfräsen			i.O.

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	04.03.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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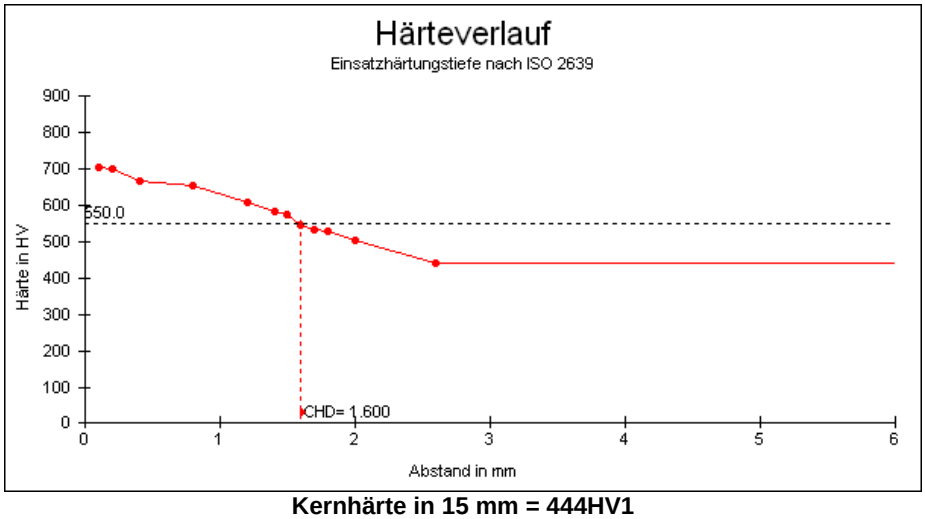
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

DOK-QS-121	Härteverlauf Hardness profile	REINTJES POWERTRAIN SOLUTIONS

Abnahmeprüfzeugnis gemäß DIN/EN 10204 – 3.1
Inspection certificate according to DIN/EN 10204 - 3.1

Kunde: Customer:	**Pekrun**	**Benennung:** Object:	**Stirnrad 71**
FAUF: Production No.:		**Bestell Nr. /Pos:** Purchase Order No./Item:	**4500058759**
Zeichnungs Nr.: Drawing No.:	**PN-00077527**	**Auftrags Nr.:** Order No.:	**2053592**
Werkstoff: Material:	**18 CrNiMo 7-6**	**Proben Nr.:** Sample No.:	**09215**
Stückzahl: No. of pieces:	**3**	**Ofencharge:** Oven batch:	**C22-21935**

CHD 550H V1 = 1.60 mm



Kernhärte in 15 mm = 444HV1

Oberfl.-Härte IST: Surface hardness actual:	**60**	HRC	**EHT IST:** Penetration depth actual:	**1,60**	mm
Oberfl.-Härte SOLL: Surface hardness nominal:	**60 +- 2**	HRC	**EHT SOLL:** Penetration depth nominal:	**1,4 + 0,2**	mm
Martensit IST: Martensit actual:		%	**Restaustenit IST:** Resodual austenite:		%
Randoxidation IST: Surface oxidation actual:		µm	**Randentkohlung IST:** Surface dicarborising actual:	---	µm
Karbidanteil IST: Katbit actual:	---	%	**Rand C-Gehalt IST:** Surface-C actual:		%
Bemerkungen: Remark:					

Prüfer / Workinspector i.A. V.Gärtner Prüfdatum / Work date: 02.03.22

Dieses Zeugnis wurde maschinell erstellt und ist OHNE Unterschrift gültig.
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Prozessverantwortlicher:	QS / Hr. Dr. Reso / 17.01.2018	Revisions-Nr.:	02

Seite 1 von 1

PEKRUN

Teilung **DIN3962**

Auftrag: 71Z 8M-P-057679

19396/10-P-057679-3 R.V.OBEN ZW=656.155-655.945

Maschine: #945 05.05.2022 11:09:53 23.5°C

z	71	β [Grad]	27.0000	da [mm]	652.7000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	620.9500
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
Ø [mm]	2.0	Messhöhe [mm]	0.0000	Messkreis [mm]	634.0000

[µm]		Q Soll	Q Ist	[..]	Istwert	Min	Max
20.0 µm	- fp +						
	fp	6	4	11.0	5.5	1	49
	fu	6	4	14.0	7.5		1
20.0 µm	+ fp -						
	fp	6	5	11.0	8.5	32	71
	fu	6	6	14.0	12.0		64
20.0 µm	- Fp +						
	Fp	6	2	45.0	9.0	47	19
20.0 µm	+ Fp -						
	Fp	6	4	45.0	18.0	3	44
20.0 µm	- Fr +						
	Fr	6	5	36.0	22.5	57	3

Zweikugelmaß für Kugeldurchmesser 14.00 mm Soll: 656.050 mm / Ist: 656.094 mm

GearPro V3.17.97 1 / 1

PEKRUN

Profil / Flankenlinie DIN3962

Auftrag: 71Z 8M-P-057679

19396/10-P-057679-3 R.V.OBEN ZW=656.155-655.945

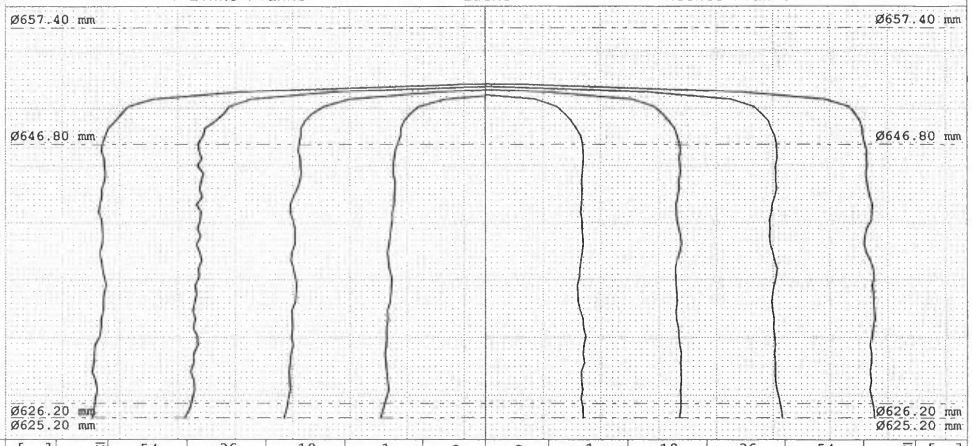
Maschine: #945 05.05.2022 10:09:56 23.4°C

z	71	β [Grad]	27.0000	da [mm]	652.7000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	620.9500
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
D⟷● Ø [mm]	2.0	Messhöhe [mm]	0.0000	Lα [mm]	27.6532
		Messkreis [mm]	637.4810	Lβ [%]	80.0

Profil

20.0 µm 500:1 — 6.1 mm — 1.6:1

+ Linke Flanke - Lücke - Rechte Flanke +

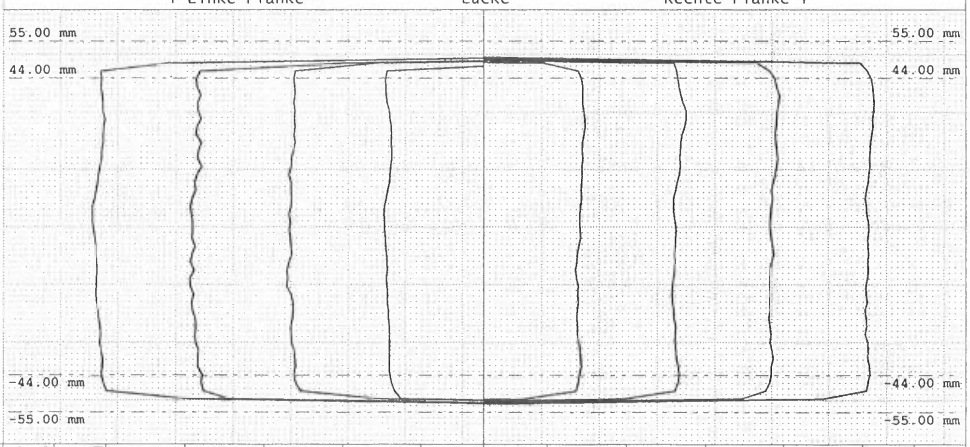


[µm]	[..]	x̄	54	36	18	1	Q	Q	1	18	36	54	x̄	[..]
Fα	16.0	4.4	5.0	4.5	4.5	3.5	3	2	3.0	2.0	3.5	3.5	3.0	16.0
ffα	14.0	3.1	4.0	2.5	3.5	2.5	3	2	3.0	2.0	3.0	3.0	2.8	14.0
fHα	9.0	-3.1	-3.0	-3.0	-3.0	-3.5	3	1	0.0	-0.5	-0.5	-2.0	-0.8	9.0
Q Soll / Q Ist							6/ 3	6/ 2						

Flankenlinie

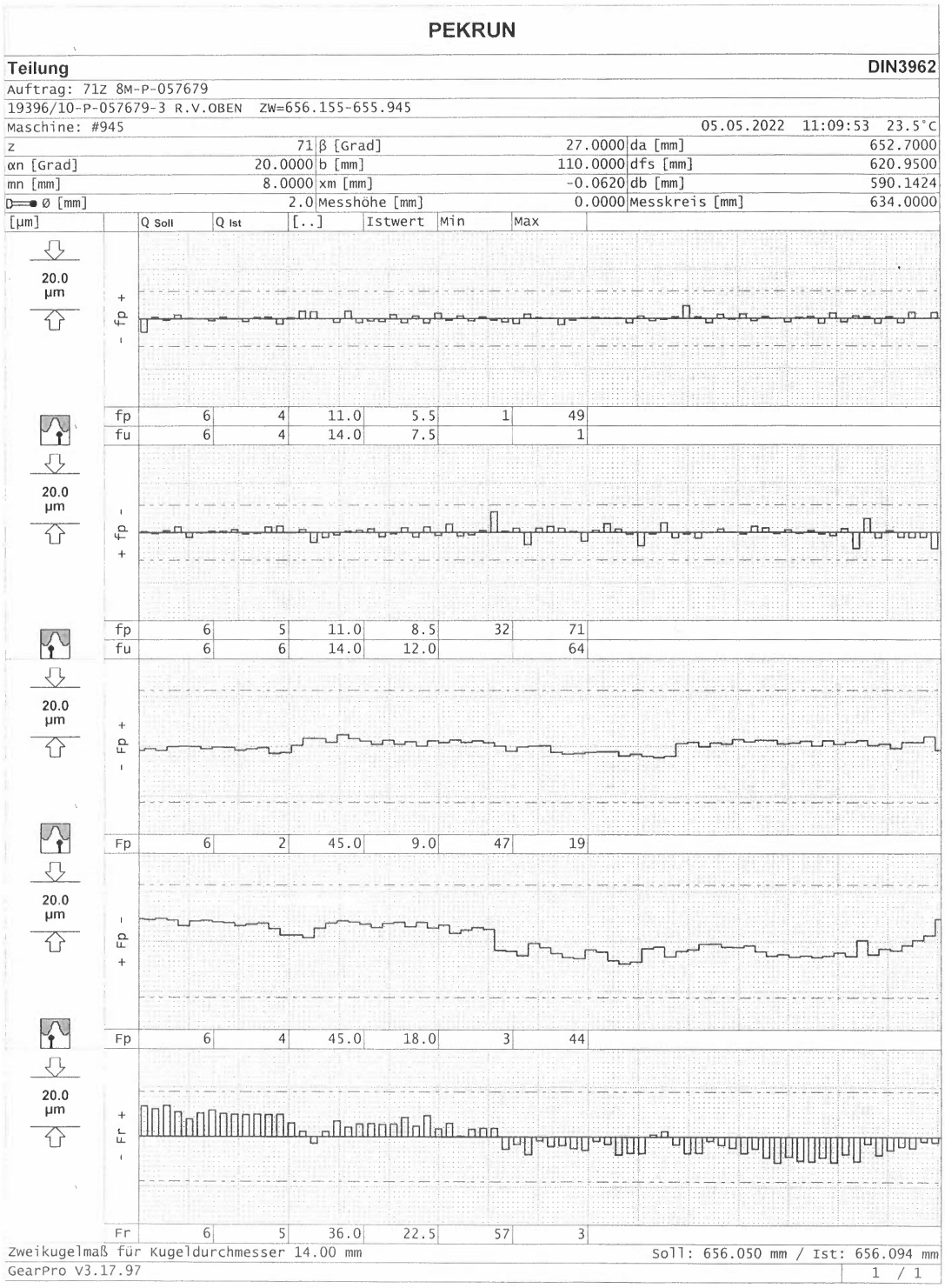
20.0 µm 500:1 — 17.1 mm — 1:1.7

+ Linke Flanke - Lücke - Rechte Flanke +



[µm]	[..]	x̄	54	36	18	1	Q	Q	1	18	36	54	x̄	[..]
Fβ	16.0	3.6	4.5	4.5	3.0	2.5	1	1	3.5	5.0	3.5	3.0	3.8	16.0
ffβ	12.0	3.5	4.0	4.5	3.0	2.5	2	1	2.5	3.5	2.5	2.5	2.8	12.0
fHβ	11.0	-0.6	-1.0	-1.0	-0.5	0.0	1	1	2.0	3.0	2.5	2.0	2.4	11.0
Q Soll / Q Ist							6/ 2	6/ 1						

GearPro V3.17.97 1 / 2



PEKRUN

Teilung DIN3962

Auftrag: 71Z 8M-P-057679

19396/10-P-057679-3 R.V.OBEN ZW=656.155-655.945

Maschine: #945 05.05.2022 11:09:53 23.5°C

z	71	β [Grad]	27.0000	da [mm]	652.7000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	620.9500
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
Ø [mm]	2.0	Messhöhe [mm]	0.0000	Messkreis [mm]	634.0000

[µm]		Q Soll	Q Ist	[..]	Istwert	Min	Max
20.0 µm	- fp +						
	fp	6	4	11.0	5.5	1	49
	fu	6	4	14.0	7.5		1
20.0 µm	+ fp -						
	fp	6	5	11.0	8.5	32	71
	fu	6	6	14.0	12.0		64
20.0 µm	- Fp +						
	Fp	6	2	45.0	9.0	47	19
20.0 µm	+ Fp -						
	Fp	6	4	45.0	18.0	3	44
20.0 µm	- Fr +						
	Fr	6	5	36.0	22.5	57	3

Zweikugelmaß für Kugeldurchmesser 14.00 mm Soll: 656.050 mm / Ist: 656.094 mm

GearPro V3.17.97 1 / 1

PEKRUN

Profil / Flankenlinie **DIN3962**

Auftrag: 71Z 8M-P-057679

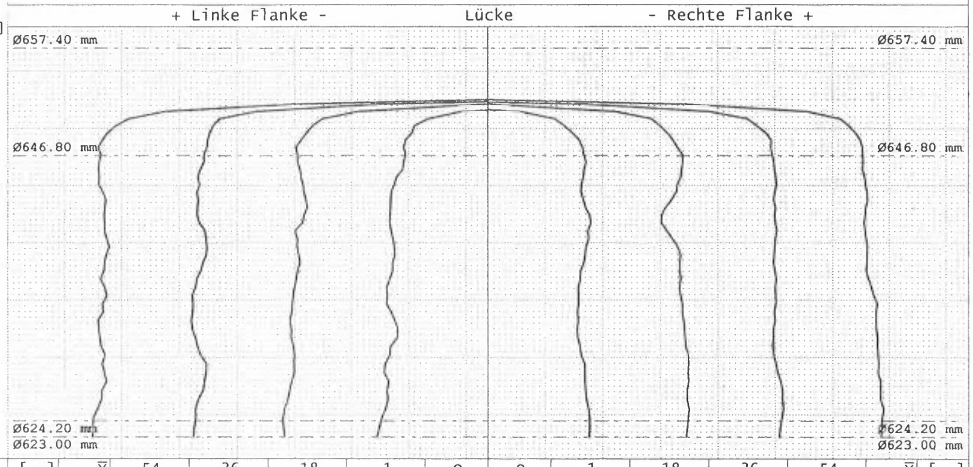
19396/10-P-057679-3 L.V.UNTEN ZW=656.155-655.945

Maschine: #945 06.05.2022 05:32:05 21.6°C

z	71	β [Grad]	-27.0000	da [mm]	652.8000
αn [Grad]	20.0000	b [mm]	110.0000	dfs [mm]	621.2000
mn [mm]	8.0000	xm [mm]	-0.0620	db [mm]	590.1424
D⊸● Ø [mm]	2.0	Messhöhe [mm]	0.0000	Lα [mm]	30.6824
		Messkreis [mm]	637.4810	Lβ [%]	80.0

Profil

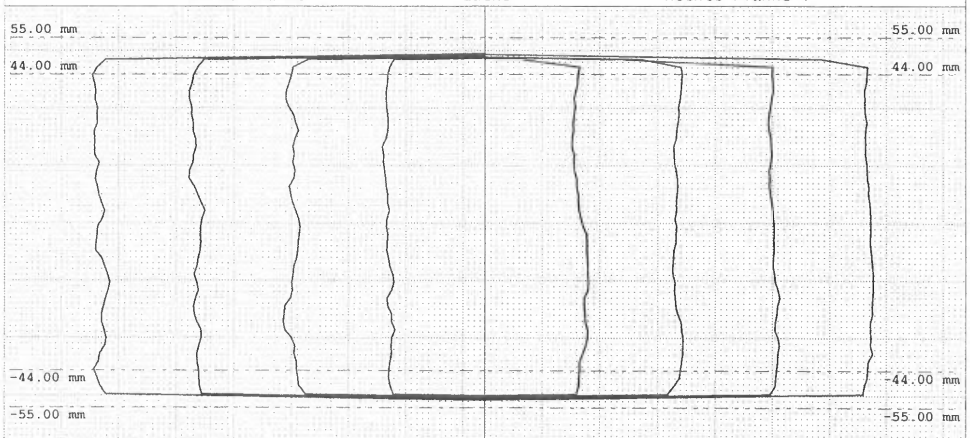
20.0 µm 500:1 — 6.6 mm 1.5:1



[µm]	[..]	X̄	54	36	18	1	Q	Q	1	18	36	54	X̄	[..]
Fα	16.0	6.9	5.5	5.5	8.5	8.0	5	5	4.5	9.5	4.0	7.5	6.4	16.0
ffα	14.0	5.1	5.0	5.5	5.5	4.5	4	5	4.5	9.0	3.5	3.0	5.0	14.0
fHα	9.0	-2.9	-1.0	-0.5	-6.0	-4.0	5	6	0.5	-6.5	-2.0	-7.5	-3.9	9.0
Q Soll / Q Ist							6/ 5	6/ 6						

Flankenlinie

20.0 µm 500:1 — 17.1 mm 1:1.7



[µm]	[..]	X̄	54	36	18	1	Q	Q	1	18	36	54	X̄	[..]
Fβ	16.0	5.5	6.0	5.5	6.0	4.5	2	2	5.5	3.5	4.0	3.0	4.0	16.0
ffβ	12.0	5.1	6.5	5.0	6.0	3.0	3	2	5.0	3.5	2.5	3.0	3.5	12.0
fHβ	11.0	2.1	3.5	2.5	0.0	2.5	2	4	-5.0	-0.5	-3.0	-2.5	-2.8	11.0
Q Soll / Q Ist							6/ 3	6/ 4						

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057679
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Stirnrad / spur gear	PN-00077527.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo 7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Verzahnungsbereich / toothing area*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	12.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

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Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **414819**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-005-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält Round bars,forged,peeled
Werkstoff / Quality	1.6587 18CrNiMo7-6
Anforderungen / Requirements	LVL- 02 18Cr Rev.18 - 07/20 1.6587 18CrNiMo7-6 ,ISO 6336 -5 Third ed. 2016-08-15 1.6587 18CrNiMo7-6 ,DIN EN ISO 683 -3 April 2019 Lieferzustand: Vorvergütet Die Werkstoffqualität "MQ/ME" nach ISO 6336-5 wird bestätigt. Diese Bestätigung gilt nur für die Eigenschaften, die vom Stahlhersteller beeinflußt werden können. Für Eigenschaften, die von der konstruktiven Gestaltung, der Endwärmebehandlung und der Einsatzbedingungen abhängig sind, kann der Stahlhersteller keinerlei Garantie und Gewährleistung übernehmen. The material quality "MQ/ME" acc. ISO 6336-5 will be confirmed. This confirmation is only valid for the properties, which can be affected by the steel producer. The steel producer cannot provide any guarantee for properties, which are dependent on the constructional design, the final heat treatment and the application conditions.

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d´élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d´identification(analyse spectrale)
ohne Beanstandung without objection	E- LF/VD	ohne Beanstandung without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
5	4	290 mm rd. x 3751 - 3860 mm	8006 kg	735116

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb	V	Ti
735116	0,175	0,28	0,54	0,007	0,0010	1,71	0,32	1,52	0,102	0,003	0,009	0,001

Al	N	H(ppm)	O	Sn	Sb	Ca	Al/N	Cu+10xSn
0,023	0,0110	1,50	0,0014	0,004	0,003	0,0004	2,091	0,142

Wärmebehandlungszustand / Condition of heat treat: vergütet / quenched and tempered

Probe-Nr. / Test-No.	Lage / Loc.	Temp. / °C	Rp0,2 / N/mm²		Rm / N/mm²	A5 / %	Z / %	Kerbschlagarbeit / Impact value / J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness / HB
Soll/Req.	T	RT	>=785		>=1120 <=1450	>=8	>=25	>=30			RT	<=238
332W2	T	RT	923		1321	8,2	36	63	64	66	RT	192
332W2	T							49	50	50	-20°C	am Material

Die mechanischen Kennwerte wurden an einer Referenzprobe (30 mm rd.) ermittelt:
The mechanical properties were tested at a reference block (30 mm dia.) :
870°C 2h Oel/oil, 180°C 2h Luft/air

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	06.12.2021	**Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / **Certificate no.** / **No. de certificat** **414819**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-005-01**

```
Stirnabschreckversuch / Jominy test - EN ISO 642:
mm     1,5   5     11    25    40
HRC    45    44    43    38    36

Umformgrad      : 4.8 : 1
Reduction ratio:

Korngröße  nach ASTM E 112: 6
Grain size acc. ASTM E 112:

Korngröße  nach ISO 643 (950°C 50h Oel): 6
Grain size acc. ISO 643 (950°C 50h oil):

Reinheitsgrad nach DIN 50602   : K4 = 2 (Ox + S)
Degree of purity acc. DIN 50602:

Reinheitsgrad nach ISO 4967, Methode A  : DS = 1,5
Degree of purity acc. ISO 4967, method A:
Type            A      B      C      D
Dünn/fine      0,0    0,8    0,5    1,0
Dick/thick     0,0    0,5    0,3    0,5

Restmagnetismus   : < 8 A/cm
Residual magnetism:

Das Material wurde gemäß der Spezifikation hergestellt.
The Material was produced in compliance with the Specification.

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done                  : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze
von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection
limit of 0.1 Bq/g.
```

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	06.12.2021	**Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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BGH

Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat 414819

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 3.1
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
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Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client 171472

BGH-Auftrags-Nr. / BGH works no. / BGH référence 816888-005-01

BGH Q 07

Bei Überschreitung der regelwerksseitigen Abmessungsgrenze sind im Zweifelsfall die Vorgaben
des Regelwerks vom Bauteilhersteller zu verifizieren. Seitens des Werkstoffherstellers werden
nur die, an der von ihm produzierten Geometrie, überprüften Eigenschaften bestätigt.
In case of doubt, the specifications of the regulations must be verified by the component manufacturer
if the dimensional limit of the regulations is exceeded. On the part of the material manufacturer,
only the properties verified on the geometry, produced by him, are confirmed.

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	06.12.2021	Langer

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Ritzelwelle_pinion shaft_material certificates_PART-057680

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. **171472**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816888-005-01**
BGH works no.
BGH référence

Zeugnis-Nr. **414819**
Certificate no.
No. de certificat

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.6587 18CrNiMo7-6
Abmessung/Dimension: 290 mm rd. x 3751 - 3860 mm
Anzahl/Quantity : 4 Gewicht /Weight : 8006 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
DIN EN 10228-3 Tab. 3 Typ 1a (100%)und
Tab. 5 Qualitätsklasse 4 für Randzone (1/3 D, min. 60mm)
Tab. 5 Qualitätsklasse 3 für Restbereich
DIN EN 10228-3 Tab.3 typ 1a (100%)and
Tab.5 quality class 4 for surface zone (1/3 D, min. 60 mm)
Tab.5 quality class 3 for remaining area

Prüfrichtlinie : DIN EN 10228-3 Tab. 3 & 4 (vollständig 360°)
Specification

Prüfgerät : K.Deutsch RPT.S 1156
Deutsch Echopraph 1090
Testing device

Prüfkopf : STS32.20P4L150C, STSE18/16P4
S 24 W4, SE 18/16 PB4
Search unit

Kopplungsmittel : Wasser / Kleister
Couplant water / glue

Prüfumfang : 360°
Amount of inspection

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0
Recording threshold FBH 2.0 mm

Schallschwächung : < 6 dB/m
Wave attenuation

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 06.12.21	Prüfer Testing operator Opérateur Drobin Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A BGH Q 30	Überwacher Supervisor Surveilleur

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This certificate was generated by data system and it is valid without signature as well.
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EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Abnahmeprüfzeugnis

gemäß DIN EN 10204-3.1

Belegnr	**PZ-2022-0097335**
Auftragsnr	**2022-0238565-2**
Kundennr	1011419
Ausgeber	Virzi, Laura
Telefon	0234/903660
Datum	25.03.2022
Seite	1/1

Teile/Verfahren	Stück	Gewicht
Ihre Auftragsnr: 19396/Pos.10	3	---

Ihre Liefers.Nr: Abholung vom 17.03.2022
Ihre Bestellnr: 4500060199-P / 20 vom 17.03.2022
Uns. Auftragsnr: 2022-0238565-2 von 2 vom 21.03.2022
Bezeichnung: Ritzelwelle
Teilenummer: PART-057680
Zeichnungsnr: PN00077528
Fr. Feld: 2053591
WE-Nummer: WE-000096728
Werkstoff: 1.6587/18CrNiMo7-6/17CrNiMo6
Vorschrift: Isolieren, Einsatzhärten, Strahlen, Richten, Zeugnis

Soll-Vorgaben

Randhärte	58-62 HRC
Einsatzhärtetiefe	1,4-1,6 mm

Ergebnisse	Prüfer	Prüfdatum
RH:59-60 HRC EHT:1,60 mm	Rainer Theuer	25.03.2022

Die CHD haben wir an unserer Chargenbegleitprobe aus 18CrNiMo7-6 ermittelt.

Hiermit bestätigen wir, dass obige Teile gemäß den Vereinbarungen bei der Bestellannahme auf der Grundlage der Ihnen bekannten Allgemeinen Geschäftsbedingungen der Härterei Reese Bochum GmbH, Stand: Juli 2018 behandelt wurden.

Dieses Dokument wurde elektronisch erstellt und ist daher ohne Unterschrift gültig.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/9036-0
Fax +49 (0) 234/9036-96

Oberscheidstr. 25 · 44807 Bochum
bochum@haerterei.com
Handelsregister: HRB 1717
Ust-ID-Nr.: DE257486215
Steuer-Nr.: 306/5709/0368

National-Bank Essen BIC: NBAGDE3EXXX IBAN: DE89 3602 0030 0006 3781 29
VB Bochum Witten eG BIC: GENODEM1BOC IBAN: DE83 4306 0129 0123 2073 00
Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

www.haerterei.com

EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Inspection certificate

according to DIN EN 10204-3.1

Document #	PZ-2022-0097335
Job #	2022-0238565-2
Customer #	1011419
Issuer	Virzi, Laura
Telephone	0234/903660
Date	25.03.2022
Page	1/1

Parts/Process		Quantity	Weight
Your Job #:	19396/Pos.10	3	---
Your P/S. #:	Abholung vom 17.03.2022		
Your P.O. #:	4500060199-P / 20 from 17.03.2022		
Our Job #:	2022-0238565-2 of 2 from 21.03.2022		
Description:	pinion shaft		
Serial #:	PART-057680		
Drawing #:	PN00077528		
Free Field:	2053591		
RG-No.:	WE-000096728		
Material:	1.6587/18CrNiMo7-6/17CrNiMo6		
Process:	protection, case hardening, shot blasting, straightening, certificate		

Hardness requirements

Surface hardness	58-62 HRC
Case hardening depth	1,4-1,6 mm

Results	Auditor	Test date
EH:59-60 HRC CHD:1,60 mm	Rainer Theuer	25.03.2022

CHD was tested on our test-piece 18CrNiMo7-6 from the same batch.

We hereby confirm that the above parts will be treated and examined in accordance with the agreements applying on acceptance of order and based on the familiar General terms and conditions of business of Härterei Reese Bochum GmbH Edition: July 2018.

This document automatically generated valid without signature.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
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Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

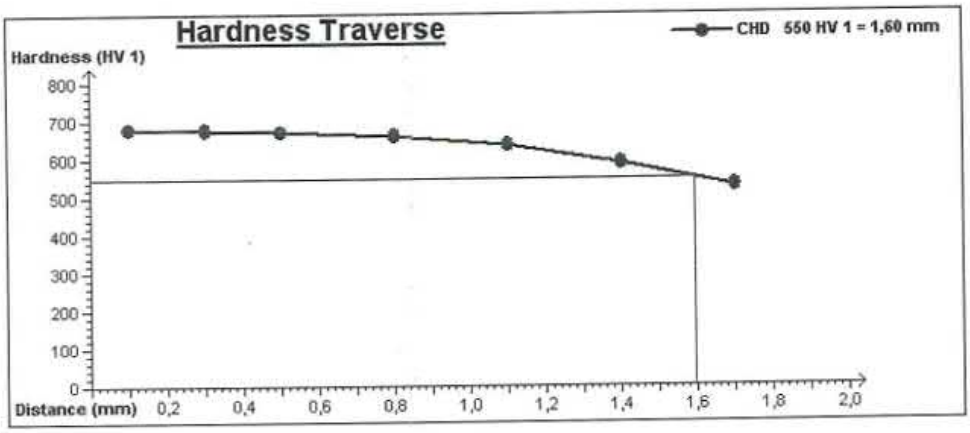
www.haerterei.com

REESE HÄRTEREI

Härterei Reese
Bochum GmbH
Oberscheidstrasse 25
44807 Bochum

Chargen-Nr.: .
Datum: 25.03.2022
Auftrags-Nr.: 2022-0238565-2
Prüfer: Labor

Kunde: Pekrun
Proben-Nr.: 18 CrNiMo7-6
H.R.Probe



Ergebnis

CHD 550 HV 1 = 1,60 mm

Reihe 1

Punkt	Abstand	Härte	Kommentar
1	0.100	680 HV 1	
2	0.300	678 HV 1	
3	0.500	672 HV 1	
4	0.800	661 HV 1	
5	1.100	637 HV 1	
6	1.400	589 HV 1	
7	1.700	529 HV 1	

QUALITÄTSWESEN HÄRTEREI REESE BOCHUM

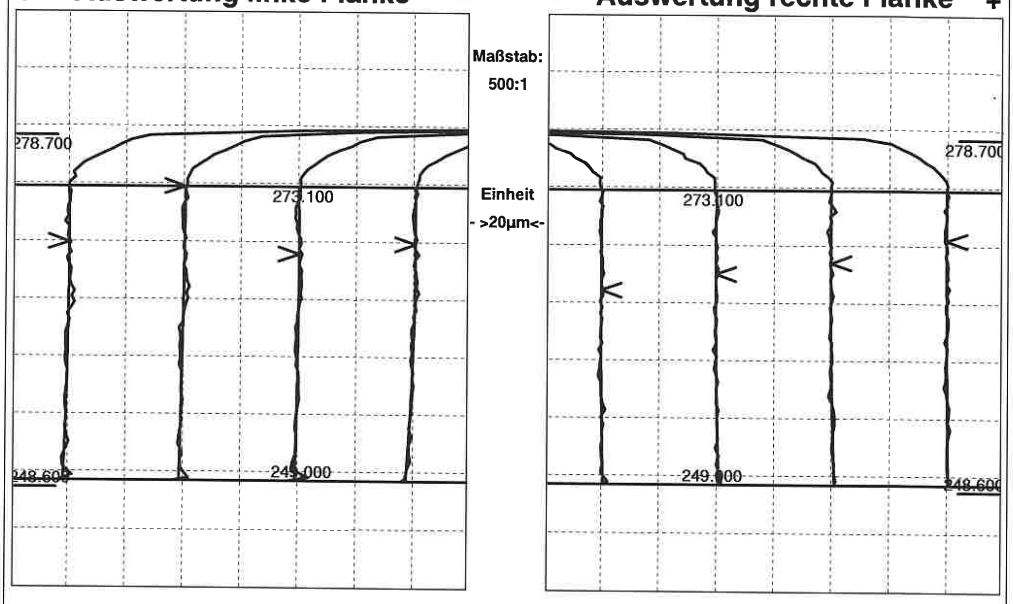
Profilmessung

Messung vom 05/12/2022 12:38:17 Dauer: 00:03:06 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.3

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Rechtsschräg 27.000000 Grad	Meßbreite	57.500 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	278.700 mm	Fußformkreis (d)	248.600 mm

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
4	7.2		6.9	7.3	7.0	7.6	F_α	4.9	4.7	4.0	3.4		4.3	3
3	- 1.9	0.0	- 1.7	- 1.8	- 1.1	- 3.0	fH_α	- 0.6	- 1.0	- 1.2	- 0.6	0.0	- 0.9	1
4	4.9		4.4	5.4	6.9	3.0	ff_α	2.6	2.1	2.9	2.1		2.4	2
	- 0.6	2.0	- 0.7	- 0.2	- 0.5	- 1.2	C_α	- 0.5	- 0.6	- 0.6	- 0.2	2.0	- 0.5	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

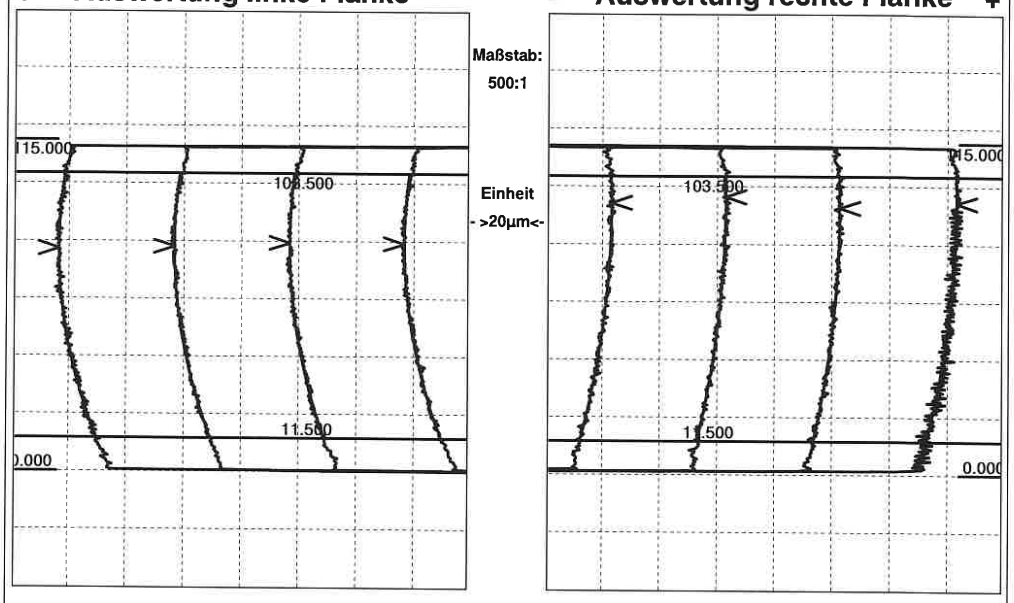
Flankenlinienmessung

Messung vom 05/12/2022 12:30:08 Dauer: 00:07:42 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.3

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	232
Schrägungswinkel	Rechtsschräg 27.000000 Grad	Meßzylinder (d)	261.103 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	115.000 mm		

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
2	4.0		5.3	3.6	3.3	3.7	Fβ	3.3	3.9	4.8	7.1		4.8	3
1	11.0	13.0	11.2	10.8	10.5	11.3	fHβ	10.8	10.0	9.0	10.4	13.0	10.0	1
1	3.1		3.8	2.9	2.6	3.2	ffβ	3.3	3.0	3.8	7.7		4.4	4
	6.0	7.0	6.5	6.0	5.6	5.9	Cβ	3.4	2.9	3.0	3.2	7.0	3.1	

Vert. Maßstab 1:2, d.h. 10 mm entspr. 20 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

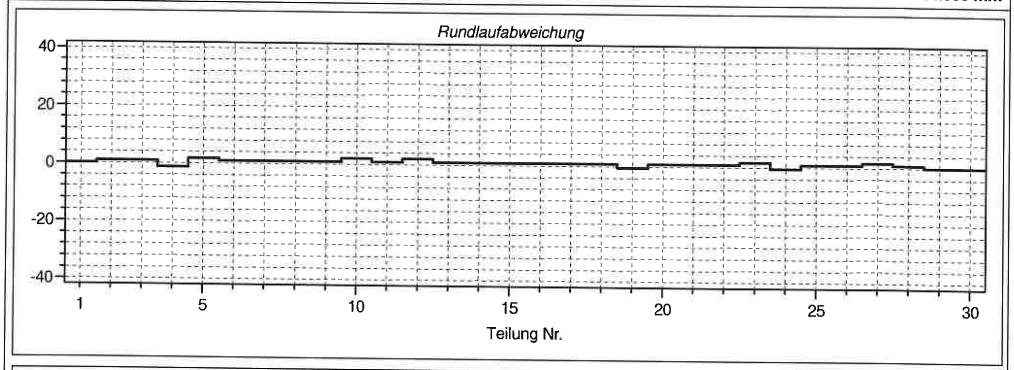
Alle Angaben in µm
Qualitäten nach DIN 3961

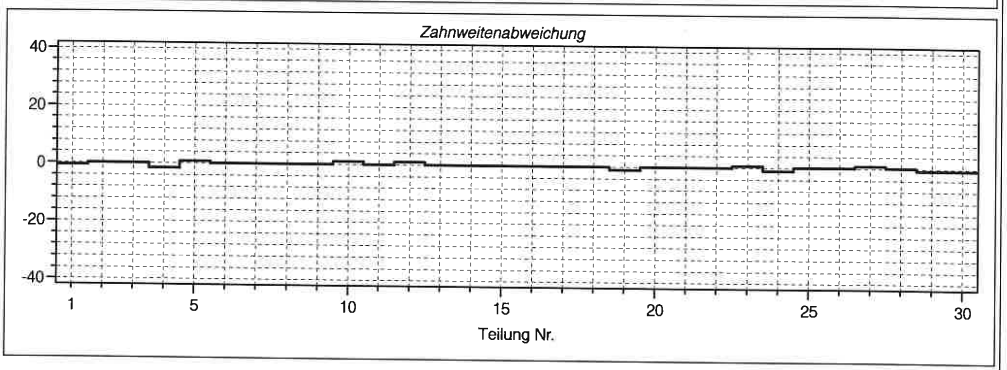
Teilungsmessung

Messung vom 05/12/2022 12:41:50 Dauer: 00:06:05 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.3

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.103 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.176		
Zahnweite (Nennmaß)	111.750 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.454 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.849 mm	Meßrollendurchmesser	14.000 mm





				Q
Min. Zahnweite (mm)	111.752	Mittl. Zahnweite (mm)	111.754	
Max. Zahnweite (mm)	111.755	Zahnweiten-Schwankung (µm)	2.7	
Anzahl Meßzähne	5			
		Rundlaufabweichung (Fr)	3.4	1
		Meßkugeldurchmesser (mm)	14.000	

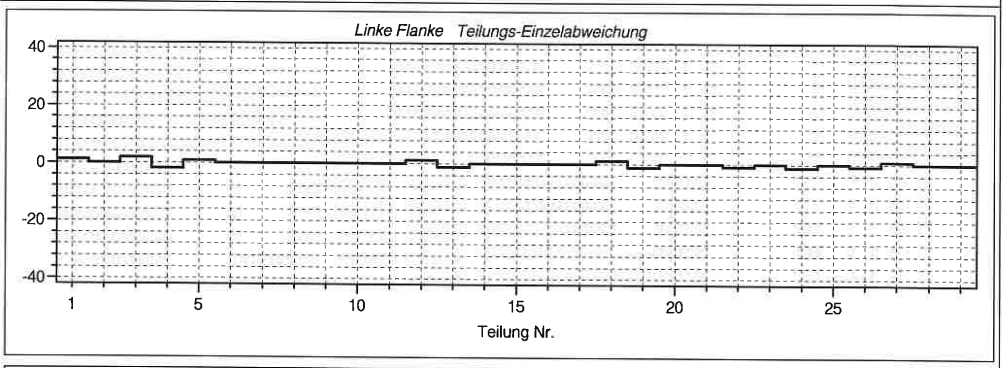
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

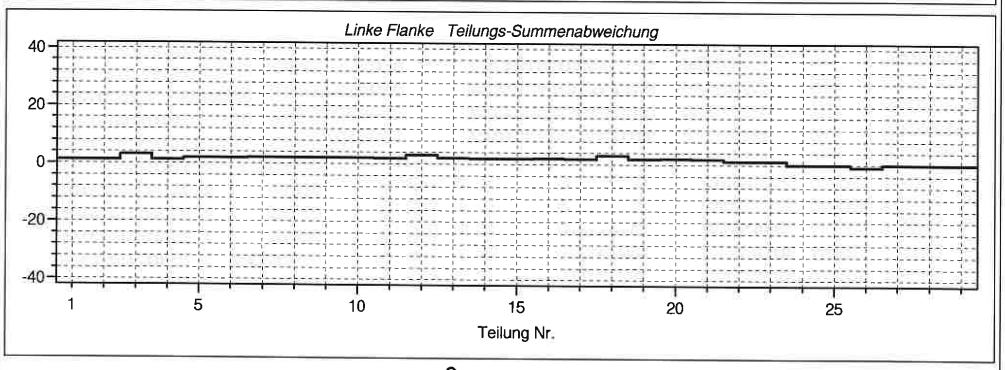
Teilungsmessung

Messung vom 05/12/2022 12:41:50 Dauer: 00:06:05 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.3

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.103 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.176		
Zahnweite (Nennmaß)	111.750 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.454 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.849 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	1.9	1	Teilungs-Schwankung (Rp)	3.9	
Teilungs-Gesamtabw. (Fp)	3.9	1	Max. Teilungssprung (fumax)	3.9	3
Teilungs-Spannenabw. (Fp(z/8))	3.1	1			

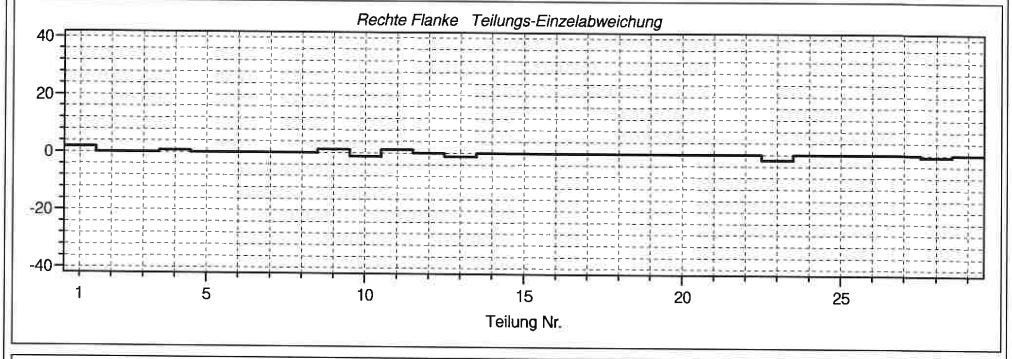
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

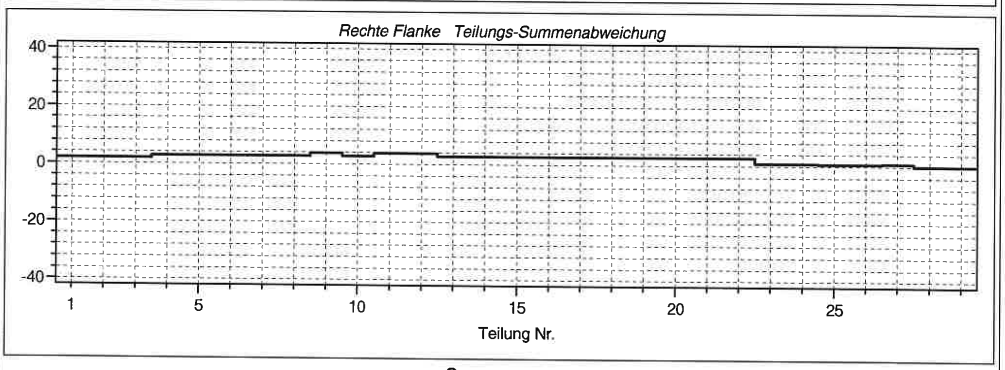
Teilungsmessung

Messung vom 05/12/2022 12:41:50 Dauer: 00:06:05 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.725
R.V.UNTEN
NR.3

Name der Verzahnung:	29Z 8M-P-057680-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.103 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.176		
Zahnweite (Nennmaß)	111.750 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.454 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.849 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	1.9	1	Teilungs-Schwankung (Rp)	3.8	
Teilungs-Gesamtabw. (Fp)	3.8	1	Max. Teilungssprung (fumax)	2.3	1
Teilungs-Spannenabw. (Fp(z/8))	2.7	1			

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

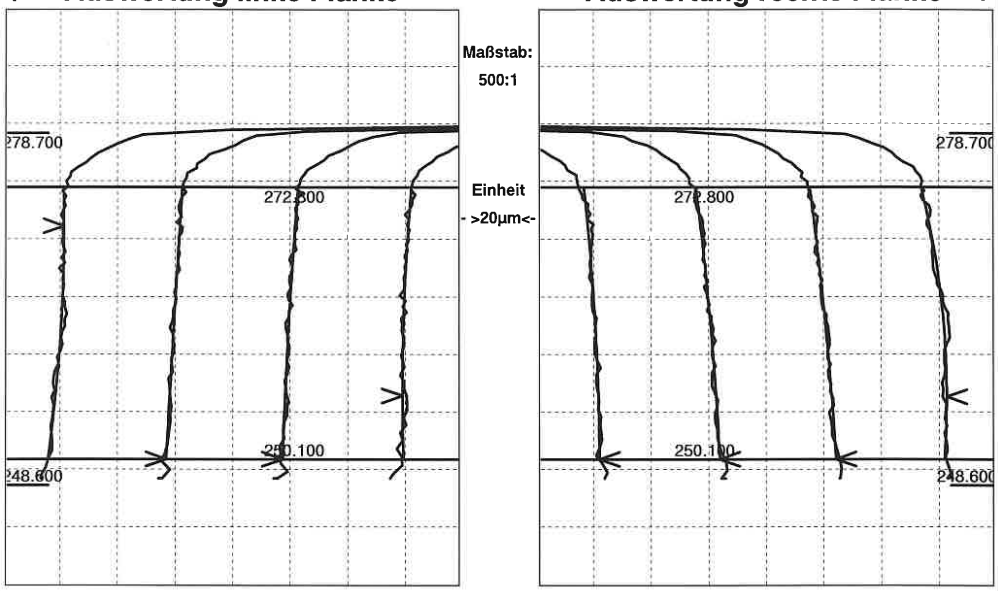
Profilmessung

Messung vom 05/12/2022 10:19:57 Dauer: 00:03:05 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.3

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Linksschräg 27.000000 Grad	Meßbreite	57.500 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	278.700 mm	Fußformkreis (d)	248.600 mm

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
5	7.4		9.0	8.2	6.8	5.5	F_α	6.1	9.8	10.1	7.9		8.5	5
5	- 4.9	0.0	- 5.4	- 5.7	- 5.4	- 2.9	fH_α	- 5.3	- 8.2	- 8.9	- 7.9	0.0	- 7.6	6
3	3.2		3.2	2.8	2.9	3.8	ff_α	3.8	2.9	2.7	3.5		3.2	3
	0.0	4.0	- 1.9	0.1	0.6	1.4	C_α	1.3	0.9	0.8	3.7	4.0	1.7	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

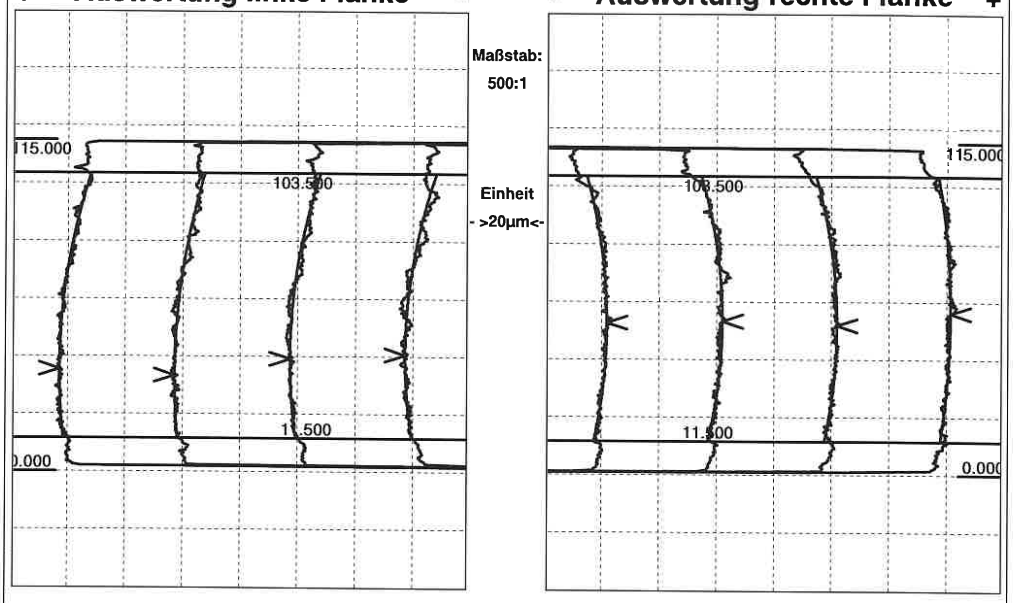
Flankenlinienmessung

Messung vom 05/12/2022 13:25:41 Dauer: 00:07:45 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.3

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Zähnezahl	29	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	232
Schrägungswinkel	Linksschräg 27.000000 Grad	Meßzylinder (d)	261.103 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	115.000 mm		

+ Auswertung linke Flanke - | - Auswertung rechte Flanke +



Q	M	S	23	16	8	1	Lücke Nr.	1	8	16	23	S	M	Q
4	7.5		7.7	7.2	6.2	9.1	Fβ	6.8	8.3	5.8	5.4		6.6	4
4	- 8.9	-5.0	- 9.5	- 9.4	- 8.5	- 8.4	fHβ	- 2.6	- 2.3	- 2.8	- 0.6	-5.0	- 2.1	2
4	5.4		4.5	4.9	4.9	7.3	ffβ	6.4	6.7	4.7	4.4		5.5	4
	5.1	6.0	5.0	4.4	5.3	5.7	Cβ	5.8	6.2	5.7	3.9	6.0	5.4	

Vert. Maßstab 1:2, d.h. 10 mm entspr. 20 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

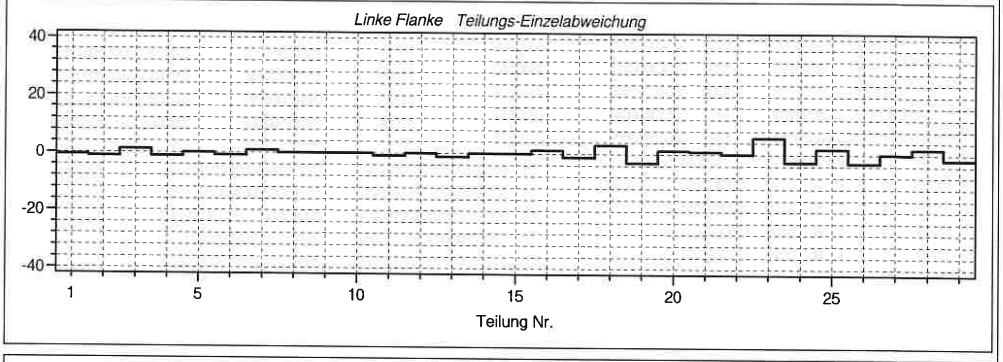
Alle Angaben in µm
Qualitäten nach DIN 3961

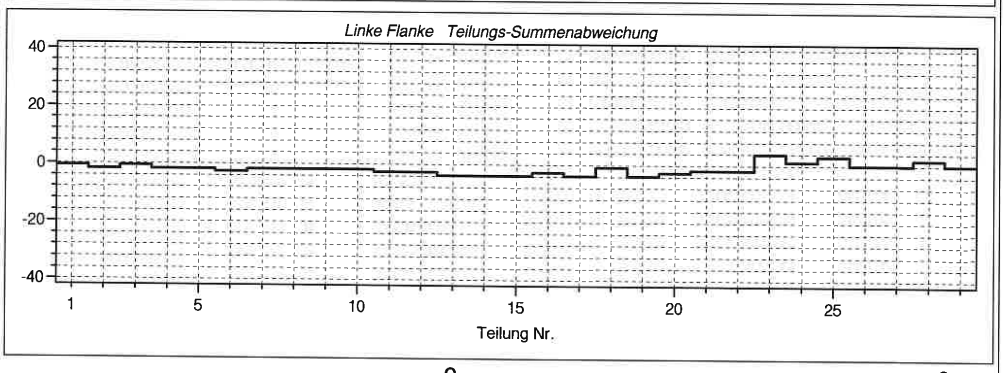
Teilungsmessung

Messung vom 05/12/2022 10:23:29 Dauer: 00:06:05 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.3

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.103 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.176		
Zahnweite (Nennmaß)	111.750 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.454 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.849 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	5.8	5	Teilungs-Schwankung (Rp)	8.9	
Teilungs-Gesamtabw. (Fp)	7.7	2	Max. Teilungssprung (fumax)	8.5	5
Teilungs-Spannenabw. (Fp(z/8))	7.7	3			

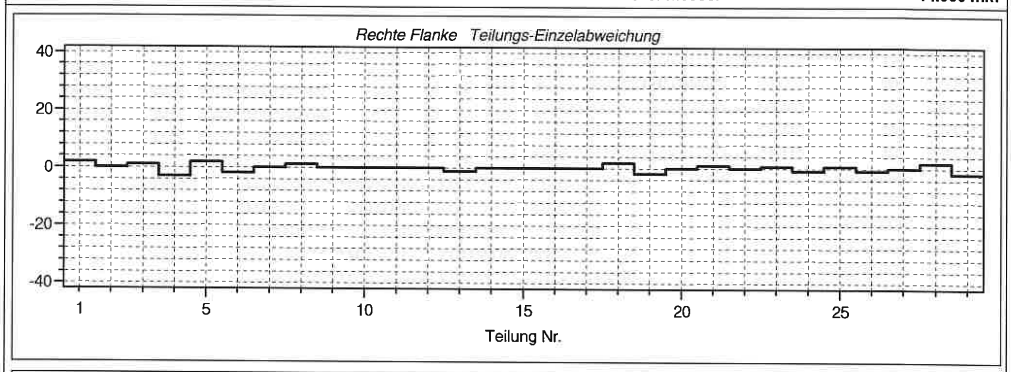
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

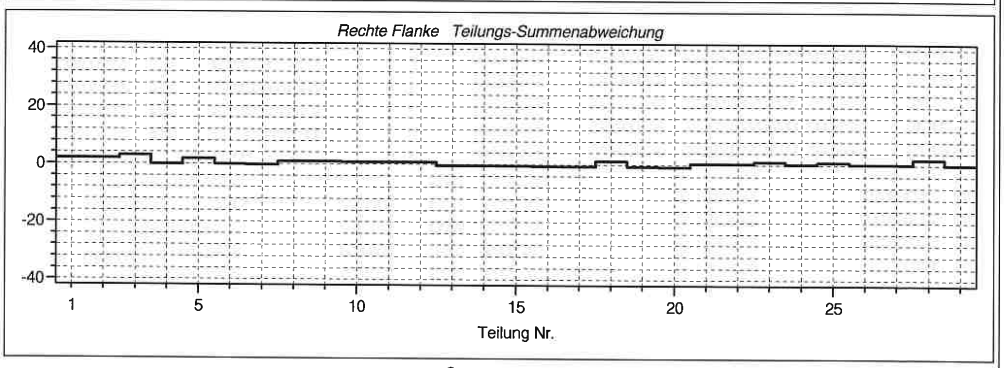
Teilungsmessung

Messung vom 05/12/2022 10:23:29 Dauer: 00:06:05 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.3

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.103 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.176		
Zahnweite (Nennmaß)	111.750 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.454 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.849 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 3.1	3	Teilungs-Schwankung (Rp)	4.9	
Teilungs-Gesamtabw. (Fp)	3.7	1	Max. Teilungssprung (fumax)	4.9	3
Teilungs-Spannenabw. (Fp(z/8))	3.2	1			

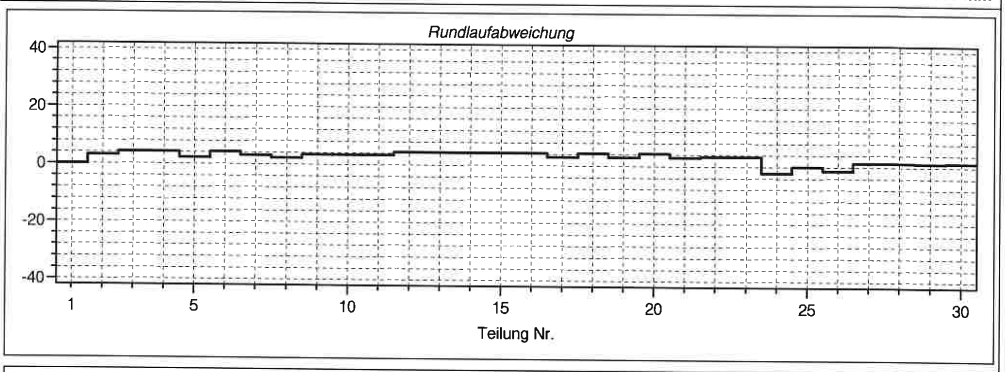
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

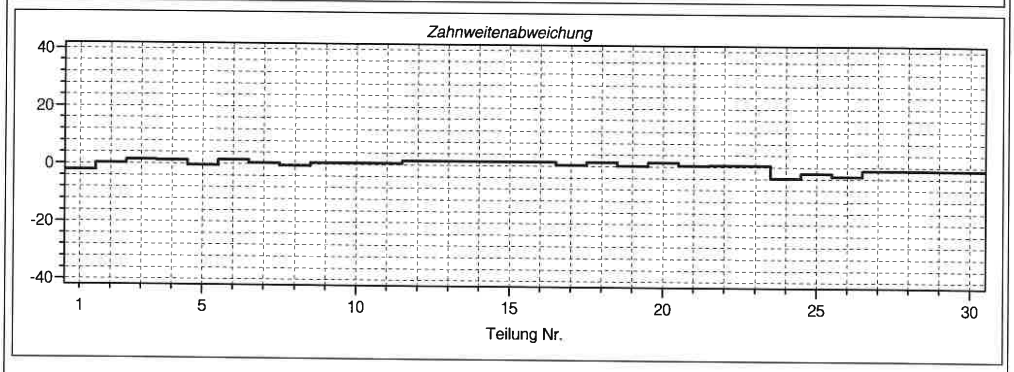
Teilungsmessung

Messung vom 05/12/2022 10:23:29 Dauer: 00:06:05 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/10-P-057680 ZW: 111.772 - 111.72.5
L.V.OBEN
NR.3

Name der Verzahnung:	29Z 8M-P-057680-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	29
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 27.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	261.103 mm
Meßbreite	57.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.176		
Zahnweite (Nennmaß)	111.750 mm	Anzahl Meßzähne	5
Diametrales Zweikugelmaß (Nennmaß)	282.454 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	282.849 mm	Meßrollendurchmesser	14.000 mm





				Q
Min. Zahnweite (mm)	111.752	Mittl. Zahnweite (mm)	111.756	
Max. Zahnweite (mm)	111.758	Zahnweiten-Schwankung (µm)	5.3	
Anzahl Meßzähne	5			
		Rundlaufabweichung (Fr)	6.6	2
		Meßkugeldurchmesser (mm)	14.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Ritzelwelle / pinion shaft	PN-00077528.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Durchmesser	Ø 140 m6	+0,040 +0,015	140,03-140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03
Durchmesser	Ø 140 m6	+0,040 +0,015	140,03-140,04

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	18.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057680
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Ritzelwelle / pinion shaft	PN-00077528.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Vrerzahnung und Wellenübergänge / toothing and shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	18.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Gehäuse_housing_material certificates_PART-057669

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPQ6IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : Q8S1008030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Size	Product No.	Quantity	Weight (kg)	Heat No.	Position	Tensile Test YP (N/mm²)	Tensile Test TS (N/mm²)	Tensile Test EL (%)	Impact Test V Notch -20°C Energy (Joule)	Division		C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Cu (%)	Mo (%)	N (ppm)	Nb (%)	Ti (%)	V (%)	Sol-Al (%)
6x2500x12000	PK20727091	1	1,413	SK21827	T	502	548	31	1: 104 2: 108 3: 119 A: 110		L P	0.0752 0.0751	0.241 0.249	1.547 1.551	0.0184 0.0187	0.0020 0.0017	0.024 0.023	0.034 0.034	0.006 0.008	0.005 0.001	33 31	0.026 0.026	0.0133 0.0133	0.040 0.040	0.037 0.036
*** Sub Total (1ea) ***		47	66,411 (kg)																						
*** Heat Treatment ===> Normalizing rolling ***												CEQ (%) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5													
8x3000x12000	PK20684801-4803	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110		L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.048 0.046	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
------>8x3000x12000	PK20684701-4703	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110		L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.048 0.046	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
8x3000x12000	PK20684801-4803	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108		L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.006 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20684701-4703	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108		L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.006 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20685001-5003	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108		L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.006 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test, Direction : Transversal, Gauge Length : 5.65 √A, (Rectangular),
  YP Method : Upper Point
* Impact Test, Direction : Surface Longitudinal, Sub-Size : 10mmX5.0mm
* Division - L : Ladle Analysis, P : Products Analysis
* Supply Condition : As-Rolled unless otherwise Heat Treated.

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN10025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging, improper use of product can cause safety issues.

CE 0036 14 0035-CPR-A269 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia

Copia de certificados de materiales empleados
Para el trabajo de: VAN LASA
Realizado con la O.F. de OLAN Nº: 110452
Su pedido N.º: 66834
Ref.: OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPC8IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : QBS1006030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

Product No.	Division	Total-Al (%)	CEQ (%)	
PK20727001	L P	0.036 0.037	0.348	
*** Sub Total (010) ***			47	66,411 (kg)
PK20684601-4603	L P	0.033 0.035	0.351	
PK20684701-4703	L P	0.033 0.035	0.351	
PK20684801-4803	L P	0.035 0.034	0.348	
PK20684901-4903	L P	0.035 0.034	0.348	
PK20685001-5003	L P	0.035 0.034	0.348	

CEQ (%) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN10025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

CE 0035-14-0035-CPR-A258 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia < PAGE : 172 > Testing and Inspection Team Leader NA SEON-HA

Gehäuse_housing_material certificates_PART-057669

검 사 증 명 서
MILL TEST CERTIFICATE

HYUNDAI STEEL

0038/07

주문번호 Order No. : F171200 026

품 명 Commodity : Hot Rolled Steel Plate

재질규격 Specification : EN 10025-2 S355J2+N

고객사 Customer : OLAN

주문자 Contractor : HYUNDAI CORPORATION

증명서 번호 Certificate No. : 20171229-PS-032-020

발행일자 Date of Issue : 2017-12-29

제품사이즈 Dimension	수량 Quantity	중량 Weight (Kg)	제강번호 Heat No.	제품번호 Product No.	Position	인장시험 Tensile Test YP (N/mm²)	TS (N/mm²)	EL (%)	YP-EL (%)	RA (%)	YR (%)	yp Mid	충격시험 Impact Test V Notch -20.0℃ Energy (Joule)	SF (%)	LE (mm)	화학성분 Chemical Composition (%) Direction	C	Si	Mn	P	S	Cr	Ni	Cu	Mo	N	Nb	Ti	V	Sol Al	CEQ
20 x 2500 x 12100	1	4,749	P54860	FA0048302	T	436.0	540.3	28				U	1:214			L	1,546	199	1,176	167	44	3	1	29	0	43	43	2	1	24	353
													2:210			P	1,564	194	1,165	172	41	3	1	27	0	35	43	1	1	26	353
													3:233																		
													A:216																		
20 x 2500 x 12100	1	4,749	P54860	FA0048303	T	436.0	540.3	28				U	1:214			L	1,546	199	1,176	167	44	3	1	29	0	43	43	2	1	24	353
													2:210			P	1,564	194	1,165	172	41	3	1	27	0	35	43	1	1	26	353
													3:233																		
													A:216																		
20 x 2500 x 12100	1	4,749	P54863	FA0048401	T	436.0	534.5	28				U	1:245			L	1,546	199	1,176	167	44	3	1	29	0	43	43	2	1	24	353
													2:257			P	1,564	194	1,165	172	41	3	1	27	0	35	43	1	1	26	353
													3:242																		
													A:248																		
20 x 2500 x 12100	1	4,749	P54863	FA0048402	T	436.0	534.5	28				U	1:245			L	1,546	199	1,176	167	44	3	1	29	0	43	43	2	1	24	353
													2:257			P	1,564	194	1,165	172	41	3	1	27	0	35	43	1	1	26	353
													3:242																		
													A:248																		

NOTE
- Position – T:Top, M:Mid Side, B:Bottom
- Tensile test – Direction Transverse, Gauge length:200mm (Rectangular), Elongation is converted to elongation on gauge lenth 5.65√A, by ISO 2566-1, YP Mid : 2 (0.2% off-set),3 (0.5% underload), U (Upper yield point), L (Lower yield point)
- Impact test – Direction Longitudinal, Size:10mmX10mm, SF:Shear fracture, LE:Lateral Expansion
- Division – P:Product analysis, L:Ladle analysis

- THIS CERTIFICATE IS ISSUED ACCORDING TO EN 10204 3.1 AD2000W0(W1)
This Mill Test Certificate is issued in accordance with EN 10204 Type 3.1

상기의 제품은 검사의 결과 주문요구사항과 지정된 규격의 합격한 것을 증명합니다.
WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ORDER AND SPECIFICATION

Signature S. B. Park
Chief Of Quality Assurance Team

- 본 검사증명서는 현재의 온라인 전자서명 정보 유효기간에서 출력된 사본입니다. 전자증서의 어떠한 변경과정 그리고 출력에서 확인하실 수 있습니다. (www.hyundai-steel.com/cs/validation.jsp)
- This Mill Test Certificate is a copy that has been printed from original electronic document with digital signing.
You are able to check an original electronic document at hyundaisteel's customer portal (www.hyundai-steel.com/cs/validation.jsp) + QRcode scanner App. ("Ofax"
- 사용상 주의사항 | 본 제품을 사용하기 전에 규격 및 사용시 제품손상 및 안전상 문제가 발생할 수 있습니다.
- Caution for Use | Damage of products and safety problems may arise if used other than to the uses stated in this Mill Test Certificate.

Copia de certificados de materiales empleados
Para el trabajo de ...OLAN...
Realizado con la O.F. de OLAN Nº ...10452...
Su pedido N.º ...65.834...
Ref. ...OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

CE
0045
13
0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011094

Date : 16.10.2021

Page 7 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID.SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Arala - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Supply Condition:NORMALIZING ROLLING

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N Plate Dimension** -Thickness x Width x Length : **25.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%El *	Bend Test	Impact Value x(J) I	II	III	Avg	Temp °C	Orien
					Chemical Analysis																Mechanical Properties									
B17532	B175321100	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.019	56	0.42	419	552	27		322	334	309	321.67	-20	Lo.
B17532	B175321100	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.019	56	0.42	419	552	27		322	334	309	321.67	-20	Lo.
B17533	B175330160	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330160	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330120	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330240	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330200	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330200	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B175330360	1	5.838	L	0.195	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
Sub Total		17	99.246																											

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:33:32
Printing Date 18.10.2021 & Time 11:16:51

Deepak Prasad
Authorised Signatory
TSD PlateMill

Copia de certificados de materiales empleados
Para el trabajo de.....LIAN.....LADA.....
Realizado con la O.F. de OLAN Nº.....120452
Su pedido N.º.....66834.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qcfab.pm@angul.jspl.com
Registered Office:Post box No. 5 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Centre,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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0045 - CPR - 1835

INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena Cintxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

Page 15 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PL.T.A.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355J2+N Plate Dimension -Thickness x Width x Length : 8.000MMX3000MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/F	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)						
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orient.
018727	018727/009	1	2.211	L	0.180	1.33	0.004	0.016	0.21	0.050	0.007	0.001	0.021	0.002	0.0010	0.009	0.0005	0.014	58	0.40	432	589	28		94	98	107	99.670	-20	Lo
Sub Total		1	2.211																												
G Total		114	070.884																												

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3. 1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-00733A; Rev.02, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B
5. Surface Inspection: As per EN10163 class A Subclass 3
6. Flatness: As per EN10029 Class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) ,C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination :- All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

CE
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0045 - CPR - 1835

INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

Page 16 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID-SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

11. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No:
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pre@angul.jsp1.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000011045

Date : 14.10.2021

Page 21 of 25

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID.SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena Cintxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355J2+N Plate Dimension -Thickness x Width x Length : 50.00MMX2500MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value (vJ) I	II	III	Avg	Temp °C	Orient
			MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value (vJ) I	II	III	Avg	Temp °C	Orient
A136200	A136200A0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0005	0.018	56	0.42	405	536	27		126	132	144	134.00	-20	Lo
A136200	A136200B0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0005	0.018	56	0.42	405	536	27		126	132	144	134.00	-20	Lo
B17869	B17869B6A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B17869B8A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B17869A7A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B17869B7B0	3	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo
B17869	B17869B8A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	390	538	26		144	134	133	137.00	-20	Lo
Sub Total		7	82.075																											

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Copia de certificados de materiales empleados
Para el trabajo de.....JUAN LASA.....
Realizado con la O.F. de OLAN Nº 210452
Su pedido N.º.....06834.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Paface, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000011045

Date : 14.10.2021

Page 24 of 25

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PL.T.A.28016 MADRID SPAIN CIF 853,SPAIN,PIN-06000

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355J2+N Plate Dimension -Thickness x Width x Length : 55.00MMX2500MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value (J) I	II	III	Avg	Temp °C	Orient
B16535	B165350 6A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.001	0.0020	0.010	0.0005	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo.
B16535	B165350 8A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.001	0.0020	0.010	0.0005	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo.
Sub Total		3	38.709																												
G Total		157	1150.149																												

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/- 00733A, Rev.2, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class B
5. Surface Inspection: As per EN10163:2005 class A Subclass 3
6. Flatness: As per EN10029:2011 table 4 class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) : C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 3-H 14.07.2021
Despatch Advice No:
Vehicle No.
* DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000011045

Date : 14.10.2021
Page 25 of 25

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 583,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C/Intxerdui 9
01250 Arala - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
11. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 24H 14.07.2021
Despatch Advice No:
Vehicle No.
* DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14.26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

INSPECTION CERTIFICATE

CE

Test Certificate No. 6276
To: Mr. NETWORK STEEL S.L. SPAIN
CARRENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF B83,SPAIN,PIN-00000

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling

TEST RESULTS

OLAN SA
Pol.Ind.Asparrena Cintxerdui 9
01250 Arala - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Supply Condition: Furnace Normalized
Deoxidation: Fully Killed

Material Grade : EN10025-2,2005 S355J2+N Plate Dimension -Thickness x Width x Length :

Heat No	Plate No	No of Pcs	Wt. MT	Chemical Analysis (Ladle)																		Mechanical Properties									
[illegible]	[illegible]	7	[illegible]	0.18	1.46	0.012	0.02	0.22	0.021	0.005	0.003	0.043	0.033	0	0.005	0.0018	0.023	49	0.429	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	11	142.465	0.173	1.45	0.012	0.015	0.2	0.026	0.007	0.002	0.046	0.038	0	0.006	0.0009	0.020	51	0.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	1	12.953	0.181	1.45	0.012	0.015	0.18	0.021	0.006	0.002	0.045	0.038	0.0000	0.006	0.0020	0.022	55	0.430	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Sushat Behera

Copia de certificados de materiales empleados
Para el trabajo de.....OLAN.....ARA.....
Realizado con la O.F. de OLAN Nº.....70452
Su pedido N.º.....6687.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

CE

INSPECTION CERTIFICATE

Test Certificate No. 4276

To, M/s NETWORK STEEL S.L. SPAIN

CARDINAL MARCELO SPINOLA 2-8 PLTA.28016 MADRID SPAIN CIF B81,SPAIN,PIN-00000

TEST RESULTS

Supply Condition: Furnace Normalized

Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 in Class A

Surface Inspection: As per EN10163:2005 class A Subclass 3

Hardness: As per EN10021:2006 (table 4 class N.O. Type)

Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011

Marking details: Mfg. Name, & logo plate identification, specification & grade, size, customer name & UT Spec.

Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction

Q. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described above has manufactured and tested with satisfactory results in accordance with the requirements of the above mentioned material specification

Thickness Examination : All the above plates are ultrasonically tested as per EN10160:1999 S1:E1 and found ok

Purchase Reference & Date: PRUVAXXHPL1500:08.UT 2/04.07.2018

"TWIP can be viewed at www.jindalsteelpower.com", TWIP No.: JSPL/CE/PL/555512

* Gauge Length: 5.65(S0)1/5

ISPL/AKG/PM-QA&QC/F-2M

Authorised Signatory

QA/QC Manager

Gehäuse_housing_material certificates_PART-057669

검 사 증 명 서
MILL TEST CERTIFICATE

HYUNDAI STEEL
0038/07

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Arsia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

주문번호 Order No.: P171200028
품 명 Commodity: Hot Rolled Steel Plate
제품규격 Specification: EN 10025-2 S355J2+N
고객사 Customer: OLAN
주문자 Contractor: HYUNDAI CORPORATION
증명서 번호 Certificate No.: 20180301-PS-010-003
발행일자 Date of Issue: 2018-03-01

치수 Dimension	수량 Quantity	중량 Weight (Kg)	제강번호 Heat No.	제품번호 Product No.	열처리 Heat Treatment	인장시험 Tensile Test YP (N/mm²)	TS (N/mm²)	EL (%)	YP-EL (%)	RA (%)	YR (%)	YP Mid (%)	충격시험 Impact Test V Notch -20.0 °C Energy (J)	SF (%)	LE (mm)	화학성분 Chemical Composition (%)	C	Si	Mn	P	S	Cr	Ni	Cu	Mo	N	Nb	Ti	V	Cu+Ni	CEQ
																Limit	4	3	3	4	4	3	3	3	3	4	3	3	3	3	3
> 65 x 2500 x 12000	1	15,306	P59185	FA0218701	T	380.6	514.1	32				U	1:283 2:313 3:255 Ave:277			L	1,152	210	1,454	147	40	2	10	62	0	41	31	16	1	30	374
																P	1,201	207	1,453	160	37	2	10	78	0	37	29	16	2	27	379
65 x 2500 x 12000	1	15,306	P59185	FA0218701	T	380.6	514.1	32				U	1:283 2:312 3:255 Ave:277			L	1,152	210	1,454	147	40	2	10	62	0	41	31	16	1	30	374
																P	1,201	207	1,453	160	37	2	10	78	0	37	29	16	2	27	379
65 x 2500 x 12000	1	15,306	P59753	FA0222801	T	384.1	503.0	32				U	1:313 2:272 3:320 Ave:302			L	1,142	198	1,455	145	38	2	9	61	1	43	29	16	2	30	374
																P	1,147	191	1,456	119	33	2	9	60	1	35	29	16	1	34	379
65 x 2500 x 12000	1	15,306	P59750	FA0223701	T	389.8	501.2	32				U	1:289 2:313 3:255 Ave:285			L	1,170	186	1,454	156	35	2	9	61	0	41	29	16	2	36	374
																P	1,247	194	1,425	134	37	2	9	73	1	36	31	16	1	31	380

NOTE
- Position – T:Top, M:Middle, B:Bottom
- Tensile test – Direction:Transverse, Gauge length:5.65√A, (Round), YP Mid : 2 [0.2% off-set],5 (0.5% underload), U (Upper yield point), L (Lower yield point)
- Impact test – Direction:Longitudinal, Size:10mm X10mm, SF:Shear fracture, LE:Lateral Expansion
- Division – P:Product analysis, L:Ladle analysis

- THIS CERTIFICATE IS ISSUED ACCORDING TO EN 10204 3.1 AS2300(W2W1)
This Mill Test Certificate is issued in accordance with EN 10204 Type 3.1

상기의 제품은 검사치 결과 주문및우리사항의 지정된 규격에 합격한것을 증명함니다.
WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ORDER AND SPECIFICATION

Signature: S. B. Park
Chief Of Quality Assurance Team

- 본 검사증명서는 원본의 전자문서(전자서명 포함 포맷)로부터 출력된 사본입니다. 전자문서는 이용한 한국제철 고객포털에서 확인하실 수 있습니다 (http://kr.hyundai-steel.com/cs/cs/login.jsp)
- This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signing).
You are able to check all original electronic documents at hyundaisteel's customer portal(http://kr.hyundai-steel.com/cs/cs/login.jsp) ● DRoots scanner Ave / DRear
- [사용상 주의사항] 본 검사증명서의 명기된 사용 외 타 사용시 특성변형 및 인장성 분쇄가 발생될 수 있습니다.
- [Caution for Use] Damage on products and safety problems may arise if used other than to the uses stated in this Mill Test Certification.

Copia de certificados de materiales empleados
Para el trabajo de.....LINA LAA.....
Realizado con la O.F. de OLAN Nº.....210652
Su pedido N.º.....66834.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

CE
0045
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0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011096

Date : 16.10.2021

Page 1 of 2

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Aaparrena Ciintxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:FURNACE NORMALIZED

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** Plate Dimension -Thickness x Width x Length : **130.0MMX2200MMX8550MM**

Heat No	Plate ID	Pcs	Wt. MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) T	II	III	Avg	Temp °C	Orient
A13625	A136250AB	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.00101	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A136250AC	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.00101	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A136250AD	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.00101	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A136250AE	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.00101	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
B16551	B165310AB	1	19.196	L	0.182	1.47	0.002	0.016	0.20	0.037	0.008	0.045	0.046	0.011	0.00101	0.011	0.0005	0.015	57	0.44	330	524	26		188	159	166	171.00	-20	Lo.
Sub Total		5	95.980																											
G Total		5	95.980																											

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-00733A; Rev.02, Dt.:09.03.2021
4. Supply Condition: Furnace Normalized at 900 ± 20°C, cycle time minimum: 1.4 minutes per mm thickness + 10 minutes.
5. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:48:20
Printing Date 18.10.2021 & Time 11:22:14

Deepak Prasad
Authorised Signatory
TSD Plate/Mill

Copia de certificados de materiales empleados
Para el trabajo de.....OLAN, S.A.....
Realizado con la O.F. de OLAN Nº.....170.452.....
Su pedido N.º.....6084.....
Ref.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-06761) 254191-95; Fax :-06761 -254141-44

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0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011096

Date : 16.10.2021

Page 2 of 2

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:FURNACE NORMALIZED

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

6. Surface Inspection: As per EN10163 class A Subclass 3
7. Flatness: As per EN10029 Class N (L Type)
8. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
9. CE (IIW) C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
10. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
11. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
12. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No:
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:48:30
Printing Date 18.10.2021 & Time 11:22:14

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

OLAN, S.A.
PRODUCTOS METÁLICOS - CORTE A MEDIDA
OXICORTE - TRATAMIENTOS ANTICORROSIVOS

INFORME DE INSPECCIÓN POR ULTRASONIDOS
ULTRASONIC INSPECTION REPORT

Nº Informe (Report): **O.F. 170.452**

Cliente: Customer:	JUAN LASA	**Nº Pedido:** Order:	66.834	**Referencia:** Reference:	OF.8617
Descripción: Description:	Chapa	**Norma:** Standard:	UNE-EN 10160:2000	**Clase:** Grade:	S2 + E2
Tipo de material: Type of material:	Chapas de acero			**Acabado superficial:** Surface finish:	Laminación
Equipo: Equipment:	KRAUTKRAMER USM 32			**Acoplamiento:** Couplant:	AGUA

PALPADOR - PROBE				CALIBRACIÓN - CALIBRATION				
TIPO TYPE	FREC. FREQ (MHz.)	TAMAÑO SIZE (mm.)	Espesor Thickness (mm.)	PARA CAMPO FOR RANGE	CAMPO RANGE (mm.)	TALADRO REGISTRO REC. HOLD	PARA LA GANANCIA FOR GAIN	GANANCIA GAIN
SEB-4T	4	Ø 24 mm	8 / 65	Chapa	16 / 130	Ø 5 mm.	80 % ECO	42 / 56 dB
B2S-E	2	Ø 24 mm	130	Chapa	260	Ø 8 mm.	80 % ECO	46 dB

RESULTADOS (RESULTS):
Se ha efectuado la inspección por ultrasonidos según la norma UNE-EN10160:2000 según clases S2 + E2 al siguiente material / The inspection by ultrasonic test has been made in accordance with UNE-EN10160:2000 standard and S2 + E2 grade the following material:

1 chapa/*plate* 8 x 3000 x 12000 (S-355-J2+N):	PK20684701
1 chapa/*plate* 20 x 2500 x 12100 (S-355-J2+N):	FA90548303
1 chapa/*plate* 25 x 2500 x 12000 (S-355-J2+N):	B1753303A0
1 chapa/*plate* 50 x 2500 x 12000 (S-355-J2+N):	B1706906B0
1 chapa/*plate* 55 x 2500 x 12000 (S-355-J2+N):	B8370204A0
1 chapa/*plate* 65 x 2500 x 12000 (S-355-J2+N):	FA92167401
1 chapa/*plate* 130 x 2200 x 8550 (S-355-J2+N):	A1362509A0

En dicha inspección se han detectado indicaciones que NO superan el nivel de referencia, por lo que se clasifica la chapa como ACEPTABLE / In this inspection weren't found indications exceeding the reference level, so the material is classified as **ACCEPTABLE.**

CROQUIS (SKETCH):

OPERADOR (OPERATOR): José Ignacio Bañales Esparza
Nº CERTIFICADO (CERTIFICATE NR.): E-A-004397-UT-2-M-2
FECHA (DATE): 14/02/2022

OLAN, S.A.
Pol. Ind. Ascarrena - C/ Amezaga, 8
01250 ESTIBALIZ (ALAVA)
Tf. 945 31 46 00 - Fax 945 31 45 89

Gehäuse_housing_material certificates_PART-057669

INTEC Inspección Técnica	INSPECCIÓN VISUAL *(Visual Testing)*	INFORME Nº *(ReportNr.)* 220226

CLIENTE *(Customer)*	ORDEN DE FABRICACIÓN *(Purchaseorder)*	PLANO CLIENTE *(CustomerDrwg).*
TALLERES JUAN LASA, S.A.	65.489/ OF 8617	PART-057669
DESIGNACIÓN *(Item)*	**MATERIAL** *(Material)*	**SOLDADURA** *(Welding)*
GEHÄUSE (3 piezas)	S355J2+N	FW / BW

CONDICIONES DE EXAMEN(Examination Conditions)

ILUMINACIÓN *(Ilumination)*		SOLDADURA *(Welding)*		ESTADO DE LA SUPERFICIE *(Surface status)*
				SOLDADURA EN BRUTO
Natural *(Natural)*	Artificial *(Artificial)*	Procedimiento *(Proced.)*	Tipo Junta *(Jointtype)*	PROCEDIMIENTO DE INSPECCIÓN *(Inspectionprocedure)*
	X	MAG	FW/BW	UNE EN ISO 17637

ESPECIFICACIÓN *(Specification)*	OBSERVACIONES (Observations)
S/EN5817	
GRADO *(Grade)*	**RESULTADO DEL EXAMEN** *(ExaminationResults)*
B	ACEPTABLE

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.

(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-003109-VT-2-S-2 *(Level 2 Inspector)*	FECHA *(Date)*
INTEC Inspección Técnica email: intec.era@gmail.com Tel: 696 320 618 / Lasarte, Gipuzkoa	23/02/2022

Gehäuse_housing_material certificates_PART-057669

INTEC Inspección Técnica	EXAMEN POR LÍQUIDOS PENETRANTES *(Examfor penetran liquids)*	INFORME Nº *(ReportNr.)* 220217

CLIENTE *(Customer)*	PEDIDO CLIENTE *(Purchaseord.)*	PLANO CLIENTE *(PurchaseDrwg.)*
TALLERES JUAN LASA, S.A.	65.489/ OF 8617	PART-057669

MATERIAL *(Material)*	COLADA *(Heat)*
S355J2+N	--

DESIGNACIÓN *(Item)*
GEHÄUSE

LIMPIEZA *(Cleaning)*	TIPO DE PENETRANTE *(Type of penetrating)*	ELIMINADOR *(Eliminator)*	REVELADOR *(Revealer)*
ARDROX 9PR5	ARDROX 996 PB	ARDROX 9PR5	ARDROX LD7

MÉTODO *(Method)*
LIQUIDOS PENETRANTES COLOREADOS LAVABLES CON DISOLVENTE

ESTADO DE LA SUPERFICIE *(State of thesurface)*
SOLDADURAS EN BRUTO

OBSERVACIONES *(Observations)*

ACEPTADOS *(Accepted)*	RECHAZADOS *(Rejected)*
3 PIEZAS	--

PROCEDIMIENTO *(Specification)*	GRADO DE EXIGENCIA *(Demand grade)*
EN ISO 23277	3X

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.
(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-003109-PT-2-S	FECHA
INTEC Inspección Técnica email: intec.ona@gmail.com Tel: 695 320 618 / Lazkao Gipuzkoa	23/02/2022

05 – PT – IT – M

Gehäuse_housing_material certificates_PART-057669

Juan Lasa	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	**PEKRUN**	**Pedido cliente** / *Customer Order* 4.500.058.885
PLANO Nº *Drawing Nº:*	**PART-057669**	**OF TJL** / *Manufacturing Order TJL* 8617- 1

Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		565		22				
2	485+D		500		23				
3	185		186		24				
4	330		331		25				
5	65		65		26				
6	Ø360-D		Ø340		27				
7	Ø330-D		Ø310		28				
8	310		309		29				
9	Ø300-D		Ø280		30				
10	Ø300-D		Ø280		31				
11	520		518		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

Responsable control final/ *Final Control responsable*

Gehäuse_housing_material certificates_PART-057669

Juan Lasa	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order*	4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL*	8617 - 2

		Valor medido *Measured Value*					Valor medido *Measured Value*		
Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		565		22				
2	485+D		497		23				
3	185		186		24				
4	330		330		25				
5	65		64		26				
6	Ø360-D		Ø340		27				
7	Ø330-D		Ø310		28				
8	310		309		29				
9	Ø300-D		Ø280		30				
10	Ø300-D		Ø280		31				
11	520		518		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

Responsable control final/ *Final Control responsable*

Gehäuse_housing_material certificates_PART-057669

Juan Lasa	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order* 4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL* 8617-3

Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		564		22				
2	485+D		499		23				
3	185		186		24				
4	330		330		25				
5	65		64		26				
6	Ø360-D		Ø339		27				
7	Ø330-D		Ø310		28				
8	310		309		29				
9	Ø380-D		Ø280		30				
10	Ø300-D		Ø280		31				
11	520		519		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

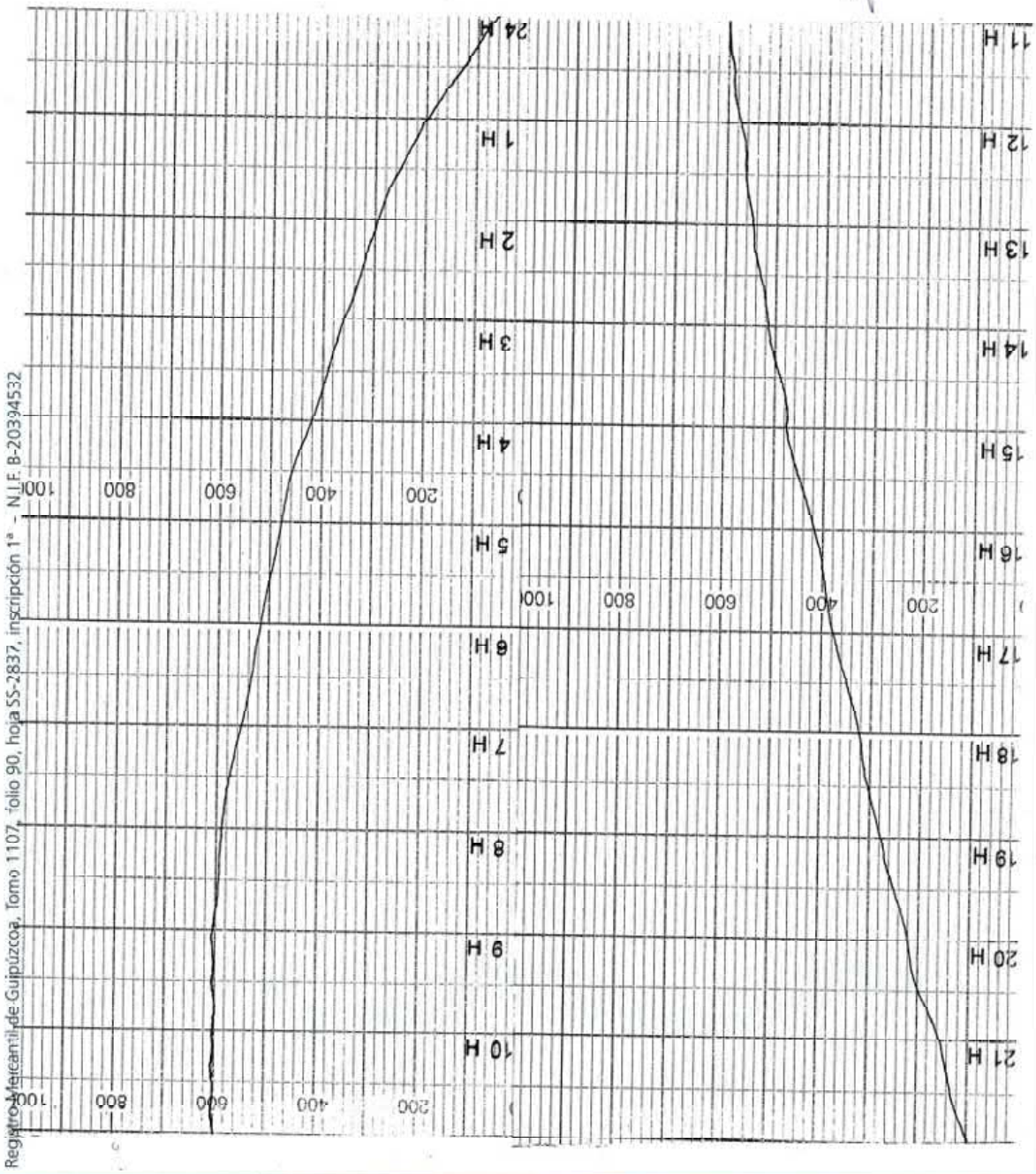
Responsable control final/ *Final Control responsable*

Gehäuse_housing_material certificates_PART-057669

muñagorri S.L.
recubrimientos

Talleres Juan Lasa, S.A.
Nº Reg. 24-02-2022
Pdo. 65.493 OF: 8617
3 carter. s/p PN 00077481.00
Estabilizado 600ºC

RECUBRIMIENTOS MUÑAGORRI, S.L.
Polígono Industrial Beotibar
20491 BELAUNTZA



Registro Mercantil de Guipúzcoa, Tomo 1107, folio 90, hoja SS-2837, inscripción 1ª - N.I.F. B-20394532

Polígono Industrial Beotibar, s/n Tel. 943 67 30 28 Fax 943 67 01 35 20491 BELAUNTZA (Gipuzkoa)

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.151-251-351	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002289-91

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
3	Gehäuse / housing	PN-00077481.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagerbohrung	Ø 360 H7		360,03-360,05
Lagerbohrung	Ø 360 H7		360,03-360,05
Lagerbohrung	Ø 300 H7		300,02-300,04
Lagerbohrung	Ø 300 H7		300,03-300,04
Achshöhe	550	0 -0,2	i.O.
Ankerlöcher	Ø 42		i.O.
Lochabstand	400		i.O.
	700		i.O.
	380		i.O.
	380		

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	23.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 2

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	Projekt-Nr. 4000370 S/No. 10002291

Menge *Quantity*	Benennung *Designation*	Getriebetyp *Gearbox type*	Zeichnungs-Nr. *Drawing no.*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW	PN-00096627.001.01

Technische Daten Getriebe / *Technical data gear unit*			
Leistung/*power*	4100 kW	Übersetzung/*ratio*	i = 2,448:1
Ölmenge/*oil quantity*	270 l / 63 l/min	Drehzahl/*number of revolution*	n_1 =1493 min^{-1}
Ölviscosität/*oil viscosity*	ISO VG 320	Drehzahl/*number of revolution*	n_2 = 609,8 min^{-1}
Anordnung Antrieb *drive arrangement*	Horizontal	Anordnung Abtrieb *output arrangement*	Horizontal
Drehrichtung Abtrieb *sense of rotation (output)*	CCW	Schmierung *lubrication*	recirculation lubrication

Messprotokoll für Getriebe / *measuring data report for gear unit*

Tragbilder und Zahnspiele
meshing patterns and gear clearance of the toothing

Prüfergebnis:

Die Tragbilder und Zahnspiele der Verzahnungen wurden während der Getriebemontage nach den Zeichnungen geprüft und entsprechen den, der Konstruktion vorgegebenen, Qualitätsanforderungen.

Test result:

The meshing patterns and gear clearances of the gear toothing were checked during gear assembly according to the drawings and correspond to the quality instructions specified by the construction.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	18.05.2022	M. Hammann	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	Projekt-Nr. 4000370 S/No. 10002291

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Stirnradgetriebe /*spur gear gearbox*	PN-00096627.001.01

Maßprotokoll der Anschlussmaße
measurement report of the connection dimensions

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Antriebswelle / *Input shaft*	Ø 140 m6	+0,040 +0,015	140,03
Höhe / *height*	550	0 -0,2	i.O.
Länge / length	180	+0,5 -0,5	i.O.
Abtriebswelle / Output shaft	Ø 240 m6	+0,046 +0,017	240,03
Höhe / *height*	550	0 -0,2	i.O.
Länge / *length*	292	+0,5 -0,5	i.O.
Fußlochabstand / *distance of the Housing holes*	400/220/480	+0,8 -0,8	i.O.
Fußlochabstand / *distance of the Housing holes*	380/380	+0,8 -0,8	i.O.
Fußlöcher / *housing holes*	Ø 42	+0,3 -0,3	i.O.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	27.05.2022	J. Nenast	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 1 von 3

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10-3
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Serial-Nr.: *Serial- No.:*	10002291	Probelaufdatum: *Test run date::*	25.05.2022

Menge/*Quantity*	Benennung/*Designation*	Getriebe-Typ/*Gearbox type*
1	Getriebe	ASR 450-R-CCW

Technische Daten Getriebe / *Technical data gear unit*					
Leistung/ *power*	P [kW]	4100	Drehmoment/ *torque*	T [Nm]	
Übersetzung/ *ratio*	i	2,4483:1	Drehzahl/ *number of revolution*	n1 [1/min]	1493
Drehrichtung/ *sense of rotation*		CCW	Drehzahl/ *number of revolution*	n2 [1/min]	609,8
Ölviscosität/ *oil viscosity*	[cST 40°C]	320	Schmierung/ *lubrication*		Circulating oil lub.
Ölmenge / *oil quantity*	[l/min]	63	Ölfüllmenge/ *oil filling quantity*	[l]	270

Probelaufprotokoll / test run report

Antriebsdrehzahl beim Probelauf *drive number of revolution during test run*	n1 [1/min]	Ist / *actual value* 1493
Abtriebsdrehzahl beim Probelauf *output number of revolution during test run*	n2 [1/min]	Ist / *actual value* 609

Temperaturen nach Laufzeit *Temperature after running time*			Lager antriebsseitig *bearing on drive side*	Lager abtriebsseitig *bearing on output side*
Antrieb/*drive*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	40	43
Abtrieb/*output*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	35	42
Öltemperatur /*oil temperature*		[°C]	41	

Separate Temperaturaufzeichnung mit Datenlogger, mit „JA“ oder „NEIN“ bestätigen *Separate temperature recording with data logger, confirm with "YES" or "NO*		Ja
Laufzeit Probelauf /*running time test run*	[h]	4
Ölfüllmenge/ *oil filling quantity*	[l]	270
Ölmenge/ *oil flow rate*	[l/min]	63
Probelauföl/ *test run oil*	[cST 40°C]	ISO VG 320

Erfassen des Öldruckes/ *recording the oil pressure*		
Öldruck bei Probelaufstart/ *oil pressure at test run start* (mit Angabe der Öltemperatur / with indication of the oil temperature)	3,3bar @ 24C°	
Öldruck bei Beharrungstemperatur (alternativ nach Laufzeit h) *Oil pressure at steady-state temperature (alternatively after running time h)*	Soll / *nominal value* bar @ C°	Ist / *actual value* 2,0bar @ 41C°

Öldichtigkeit des Getriebes, mit „i.O.“ oder „n.i.o.“ bestätigen *oil tightness of the gearbox, confirm with "i.O." or "n.i.o.*	i.O

Schwingungsmessung/ *vibration measurement*	
Schwingungsmessung gemäß Beschreibung, mit „JA“ oder „NEIN“ bestätigen *vibration measurement acc. to description, confirm with "YES" or "NO*	Ja
Messpositionen nach Vorgaben in der Maßzeichnung, mit Angabe (x) bestätigen *measuring positions acc. to specifications in the dimensional drawing, confirm with indication (x)*	x

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 2 von 3

Funktionsprüfung von Zubehörteilen/ *functional test of accessory parts*	
Zubehör auf Funktion geprüft (Durchflusswächter, Druckwächter, etc.), mit Angabe (x) bestätigen *Accessories checked for function (flow monitor, pressure monitor, etc.), confirm with indication (x)*	-

Erfassen der Serialnummern/ *recording the serial numbers*	
Erfassen aller Serialnummern des verbauten Zubehörs am Getriebe, mit Angabe (x) bestätigen *recording of all serial numbers of the installed accessories on the gearbox,/ confirm with indication (x)*	x

Prüfungen Mühlengetriebe/ *tests mill gear unit*		
Maß X/ *dimension X*	[mm]	
Anschlussflanch/ *connecting flange*		
Radialschlag/ *radial run-out*	[mm]	
Axialschlag/ *axial run-out*	[mm]	

Weitere Prüfungen/ *further tests*			
Schallpegel in 1m Entfernung *sound level at 1m distance*	[dB(A)]	Soll / *nominal value*	Ist / *Actual value*
		-	76 dB
Innenkonservierung, mit Angabe Konservierungsmittel *interior conservation,* with indication of preservative			VCI
Ölfilter gereinigt, mit Angabe (x) bestätigen *oil filter cleaned, confirm with indication (x)*			-

Bilder Probelaufaufbau / *pictures test run bench*

Bilder Öldruck bei Start /
pictures oil pressure at start

Bilder Öldruck bei Beharrungstemperatur /
Pictures oil pressure at steady-state temperature

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 3 von 3

Bilder Durchflusswächter bei Start /
Pictures flow monitor at start

Bilder Durchflusswächter bei Beharrungstemperatur /
Pictures Flow monitor at steady-state temperature

Bilder Funktionsprüfung Instrumentierung und Zubehör /
Pictures Functional test instrumentation and accessories

Bemerkung: Probelauf ohne Last. Während des Probelaufs wurden keine Undichtigkeiten am Getriebe festgestellt.

Remark : Test run without load. During the test run, no leaks were detected at the gearbox.

Prüfer / Inspector:	J. Nenast
Datum / Date:	25.05.2022

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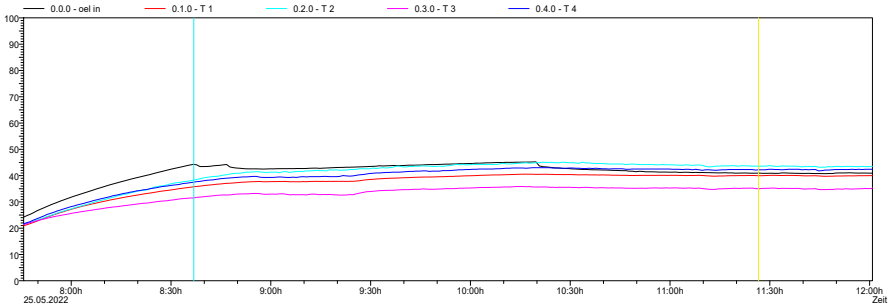
Probelaufdiagramm
test run diagram

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	Werks-Nr.: *Works no.:*	Material No. 2000064788	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-10-3
Bestell-Nr.: *Order no.:*	4500494756	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002291	Artikel-Nr.: *Article no.:*	PART-060561

Temperaturverlauf / *temperature profile*



Messstelle	Linker Cursor		Rechter Cursor		Differenz		Mittelwert	
Zeit	25.05.2022, 08:36:50		25.05.2022, 11:26:35		02:49:45			
0.0.0 - oel in	44,29	°C	40,96	°C	-3,33	°C	42,942	°C
0.1.0 - T 1	35,71	°C	39,95	°C	4,24	°C	39,195	°C
0.2.0 - T 2	38,3	°C	43,6	°C	5,3	°C	43,22	°C
0.3.0 - T 3	31,48	°C	34,98	°C	3,5	°C	34,452	°C
0.4.0 - T 4	37,5	°C	42,2	°C	4,7	°C	41,4	°C

	58640 Iserlohn	25.05.2022	J. Nenast
	ORT / *INSPECTION LOCATION*	DATUM / *DATE*	PRÜFER / *INSPECTOR*

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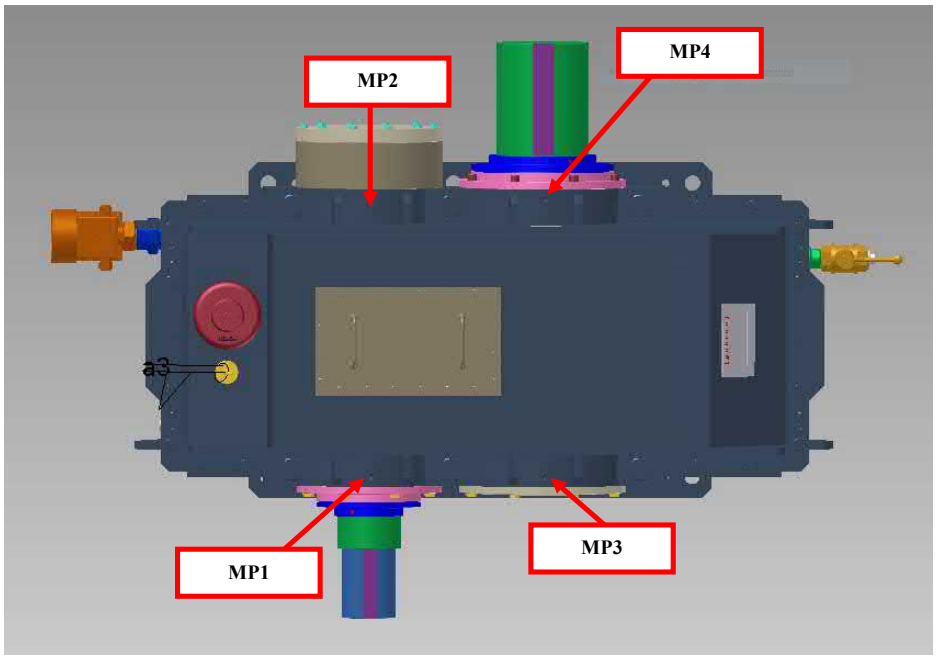
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Auftraggeber: customer:	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: PEKRUN com.-no.:	19396/10-3
Bestell-Nr.: order no.:	4500494756	Zeichnungs-Nr.: drawing no.:	PART-060561
Auftrags-Nr.: works no.:	Material-No.: 2000064788	Kennwort: code word:	Projekt-Nr. 4000370 S/No. 10002291

Menge/quantity	Benennung/designation	Getriebe-Typ/gear unit type
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW

Gearbox overview



Remarks:
Measuring points acc. to dimensional drawing.

Test result:
The results of the test run comply with the Pekrun quality specifications. The test results are listed on the second page.

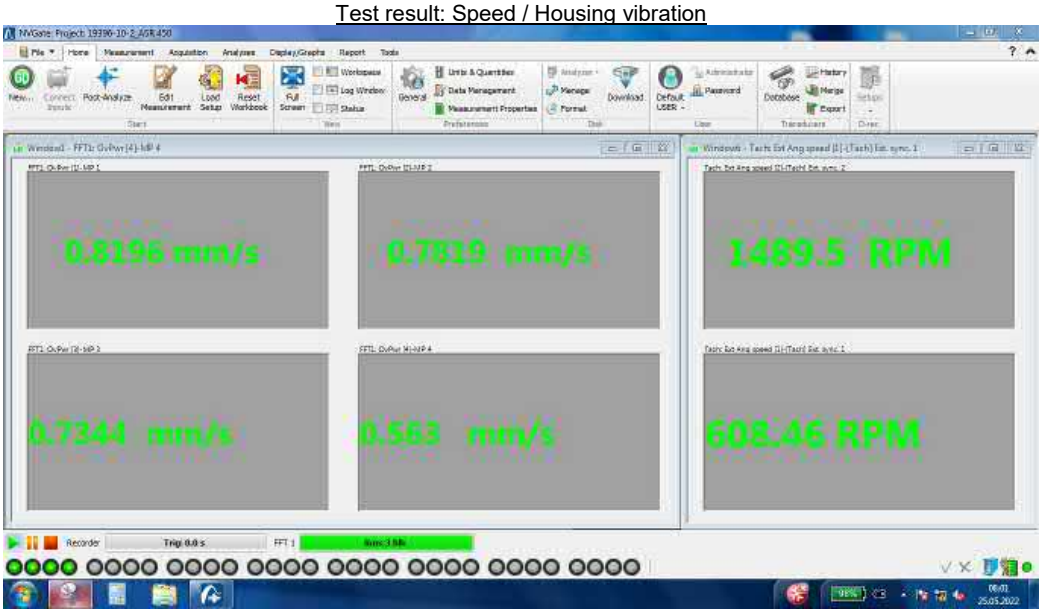
J. Nenast

Datum: 25.05.2022

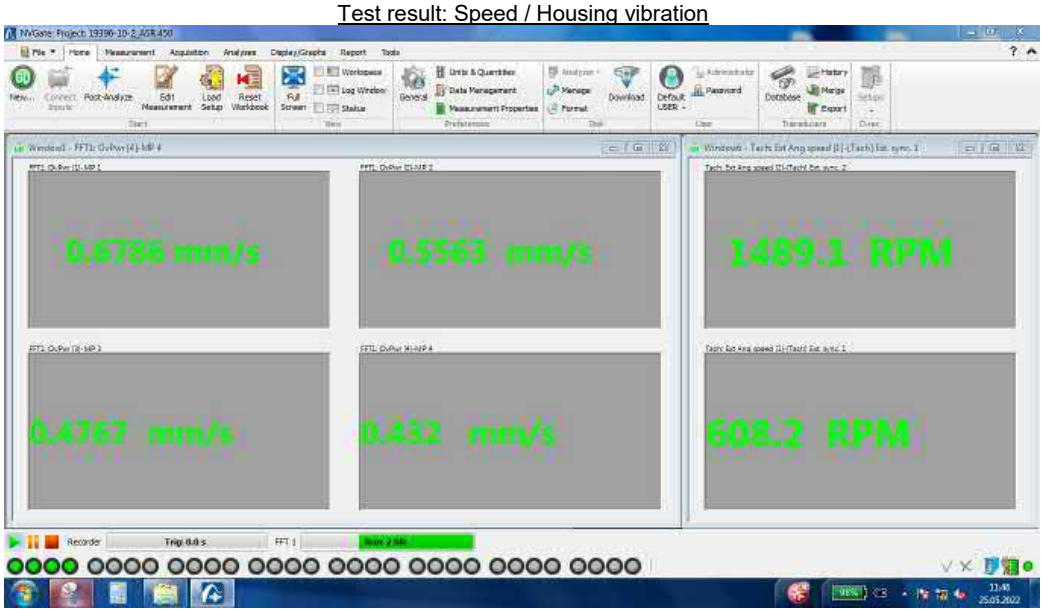
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Test result: Speed / Housing vibration



Test result: Speed / Housing vibration



Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 2

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/10
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060561
Werks-Nr.: *Works no.:*	Material-No.: 2000064788	Kennwort: *Code word:*	S/No. 10002291

Menge *Quantity*	Benennung *Designation*	Getriebe-Typ *Gearbox type:*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW

Anstrichprüfung / *coat of paint report*

Anforderungen / ***requirements:***			
Spezifikation (PEKRUN oder Kunden-Nr.): *Specification (PEKRUN or customer no.):*	QH00510B_01		
Vorbehandlung nach ISO 12944-4 *Surface preparation treatment acc to EN ISO 12944-4*	Shot blasting ☐SA 2 / ☒SA 2½ / ☐SA 3		
Oberflächenreinheit *Surface cleanliness*	Acc. to ISO 8501 (free of rust, oil, tinder and other impurities)		
Oberflächenrauheit *Surface roughness*	acc. to SA 2½		
	Grundanstrich *1st. Coat (Primary coat)*	Zwischenanstrich *2nd. Coat (Intermediate coat)*	Deckanstrich *3rd. Coat (Top coat)*
Produktname Name of Product	Vestozink 2K EP Zink	VESTOPOX 2K-EP-1.Deck EG RAPID	VESTOPUR 2K-DT-Deck – ATEX
Chargen Nr.: *Charge No.*	2200964	2200193	2200781
Farbe (RAL Nr.) *Color (RAL no.)*	graumatt	RAL 7703	RAL 5001
Trockenschichtdicke *DFT (dry film thickness)*	70 µm – 95 µm	155 µm -173 µm	225 µm – 288 µm
Lufttemperatur °C *Air temperature °C*	20 °C	22 °C	22 °C
Oberflächentemperatur °C *Surface temperature °C*	22 °C	22 °C	22 °C
Relative Luftfeuchte % *Relative air humidity %*	47 %	48 %	49 %
Datum Date	14.05.2022	31.05.2022	03.06.2022
Haftfähigkeit der Farbe nach ISO 2409 Gitterschnittkennwert: *Adhesion test acc. to ISO 2409 Parameter of grid cut test:*	ISO GT (1)		

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Bemerkungen	Schichtdickenangaben nach DIN EN ISO 12944-5

Die Sollschichtdicke gilt auch als erreicht, wenn Einzelmesswerte den Sollwert um höchstens 20% unterschreiten und der Mittelwert aller Einzelmessungen gleich oder größer der Sollschichtdicke ist.

Remarks: *Layer thickness information according to DIN EN ISO 12944-5*

The nominal layer thickness is also complied, to be achieved if individual measured values fall below the setpoint value by at most 20% and the mean value of all individual measurements is equal to or greater than the nominal layer thickness.

Prüfergebnis:	Die Anforderungen sind erfüllt.
Test result:	*The requirements are complied*

58640 Iserlohn	27.06.2022	Z. Acikgöz	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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Stage 2

TAG No. AERZEN	Link
2.7.1.451	
2.7.1.551	

Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Deutschland
www.pekrun.de

TECHNISCHE DOKUMENTATION

TECHNICAL DOCUMENTATION

DEUTSCH

ZUM AUFTRAG
TO THE ORDER

IHRE BESTELL NR. YOUR ORDER NO.	4500494756 Pos. 20	
WERKS NR. WORKS NO.	2000064792 4001310647, 4001308822	
KENNWORT CODE WORD	GLAUCH TOOBA	
TAG-No	2.7.1.451	2.7.1.551
PEKRUN SERIAL NR.	10002292	10002293
PEKRUN KOM. NO.	19396-20	
GETRIEBE TYP GEAR UNIT TYPE	ASR 450-R-CCW	
GEWICHT WEIGHT	3363 kg	
BAUJAHR YEAR OF MANUVACTURE	2022	

[pekrun]

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn

Original

Betriebsanleitung

(inkl. Montageanleitung nach EG-Maschinenrichtlinie
2006/42/EG, Anhang VI für unvollständige Maschinen)

für

Pekrun Getriebe

Geltungsbereich :	Schneckengetriebe, Stirnradgetriebe(außer Turbogetriebe), Kegelradgetriebe(außer Mühlengetriebe), Planetengetriebe, Sondergetriebe und Kombinationen hieraus
Typ :	…ALG… / ..AGZ… / ..AG… /..PG… / ..GV… / ..LG… / ..HS… ASR… / BSR… / CSR… / DSR… /..SR… / ..SH… / ..VN… / ..VG… / ..VH… AKR… / BKR… / ..KR… / ..KS.. / ...PL… …SO… / ..KZ… / ..MK…/ ..SV… / ..VH… / ..VH… / ..VN… SN*../ SNU*../ SNO*../ SNV*../ SNC*../ SNA*../ SNAF*.. SW*../SHS*../ SDA*../ SVA*../.SZA*../ ZVA*../ SEO*.. K*../KN*../ KNV*../ KNA*../ KS*../ KW*../ KZV*../ VKZ*../ SKV*.. SSN *../ SSNV*../ SSW*../ KSN*..

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1 Wichtige grundlegende Informationen

1.1 Lieferumfang

- Getriebe
(Liefermenge und Getriebetyp siehe Auftragsbestätigung bzw. Leistungs- und Liefervertrag)
- Betriebsanleitung incl. Einbauerklärung

1.2 Verantwortlichkeiten

1.2.1 Verantwortlichkeiten des Herstellers

Der Zusammenbau des Getriebes wird von der Firma Pekrun Getriebebau GmbH durchgeführt.

Die Instrumentierung und alle benötigten Überwachungsgeräte werden am Getriebe montiert. (wenn im Lieferumfang enthalten bzw. vom Kunden beigestellt).

1.2.2 Verantwortlichkeiten des Herstellers der Gesamtmaschine

Die Ausführung und Festigkeit des Fundaments liegt im Verantwortungsbereich des Anlagenherstellers bzw. Endkunden.

Die weitere Montage in die Anlage liegt in der Verantwortung des Anlagenherstellers bzw. Endkunden. Das gleiche gilt für die Elektroinstallation der Instrumentierung und aller benötigten Überwachungsgeräte am Getriebe.

Die Montage und Bereitstellung der benötigten Versorgungsanschlüsse bzw. -leitungen liegt in der Verantwortung des Anlagenherstellers/Betreibers.

Der Hersteller der Gesamtanlage ist verpflichtet alle betriebsrelevanten Informationen (z.B. Sicherheitshinweise, Vorschriften und Beschreibungen) dieser Betriebsanleitung in die Betriebsanleitung der Gesamtmaschine zu integrieren und diese über die gesamte Lebensdauer des Getriebes mit zu pflegen.

1.2.3 Verantwortlichkeiten des Betreibers

Die Inbetriebnahme liegt in der Verantwortung des Betreibers bzw. Endkunden.

Die Betriebsanleitung ist Bestandteil der Lieferung. Sie ist in jedem Fall für alle mit der Montage, Bedienung, Instandsetzung sowie der Pflege und Wartung betrauten Personen zur Verfügung zu stellen.

	HINWEIS
	Der Betreiber hat sicherzustellen, dass alle vorgenannten Personen die Betriebsanleitung gelesen und verstanden haben. Er hat dafür zu sorgen, dass sie in allen Punkten beachtet wird, um: -Gefahren für Leib und Leben des Benutzers und Dritter abzuwenden. -Die Betriebssicherheit des Getriebes sicherzustellen. -Nutzungsausfall und Umweltschäden durch falsche Handhabung auszuschließen.

1.3 Externe Schnittstellen

Vorhandene bzw. relevante Schnittstellen entnehmen Sie der auftragsabhängig erstellten Maß- bzw. Schnittzeichnung bzw. dem technischen Datenblatt im Anhang dieser BA.

Getriebe – Anlage:

Das Getriebe wird durch ein oder mehrere Antriebswellen bzw. ein oder mehrere Abtriebswellen mit der weiteren Anlage verbunden.

Getriebe – Energieversorgung:

Die elektrische Energieversorgung der Instrumentierung und Überwachungsgeräte (wenn im Lieferumfang enthalten bzw. vom Kunden beigestellt) wird vom Betreiber bzw. Endkunden angeschlossen und bereitgestellt.

Die hydraulische Energieversorgung für Schaltzylinder (wenn im Lieferumfang enthalten) wird vom Betreiber bzw. Endkunden angeschlossen und bereitgestellt.

Getriebe – Medienversorgung:

Bei Anschluss an eine externe Ölversorgungsanlage:

- Die vorgesehenen Ölzulauf- bzw. –ablaufanschlüsse werden durch den Betreiber bzw. Anlagenhersteller angeschlossen und bereitgestellt.

Bei Anschluss an eine Kühlwasserversorgung (Wasser- Ölkühler/Kühlschlage)

- Die vorgesehenen Anschlüsse für den Kühlwasserzu- bzw. -ablauf werden durch den Betreiber bzw. Anlagenhersteller angeschlossen und bereitgestellt.

Getriebe – Gebäude:

Das Getriebe wird durch Befestigungsschrauben mit dem Fundament bzw. der Stahlkonstruktion des Betreibers bzw. Endkunden verbunden. Endanschläge die zum genauen Ausrichten des Getriebes auf dem Fundament vorgesehen sind, werden vom Anlagenhersteller, Betreiber bzw. Endkunden bereitgestellt.

1.4 Rechtliche Hinweise

Das Urheberrecht an dieser Betriebsanleitung verbleibt bei der:

Pekrun Getriebebau GmbH

Die vorliegende Betriebsanleitung ist Bestandteil der Lieferung und muss stets in der Nähe des Getriebes aufbewahrt werden.

Für Schäden und Betriebsstörungen, die aus der Nichtbeachtung der BA resultieren, übernimmt Pekrun Getriebebau GmbH keine Haftung!

Das Getriebe darf im Gewährleistungszeitraum nur durch Mitarbeiter von Pekrun geöffnet werden. Ist dies nicht möglich, bedarf das Öffnen des Getriebes durch andere der schriftlichen Genehmigung von Pekrun, ansonsten wird keine Haftung übernommen! Öffnen von Schaulochdeckeln bzw. Öleinfüllöffnungen ist hiervon ausgenommen.

1.5 Dokumentation

1.5.1 Hintergrundinformation zu Inhalt und Aufbau

Die vorliegende Betriebsanleitung gibt Ihnen wichtige Informationen über Ihr Getriebe.

Sie soll Ihnen zu einem sicheren Umgang mit dem Getriebe verhelfen.

1.5.2 Inhalt und Aufbau

Der Inhalt dieser Betriebsanleitung gibt Ihnen wichtige Sicherheitshinweise zu allen Lebensphasen des Getriebes.

Im auftragsabhängig erstellten Anhang sind folgende Unterlagen enthalten: Handhabungshinweise sowie technische Daten bzw. Zeichnungen und Ersatzteillisten (wenn anwendbar)

Benutzerinformationen weiterer Lieferanten (die ebenfalls im Anhang enthalten sind) sind außerdem Bestandteil dieser Betriebsanleitung.

1.5.3 Konventionen

Allgemeine Begriffe:

Maßzeichnung / Maßblatt: *

Zusammenbauzeichnung des Getriebes welche die wichtigsten Maße zum Einbau in die Gesamtanlage und grundlegende Daten zur bestimmungsgemäßen Verwendung enthält. In dieser BA wird der Begriff Maßzeichnung verwandt.

Schnittzeichnung / Disposition: *

Zusammenbauzeichnung des Getriebes welche den Aufbau des Getriebes und die Positionierung aller Bauteile in der Schnittdarstellung enthält. In dieser BA wird der Begriff Schnittzeichnung verwandt.

Ersatzteilliste / Stückliste: *

Liste aller Bauteile des Getriebes welche zur Reparatur bzw. Ersatzteilbeschaffung benötigt werden. In dieser BA wird der Begriff Ersatzteilliste verwandt.

Technisches Datenblatt (zum Auftrag): *

Datenblatt welches auftragsabhängig erstellt wird und weitere wichtige Daten (wenn nötig) zur bestimmungsgemäßen Verwendung enthält. Diese sind zusätzlich zur BA und Maßzeichnung zu beachten.

* Die mitgelieferten Unterlagen variieren je nach Anforderung und Einsatzfall.

Abkürzungen:

BA = Betriebsanleitung

PSA = persönliche Schutzausrüstung

E-Motor = Elektromotor

ÖVA= Ölversorgungsanlage

Technische Fachbegriffe:

Fachkraft, Qualifiziertes Personal:

Person, die aufgrund ihrer einschlägigen Ausbildung und ihrer Erfahrung befähigt ist, Risiken zu erkennen und mögliche Gefährdungen zu vermeiden, die der Betrieb oder die Instandhaltung eines Produkts verursachen kann.

Benutzer:

Person oder Organisation mit der Fähigkeit, ein Produkt in Betrieb zu nehmen und/oder anzuwenden, um eine geforderte Funktion auszuführen, einschließlich einer Reihe von Tätigkeiten vom Reinigen bis zur Außerbetriebnahme am Ende der Lebensdauer des Produkts.

Trennende Schutzeinrichtung:

Körperliche Sperre, die als Teil der Maschine ausgelegt ist, um Schutz zu bieten.

1.6 Serviceadresse

Wenden Sie sich bitte mit allen technischen Fragen an unser Werk

Pekrun Getriebebau GmbH

Köbbingser Mühle 14

58640 Iserlohn

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2 Sicherheit

2.1 Konvention für Sicherheitshinweise

2.1.1 Formatierung

Bestimmte Informationen werden durch die entsprechende Formatierung hervorgehoben und gekennzeichnet:

Tabelle 2-1

Konvention	Informationstyp
Fettdruck	Komponenten von besonderer Wichtigkeit sowie Überschriften
In roter Farbe dargestellt	Wichtige Warnhinweise

2.1.2 Symbole

Die folgenden Symbole werden in der gesamten BA verwendet:

Tabelle 2-2

Symbol	Beschreibung
	Gefahr von **Personenschäden** Bei Nichtbeachtung dieses Sicherheitshinweises kann es zu schweren Verletzungen oder zum Tod führen.
	Warnung, allgemein
	Warnung vor der Gefahrenquelle Einzugsgefahr
	Warnung vor der Gefahrenquelle (Heiße Oberfläche) Verbrennungsgefahr
	Warnung vor der Gefahrenquelle Schwebende Lasten
	Betriebsanleitung allgemein Betriebsanleitung und Unterlagen der Dokumentation beachten
	Allgemeines Gebotszeichen Vermeidung von Sachschäden
	Gebotsschild Hebepunkt / Krantransport Vorgesehene Anschlagpunkte benutzen

2.1.3 Erklärung der Hinweise zur Sicherheit

In der BA werden folgende Signalwörter und Symbole für Warnhinweise verwendet. Wenn mehrere Gefahren auftreten, wird der Warnhinweis der jeweils höchsten Stufe verwendet.

	GEFAHR Kennzeichnung einer unmittelbaren Gefährdung. Die Nichtbeachtung des Sicherheitshinweises kann zum Tod oder zu schweren Verletzungen führen.

	WARNUNG Kennzeichnung einer möglichen Gefährdung mit mittlerem Risiko. Die Nichtbeachtung des Sicherheitshinweises kann zum Tod oder zu schweren Verletzungen führen.

	VORSICHT Kennzeichnung einer Gefährdung mit geringem Risiko. Die Nichtbeachtung des Sicherheitshinweises kann zu leichten oder mittleren Verletzungen führen.

	ACHTUNG Kennzeichnung von Hinweisen zur Vermeidung von Sachschäden. Die Nichtbeachtung dieser Sicherheitshinweise kann zu Schäden am Getriebe bzw. der Gesamtanlage und zu Umweltschäden führen..

	HINWEIS Kennzeichnung von Hinweisen zur allgemeinen Handhabung und Bedienung. Diese sind besonders zu beachten.

	HINWEIS Kennzeichnung von Hinweisen zur Betriebsanleitung und den auftragsabhängigen Unterlagen.

2.2 Verhalten im Notfall

GEFAHR

Lebensgefahr durch defektes Getriebe bzw. Gesamtanlage

Im Notfall ist das Antriebsaggregat sofort auszuschalten!

Das Antriebsaggregat ist sofort außer Betrieb zu setzen, wenn während des Betriebes Veränderungen an dem Getriebe festgestellt werden, wie z.B. eine erhöhte Betriebstemperatur oder veränderte Getriebegeräusche.

ACHTUNG

Sachschaden

Durch Versagen des Getriebes kann es zu Folgeschäden kommen.

Verhindern Sie weitere Schäden am Getriebe durch geeigneten Maßnahmen.

2.3 Bestimmungsgemäße Verwendung

2.3.1 Einsatzbereich

Das Getriebe ist ausschließlich zur industriellen Verwendung vorgesehen.

Das Getriebe ist zum Einbau in eine Maschine bestimmt.

Das Getriebe darf nur im Rahmen der im Leistungs- und Liefervertrag festgelegten Betriebsbedingungen und Leistungen eingesetzt und betrieben werden.

HINWEIS

Wichtige Hinweise zur bestimmungsgemäßen Verwendung für den Einsatzbereich finden Sie weiterhin auf dem Typenschild und der Maßzeichnung bzw. im technischen Datenblatt zum Auftrag.

2.3.2 Anforderungen an das Personal

Die Betriebsanleitung ist Bestandteil der Lieferung. Sie ist in jedem Fall für alle, mit der Montage, Bedienung und Wartung betrauten Personen zur Verfügung zu stellen.

HINWEIS

Es ist sicher zu stellen, dass alle vorgenannten Personen die Betriebsanleitung gelesen und verstanden haben. Es empfiehlt sich Personen mit den vorgenannten Aufgaben zu betrauen, die eine entsprechende Berufsausbildung absolviert haben.

(Fachkräfte bzw. Qualifiziertes Personal)

Folgende Personen sind im Umgang mit dem Produkt befugt:

- Transporteur: gründlich geschultes Personal
- Montageperson: Fachkräfte, Qualifiziertes Personal
- Installationsperson: Fachkräfte, Qualifiziertes Personal
- Bedienperson: geschultes Personal
- Instandhaltungspersonal: Fachkräfte, Qualifiziertes Personal

HINWEIS

Führen Sie alle Arbeiten sorgfältig und unter dem Aspekt **Sicherheit** durch. Beachten Sie die Mindestvorschriften für Sicherheit und Gesundheitsschutz bei der Benutzung von Arbeitsmitteln gemäß den jeweils gültigen Vorschriften des Anwenderlandes.

2.3.3 Sicherheitsrelevante Umgebungsbedingungen

GEFAHR

Lebensgefahr beim Betrieb in explosionsfähiger Atmosphäre!

Das Getriebe darf nur im Rahmen der im Leistungs- und Liefervertrag festgelegten Umgebungsbedingungen eingesetzt und betrieben werden.

HINWEIS

Wichtige sicherheitsrelevante Hinweise zu den Umgebungsbedingungen finden Sie auf der Maßzeichnung bzw. im technischen Datenblatt zum Auftrag

2.3.4 Sicherheitsrelevante Hinweise für bestimmte Lebensphasen

Aufstellbedingungen:

Stellen Sie das Getriebe auf einem ebenen, sicheren und möglichst starren Fundament bzw. Stahlgerüst auf. Die Verwindung der Aufstellfläche darf einen Wert von 0,1mm je 1m nicht überschreiten.

Anschlussbedingungen:

Die Verbindung zum Antriebsaggregat und zur Arbeitsmaschine muss vom Anlagenhersteller/Betreiber, über die jeweiligen Getriebewellen mittels geeigneter Kupplung, installiert werden. Hierzu gehört auch die zu installierenden trennenden Schutzeinrichtungen gem. DIN EN ISO 12100-1 für alle Wellen und beweglichen Teile.

Die Verbindung von einer externen Ölversorgungsanlage zum Getriebe muss vom Anlagenhersteller/Betreiber mittels geeigneten Anschlüssen/Leitungen bereitgestellt und montiert werden. (wenn anwendbar). Zur Vermeidung von Überdruck bzw. undichten Ölleitungen sollte der Anlagenhersteller/Betreiber eine Drucküberwachung bzw. ein Überdruckventil installieren.

Die Verbindung von der Hydraulik- bzw. Pneumatik Versorgungseinheit zu den Schaltzylindern muss vom Anlagenhersteller/Betreiber mittels geeigneten Anschlüssen/Leitungen bereitgestellt und fachgerecht montiert werden. (wenn anwendbar)

Die Elektroinstallation der Instrumentierung und Überwachungsgeräte am Getriebe muss

vom Anlagenhersteller/Betreiber durch qualifiziertes Personal (Fachkräfte der Elektrotechnik) erfolgen. (wenn anwendbar)

Montage

Während des Aufstellens des Getriebes besteht die Gefahr des Quetschens und Scherens von Gliedmaßen. Ebenso kann es zu Störung des Bewegungsapparates, Ermüdung und Unbehagen durch falsche Körperhaltung kommen.

Durch fehlerhaft montierte Schutzeinrichtungen kann es zu einer Gefährdung durch Berühren kommen.

Bei der Demontage besteht die Gefahr des Ausrutschens und Stürzens durch Öllachen von undichten Leitungen bzw. Flanschverbindungen.

Während der Installationsarbeiten besteht Verletzungsgefahr durch Montage unter Spannung. Spannungsführende Teile sind vor Montagearbeiten spannungslos zu machen.

Vermeiden Sie jede Gefährdung des Montagepersonals. Halten Sie Sicherheitsabstände ein.

Betrieb

Durch das Rotieren der Wellen besteht die Gefahr erfasst zu werden.

Durch die Bewegung von außenliegenden Bauteilen (z. B Schaltzylinder beim Schaltvorgang) besteht die Gefahr des Quetschens und Scherens von Gliedmaßen.

Bringen Sie eine trennende Schutzeinrichtung gem. DIN EN ISO 12100-1 an.

Je nach Betriebsbedingungen kann das Getriebe hohe Oberflächentemperaturen erreichen. Durch Kontakt mit dem Gehäuse kann es zu Verbrennungen auf der Haut kommen.

Das Getriebe darf nur im Stillstand und ohne anliegendes Drehmoment geschaltet werden. (wenn anwendbar)

Instandhaltung, Wartung

Durch fehlerhaft montierte Schutzeinrichtungen kann es zu einer Gefährdung durch Berühren kommen.

Die Instandhaltung und Wartung des Getriebes darf nur im Stillstand erfolgen.

Während Wartungsarbeiten besteht Verletzungsgefahr durch Montage unter Spannung. Spannungsführende Teile sind vor Montagearbeiten spannungslos zu machen.

Bei der Instandhaltung und Wartung besteht die Gefahr des Ausrutschens und Stürzens durch Öllachen von undichten Leitungen bzw. Flanschverbindungen.

Beim Ölwechsel kann es durch austretendes heißes Öl zu Verbrühungen auf der Haut kommen.

Je nach Betriebsbedingungen kann das Getriebe hohe Oberflächentemperaturen erreichen. Auch einige Zeit nach dem Stillstand kann es durch Kontakt mit dem Gehäuse zu Verbrennungen auf der Haut kommen.

Demontage

Die Demontage des Getriebes darf nur im Stillstand erfolgen.

Beim Ölablassen kann es durch austretendes heißes Öl zu Verbrühungen auf der Haut kommen.

Je nach Betriebsbedingungen kann das Getriebe hohe Oberflächentemperaturen erreichen. Auch einige Zeit nach dem Stillstand kann es durch Kontakt mit dem Gehäuse zu Verbrennungen auf der Haut kommen.

Bei der Demontage besteht die Gefahr des Ausrutschens und Stürzens durch Öllachen von undichten Leitungen bzw. Flanschverbindungen.

Während der Demontage des Getriebes aus der Anlage besteht die Gefahr des Quetschens, Scherens und Abschneidens von Gliedmaßen.

Entsorgung

Während der Entsorgung kann es zu Hautkontakt mit verunreinigtem Öl kommen. Verwenden Sie geeignete PSA.

Beachten Sie die jeweils gültigen Umweltschutzbestimmungen des Anwenderlandes.

2.4 Mögliche Fehlanwendung

Betreiben des Getriebes in explosionsfähiger Atmosphäre
⇨ Folge: Gefährdung durch Explosion.

Betreiben des Getriebes entgegen der vorgesehenen Drehrichtung bzw. mit zu hoher Drehzahl. Hierdurch besteht die Möglichkeit eines Getriebeschadens bzw. Verzahnungsteile und Lager können zerstört werden
⇨ Folge: Gefährdung durch Bruch beim Betrieb

Betreiben des Getriebes mit geöffnetem Inspektionsdeckel.
Es kann Schmutz in das Gehäuse eindringen und Öl oder andere Partikel können aus dem Gehäuse geschleudert werde.
⇨ Gefährdung durch herausgeworfene Gegenstände und Flüssigkeiten
Personen können während des Betriebes in das Gehäuse greifen und mit den Gliedmaßen zwischen rotierende Wellen im Getriebeinneren kommen
⇨ Gefährdung durch Abscheren und Quetschen

Betreiben des Getriebes ohne funktionierende Ölversorgung oder mit der falschen Ölsorte/Ölmenge. Hierdurch besteht die Möglichkeit eines Getriebeschadens bzw. Verzahnungsteile und Lager können zerstört werden.
⇨ Gefährdung durch Bruch beim Betrieb möglich

Schalten des Getriebes im Betrieb. Hierdurch besteht die Möglichkeit eines Getriebeschadens bzw. Verzahnungsteile und Lager können zerstört werden.
⇨ Gefährdung durch Bruch beim Betrieb möglich

Durchführen von Schweißarbeiten am Getriebe. Verwenden des Getriebes als Massepunkt für Schweißarbeiten. Verzahnungsteile und Lager können zerstört werden.
⇨ Gefährdung durch Bruch beim Betrieb möglich

Es wird **nicht** qualifiziertes Personal mit der Montage, Inbetriebnahme und Wartung betraut. Alle mit der Montage, Inbetriebnahme und Wartung betrauten Personen müssen die Betriebs- und Wartungsanleitung zum Getriebe, gelesen und verstanden haben. Es empfiehlt sich Personen mit den vorgenannten Aufgaben zu beauftragen, die eine entsprechende Berufsausbildung absolviert haben.
⇨ Gefährdung durch fehlerhafte Montage

2.5 Beachtung der Betriebsanleitung

Die vorliegende Betriebsanleitung ist Bestandteil der Getriebelieferung.

Bewahren Sie diese BA stets in der Nähe des Getriebes auf.

Behalten Sie die BA während der gesamten Lebensdauer des Getriebes.

Geben Sie die BA gegebenenfalls an nachfolgende Besitzer oder Benutzer des Getriebes weiter.

2.6 Restgefahren und Schutzmaßnahmen

2.6.1 Restgefahren und Schutzmaßnahmen für bestimmte Lebensphasen

⚠ **Gefahrenort: Transport (Hersteller, Spedition, Betreiber)**	
Restrisiken:	Schutzmaßnahmen:
Beim Transport und Auf-/Abladen des Getriebes kann es zum Verrutschen, Absturz und Herabfallen auf Personen durch unsachgemäße Ladungssicherung und unsachgemäßes Anschlagen der Last bzw. Auswahl nicht geeigneter Lastaufnahmemittel kommen. Es besteht die Gefahr des Quetschens und Scherens von Gliedmaßen, wenn Bediener zwischen Hindernisse und die Last kommen.	- Unterrichten Sie alle mit dem Transport und Aufstellen des Getriebes beauftragten Personen über die vorhandenen Restrisiken, insbesondere über die Auswahl von Lastaufnahmeeinrichtungen sowie das Anschlagen von Lasten. - Beauftragen Sie nur gründlich geschultes Personal mit dem Transport und Auf-/Abladen des Getriebes. - Halten Sie die Verfahrgeschwindigkeit möglichst gering. - Vermeiden Sie schnelles Wechseln zwischen Bewegen und Stoppen der Last und hieraus resultierendes Pendeln. - Vermeiden Sie jede Gefährdung des Personals. - Achten Sie darauf, dass keine Personen zwischen Hindernisse und die Last kommen. - Halten Sie Sicherheitsabstände ein. Tragen Sie PSA. - Transportieren Sie das Getriebe langsam und vorsichtig, besonders in angehobenem Zustand. - Achten Sie auf ordnungsgemäßes Anschlagen des Getriebes - Lage des Schwerpunkts (eventuell außermittig), Gewicht, Abmessungen des Getriebes beachten. Beachten Sie Hinweise zur Lastverteilung auf der Verpackung bzw. Maßzeichnung. - Geeignete Transportfahrzeuge bzw. Ladefläche (Tragfähigkeit, Dimension) - Getriebe sicher auf Ladefläche fixieren. - Benötigte Hilfsmittel: geeignete Vorrichtung zum Fixieren und Heben, ausreichend dimensioniert. (siehe Kapitel 5)

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Sicherheit

Gefahrenort: Montage und Installation (Betreiber)	
Restrisiken:	Schutzmaßnahmen:
Allgemein	- Beauftragen Sie nur qualifiziertes Personal mit der Montage und Installation des Getriebes, möglichst mit entsprechender Berufsausbildung. - Tragen Sie geeignete PSA. - Unterrichten Sie alle mit der Montage und Installation des Getriebes beauftragten Personen über die vorhandenen Restrisiken. (siehe Kapitel 5+6+7+8)
Beim Aufstellen des Getriebes auf den Grundrahmen kann es zum Verrutschen, Absturz und Herabfallen auf Personen durch unsachgemäßes Anschlagen der Last bzw. Auswahl nicht geeigneter Lastaufnahmemittel kommen. Es besteht die Gefahr des Quetschens und Scherens von Gliedmaßen, wenn Bediener zwischen Hindernisse und die Last kommen	- Halten Sie die Verfahrgeschwindigkeit möglichst gering. - Vermeiden Sie schnelles Wechseln zwischen Bewegen und Stoppen der Last und hieraus resultierendes Pendeln. - Vermeiden Sie jede Gefährdung des Personals. - Achten Sie darauf, dass keine Personen zwischen Hindernisse und die Last kommen. - Halten Sie Sicherheitsabstände ein. Tragen Sie PSA. - Transportieren Sie das Getriebe langsam und vorsichtig, besonders in angehobenem Zustand. - Achten Sie auf ordnungsgemäßes Anschlagen des Getriebes - Lage des Schwerpunkts (eventuell außermittig), Gewicht, Abmessungen des Getriebes beachten. Beachten Sie Hinweise zur Lastverteilung auf der Verpackung bzw. Maßzeichnung. - Einsatz von Personal mit körperlicher Eignung
Es kann zu Störung des Bewegungsapparates, Ermüdung und Unbehagen durch falsche Körperhaltung kommen	
Bei der Montage der Kupplungen auf die Welle bzw. der Montage in die weitere Anlage besteht die Gefahr des Quetschens und Scherens von Gliedmaßen	
Durch fehlerhaft oder nicht montierte Schutzeinrichtungen kann es zu einer Gefährdung durch Berühren kommen.	- Unterweisen Sie Personen die mit der Montage und Installation beauftragt sind in der Bedeutung von Schutzeinrichtungen
Während der Installationsarbeiten besteht Verletzungsgefahr durch Montage unter Spannung.	- Spannungsführende Teile sind vor Montagearbeiten spannungslos zu machen.
Bei der Entfernung der Konservierung mit Lösungsmitteln bzw. dem Öffnen der Schaulochdeckel kann es zu einer Gefährdung durch entweichende schädliche bzw. brennbare Gase kommen.	- Der Umgang mit Gefahrstoffen (Lösungsmittel bzw. entweichendes Konservierungsöl) sollte nur durch qualifiziertes Personal, möglichst mit entsprechender Berufsausbildung erfolgen. - Folgende Vorschriften sind zu beachten: Gefahrenstoff-Verordnung, der EG-Verordnung 1907/2006 sowie den EG-Richtlinien 2010/75/EU und 89/656/EWG
Beim Öffnen der Schaulochdeckel bzw. den Arbeiten an der ÖVA kann es zu einer	- Beachten Sie das Sicherheitsdatenblatt der

[pekrun]

Gefährdung durch entweichende schädliche bzw. brennbare Gase und Austreten von Schmierstoffen kommen.	eingesetzten Medien. - Tragen Sie geeignete PSA (Schutzbrille,-handschuhe).
Bei Arbeiten an mit Öl gefüllten Bauteilen z.B. den Rohrleitungen und im Getriebeinneren kann es zum Kontakt der Haut mit aggressiven Medien kommen.	- Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).
Bei der Montage und Installation kann es zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen.	- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel. - Dichten Sie undichte Stellen unverzüglich ab.

⚠ **Gefahrenort: Inbetriebnahme (Betreiber)**	
Restrisiken:	Schutzmaßnahmen:
Allgemein	- Beauftragen Sie nur qualifiziertes Personal mit der Inbetriebnahme, möglichst mit entsprechender Berufsausbildung - Tragen Sie geeignete PSA. - Unterrichten Sie alle mit der Inbetriebnahme des Getriebes beauftragten Personen über die vorhandenen Restrisiken. (Siehe Kapitel 8 + 9)
Bei der Inbetriebnahme kann es durch undichte Leitungen bzw. Flanschverbindungen durch Überdruck in der Ölversorgungsanlage bzw. beim Beaufschlagen mit Druck der Hydraulikleitungen der Schalteinheit zum Herausspritzen von Öl auf den Körper (z.B. in die Augen) kommen.	- Prüfen Sie vor Inbetriebnahme die Ölversorgungsleitungen und Flansch-verbindungen zum Getriebe auf festen Sitz sowie auf Leckagen. - Prüfen Sie vor Inbetriebnahme die Hydraulik-Anschlussverbindungen und die Schläuche auf korrekten Sitz sowie auf Leckagen - Verwenden Sie geeignete PSA (Augenschutz)
Bei der Inbetriebnahme kann es zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen.	- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel. - Dichten Sie undichte Stellen unverzüglich ab.
Durch fehlerhaft oder nicht montierte Schutzeinrichtungen kann es zu einer Gefährdung durch Berühren kommen.	- Unterrichten Sie alle mit der Inbetriebnahme des Getriebes beauftragten Personen über die vorhandenen Restrisiken
Während des Betriebes können Fremdmaterialien wie z.B. Sand, Staub auf rotierende Teile treffen und durch diese zurückgeschleudert werden. Beim Betrieb eines Getriebes mit einer Öldruckschmierung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen. Hierdurch kann es zu einer Verletzung der Augen durch Herausschleudern von Gegenständen und Herausspritzen von unter Druck stehenden Flüssigkeiten kommen.	- Vom Betreiber/Kunden sind trennende Schutzeinrichtungen gegen das Erreichen des Gefahrenbereichs der rotierenden Wellen vorzusehen. - Die Ölversorgungsleitungen und Flanschverbindungen zum Getriebe sind vor Inbetriebnahme auf festen Sitz sowie auf Leckagen zu prüfen.(wenn anwendbar) - Die Hydraulik-Anschlussverbindungen und die Schläuche auf korrekten Sitz sowie auf Leckagen zu prüfen.(wenn anwendbar) - Einhaltung der Wartungsintervalle (Überprüfung von Undichtigkeiten an mit

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	Druck beaufschlagten Verbindungs-stellen/Bauteilen) - Gehen Sie bei allen Arbeiten an Rohrleitungen mit der gebotenen Sorgfalt vor. - Tragen Sie geeignete Schutzkleidung und einen geeigneten Augenschutz.

Gefahrenort: Fehlersuche und –beseitigung, Instandhaltung, Wartung und Reinigung (Betreiber)	
Restrisiken:	Schutzmaßnahmen:
Allgemein	- Beauftragen Sie nur qualifiziertes Personal mit der Fehlersuche und –beseitigung, Instandhaltung und Reinigung, möglichst mit entsprechender Berufsausbildung - Tragen Sie PSA. - Arbeiten am Getriebe dürfen nur im Stillstand erfolgen. - Unterrichten Sie alle mit der Fehlersuche und –beseitigung, Instandhaltung, Wartung und Reinigung des Getriebes beauftragten Personen über die vorhandenen Restrisiken. (Siehe Kapitel 10 + 11)
Es kann zu Quetschungen von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteile (z.B. Schaulochdeckel) kommen	- Tragen Sie PSA (Handschuhe und Schuhe).
Es kann zu Kontakt mit der heißen Oberfläche des Getriebegehäuses (auch einige Zeit nach dem Stillstand) kommen und dadurch zu Verbrennungen durch Berühren führen.	- Prüfen Sie die Temperaturen am Getriebe bzw. der Getriebeoberfläche und vermeiden Sie den Beginn der Arbeiten bevor die Oberfläche auf eine ungefährliche Temperatur heruntergekühlt ist.
Beim Ölwechsel kann es durch austretendes heißes Öl zu Verbrühungen auf der Haut kommen.	
Bei der Fehlersuche und –beseitigung kann es durch undichte Leitungen bzw. Flanschverbindungen durch Überdruck in der Ölversorgungsanlage bzw. beim Beaufschlagen mit Druck der Hydraulikleitungen der Schalteinheit zum Herausspritzen von Öl auf den Körper (z.B. in die Augen) kommen.	- Prüfen Sie vor Inbetriebnahme die Ölversorgungsleitungen und Flansch-verbindungen zum Getriebe auf festen Sitz sowie auf Leckagen. - Prüfen Sie vor Inbetriebnahme die Hydraulik-Anschlussverbindungen und die Schläuche auf korrekten Sitz sowie auf Leckagen
Beim Öffnen der Schaulochdeckel bzw. den Arbeiten an der ÖVA kann es zu einer Gefährdung durch entweichende schädliche bzw. brennbare Gase und Austreten von Schmierstoffen kommen.	- Beachten Sie das Sicherheitsdatenblatt der eingesetzten Medien. - Tragen Sie geeignete PSA (Schutzbrille,-handschuhe). - Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).
Bei Arbeiten an mit Öl gefüllten Bauteilen z.B. den Rohrleitungen und im Getriebeinneren kann es zum Kontakt der Haut mit aggressiven Medien kommen.	
Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen	- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem

kommen.	Ölbindemittel. - Dichten Sie undichte Stellen unverzüglich ab.
Während der Arbeiten besteht Verletzungsgefahr durch Montage unter Spannung.	- Spannungsführende Teile sind vor Montagearbeiten spannungslos zu machen.

Gefahrenort: Außerbetriebnahme und Demontage (Betreiber)	
Restrisiken:	Schutzmaßnahmen:
Allgemein	- Beauftragen Sie nur qualifiziertes Personal mit der Außerbetriebnahme und Demontage, möglichst mit entsprechender Berufsausbildung - Tragen Sie PSA. - Arbeiten am Getriebe dürfen nur im Stillstand erfolgen. - Unterrichten Sie alle mit der Außerbetriebnahme und Demontage des Getriebes beauftragten Personen über die vorhandenen Restrisiken. (siehe Kapitel 12)
Es kann zu Quetschungen von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteile (z.B. Schaulochdeckel) kommen	- Tragen Sie PSA (Handschuhe und Schuhe).
Bei der Demontage des Getriebes aus der Anlage bzw. vom Grundrahmen kann es zum Verrutschen, Absturz und Herabfallen auf Personen durch unsachgemäßes Anschlagen der Last bzw. Auswahl nicht geeigneter Lastaufnahmemittel kommen. Es besteht die Gefahr des Quetschens und Scherens von Gliedmaßen, wenn Bediener zwischen Hindernisse und die Last kommen	- Halten Sie die Verfahrgeschwindigkeit möglichst gering. - Vermeiden Sie schnelles Wechseln zwischen Bewegen und Stoppen der Last und hieraus resultierendes Pendeln. - Vermeiden Sie jede Gefährdung des Personals. - Achten Sie darauf, dass keine Personen zwischen Hindernisse und die Last kommen. - Halten Sie Sicherheitsabstände ein. Tragen Sie PSA. - Transportieren Sie das Getriebe langsam und vorsichtig, besonders in angehobenem Zustand. - Achten Sie auf ordnungsgemäßes Anschlagen des Getriebes - Lage des Schwerpunkts (eventuell außermittig), Gewicht, Abmessungen des Getriebes beachten. Beachten Sie Hinweise zur Lastverteilung auf der Verpackung bzw. Maßzeichnung. - Einsatz von Personal mit körperlicher Eignung
Es kann zu Störung des Bewegungsapparates, Ermüdung und Unbehagen durch falsche Körperhaltung kommen	
Bei der Demontage der Kupplungen von der Welle bzw. aus der weiteren Anlage besteht die Gefahr des Quetschens und Scherens von Gliedmaßen	
Es kann zu Kontakt mit der heißen Oberfläche des Getriebegehäuses (auch einige Zeit nach dem Stillstand) kommen und dadurch zu Verbrennungen durch Berühren führen.	- Prüfen Sie die Temperaturen am Getriebe bzw. der Getriebeoberfläche und vermeiden Sie den Beginn der Arbeiten bevor die Oberfläche auf eine ungefährliche

	Temperatur heruntergekühlt ist.
Beim Öffnen der Schaulochdeckel bzw. den Arbeiten an der ÖVA kann es zu einer Gefährdung durch entweichende schädliche bzw. brennbare Gase und Austreten von Schmierstoffen kommen. Bei Arbeiten an mit Öl gefüllten Bauteilen z.B. den Rohrleitungen und im Getriebeinneren kann es zum Kontakt der Haut mit aggressiven Medien kommen.	- Beachten Sie das Sicherheitsdatenblatt der eingesetzten Medien. - Tragen Sie geeignete PSA (Schutzbrille,-handschuhe). - Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).
Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen.	- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel.
Während der Demontagearbeiten besteht Verletzungsgefahr durch Montage unter Spannung.	- Spannungsführende Teile sind vor Montagearbeiten spannungslos zu machen.
Beim Betrieb eines Getriebes mit einer Öldruckschmierung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen. Hierdurch kann es zu einer Verletzung der Augen durch Herausschleudern von Gegenständen und Herausspritzen von unter Druck stehenden Flüssigkeiten kommen.	- Die Ölversorgungsleitungen und Flanschverbindungen zum Getriebe sind bei Demontage auf Leckagen zu prüfen. (wenn anwendbar) - Die Hydraulik-Anschlussverbindungen und die Schläuche auf Leckagen zu prüfen. (wenn anwendbar) - Gehen Sie bei Demontagearbeiten an Rohrleitungen mit der gebotenen Sorgfalt vor. - Tragen Sie geeignete Schutzkleidung und einen geeigneten Augenschutz.

2.6.2 Allgemeine Schutzmaßnahmen

GEFAHR

Lebensgefahr durch Arbeiten an eingeschalteter Anlage

Setzen Sie das Getriebe und alle Bauteile einer eventuell angebauten Ölversorungsanlage grundsätzlich still.

Stellen Sie sicher das die gesamte Anlage lastfrei und drucklos ist.

Sichern Sie das Antriebsaggregat gegen unbeabsichtigtes Einschalten (z.B. durch Abschließen des Schlüsselschalters oder das Entfernen der Sicherung in der Stromversorgung). Sichern Sie an der Einschaltstelle mit einem Hinweisschild, aus dem hervorgeht, dass an dem Getriebe gearbeitet wird.

Arbeiten am Getriebe dürfen nur im Stillstand durchgeführt werden.

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Sicherheit

GEFAHR

Lebensgefahr durch rotierende und/oder bewegliche Teile

Gefahr von rotierenden und/oder sich bewegenden Bauteilen erfasst und eingezogen zu werden.

Sichern Sie alle rotierenden Antriebsteile wie Kupplungen, Zahn- oder Kettenräder, Riementriebe gegen Berührung.

Sichern Sie alle außenliegenden beweglichen Teile wie z.B. Schaltzylinder gegen Berührung.

Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen)

Sichern Sie rotierende und/oder sich bewegende Bauteile durch Schutzvorrichtungen gegen Berühren.

GEFAHR

Lebensgefahr durch gefährliche elektrische Spannung

Bei Installationsarbeiten am Getriebe besteht Verletzungsgefahr durch Montage unter Spannung.

Lassen Sie alle Arbeiten an elektrischen Bauteilen nur durch Fachkräfte der Elektrotechnik durchführen.

Halten Sie sich an die 5-Sicherheitsregeln nach DIN EN 50110-1:
Vor Beginn der Arbeiten:

- -Freischalten (Schalten Sie alle Zuleitungen spannungsfrei, auch Hilfsstromkreise)
- -Gegen Wiedereinschalten sichern
- -Spannungsfreiheit feststellen
- -Erden und Kurzschließen
- -Benachbarte unter Spannung stehende Teile abdecken oder abschranken

Spannungsführende Teile sind vor Arbeiten am Getriebe spannungslos zu machen.

WARNUNG

Verletzung der Augen durch Herausschleudern von Gegenständen und Herausspritzen von unter Druck stehenden Flüssigkeiten

Während des Betriebes können Fremdmaterialien wie z.B. Sand, Staub auf rotierende Teile treffen und durch diese zurückgeschleudert werden.

Tragen Sie einen geeigneten Augenschutz.

Beim Betrieb eines Getriebes mit einer Öldruckschmierung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen.

Tragen Sie geeignete Schutzkleidung und Augenschutz.

Verwenden Sie bei allen Arbeiten geeignete PSA, z.B. Handschutz (Schutzhandschuh), Augenschutz (Schutzbrille), Kopfschutz (Schutzhelm), Fußschutz (Sicherheitsschuhe) und Gehörschutz (Kapseln oder Stöpsel).

Benutzen Sie nur PSA die, die Sicherheitsanforderungen gemäß der PSA-Verordnung (EU) 2016/425 erfüllen.

	WARNUNG **Verbrennungsgefahr durch Berühren des Getriebes** **Schwere Verletzungen durch Verbrennungen möglich.** Während des Betriebes und noch einige Zeit nach dem Stillstand kann es zu schwere Verletzungen durch Berührungen von heißen Oberflächen (>55°C) kommen. -Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen) -Lassen Sie das Getriebe auf eine sichere Temperatur abkühlen, bevor Sie es berühren. -Tragen Sie geeignete Schutzhandschuh und Schutzkleidung.

	WARNUNG **Verbrühungsgefahr durch austretendes heißes Betriebsmedium** **Schwere Verletzungen durch Verbrühungen möglich.** Während Wartungs- und Instandsetzungsarbeiten bzw. Ölwechselarbeiten direkt nach dem Betrieb und noch einige Zeit nach dem Stillstand kann es zu schwere Verletzungen durch Austreten von heißem Betriebsmedium (>55°C) kommen. -Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen) solange keine sicheren Temperaturen vorhanden sind. -Lassen Sie vor allen Arbeiten das Betriebsmedium auf eine sichere Temperatur abkühlen. -Tragen Sie geeignete Schutzhandschuh und Schutzkleidung.

	WARNUNG **Verletzungsgefahr durch Berühren** **Schwere Verletzungen durch Kontakt mit kalten Oberflächen möglich.** Während des Stillstands der Anlage (wenn diese auf die Umgebungstemperatur abgekühlt ist) kann es zu schwere Verletzungen durch Kälteschäden (Schmerz, Taubheit, Erfrierungen) durch Berühren kalter Oberflächen (<0°C) kommen. -Prüfen Sie die Temperaturen der Getriebeeinheit bzw. Getriebeoberfläche bevor Sie es berühren. -Tragen Sie geeignete Schutzhandschuh und Schutzkleidung.

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Sicherheit

VORSICHT

Verletzungsgefahr durch falsche Körperhaltung

Durch falsche bzw. ungesunde Körperhaltung kann während der Montagearbeiten eine Ergonomische Gefährdung in Form von Störung des Bewegungsapparates, Ermüdung und Unbehagen auftreten.

- Alle mit der Montage beauftragten Personen müssen über die Restrisiken bei der Montage unterrichtet sein.
- Montage nur durch qualifiziertes Personal, möglichst mit entsprechender Berufsausbildung.

ACHTUNG

Sachschaden

Beschädigungen durch eindringende Feuchtigkeit

Die Reinigung des Getriebes mit einem Hochdruckreinigungsgerät ist **nicht zulässig**, da Feuchtigkeit in das Getriebe eindringen und zu Beschädigungen führen kann.

Beschädigungen am Getriebe durch Schaltvorgang im Betrieb möglich.

Das Getriebe darf nur im Stillstand geschaltet werden.

Gleichzeitig muss das Getriebe lastfrei sein. An- und Abtrieb müssen frei drehbar sein.

Eine Betätigung der Schaltzylinder darf nur möglich sein wenn keine Rotation der Wellen vorhanden ist und kein Drehmoment an den Wellen anliegt.

Es ist eine Verriegelung vorzusehen.

Wenn erforderlich verändern Sie die Position der Schaltverzahnung durch Tippbetrieb des Antriebsaggregates, um das Einfädeln der Schaltverzahnung zu erleichtern.

Erst nachdem das vollständige Einlegen des Ganges in seine endgültige Stellung erfolgt ist darf das Antriebsaggregat freigegeben werden.

Beschädigungen durch Veränderungen am Getriebe möglich.

Das Antriebsaggregat ist sofort außer Betrieb zu setzen, wenn während des Betriebes Veränderungen an dem Getriebe festgestellt werden, wie z.B. eine erhöhte Betriebstemperatur oder veränderte Getriebegeräusche.

Beschädigungen durch Schweißarbeiten

Führen Sie keine Schweißarbeiten am Getriebe durch. Verwenden des Getriebes als Massepunkt für Schweißarbeiten.

Verzahnungsteile und Lager können beschädigt werden.

HINWEIS

Ersetzen Sie die bei der Montage- oder Demontage unbrauchbar gewordenen Schrauben. Achten Sie dabei auf gleiche Festigkeitsklasse und Ausführung (Sicherung, Anzugmoment usw.)

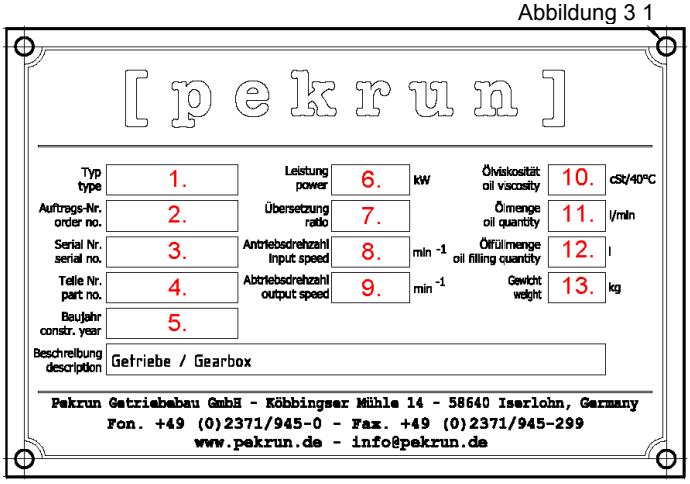
	HINWEIS
	Tragen Sie zum Umweltschutz bei! - Fangen Sie beim Ölwechsel das Altöl in geeigneten Fässern auf - Beseitigen Sie eventuell entstandene Öllachen sofort. - Bewahren Sie Konservierungsmittel getrennt von Altöl auf. - Entsorgen Sie Altöl, Konservierungsmittel, Ölbindemittel und ölgetränkte Reinigungstücher entsprechend den jeweils gültigen Umweltschutz-bestimmungen.

	HINWEIS
	Beachten Sie am Getriebe angebrachte Hinweise wie Typenschild, Drehrichtungspfeil usw. Sie müssen frei von Schmutz und Farbe sein. Ersetzen Sie fehlende Schilder.

3 Technische Daten

Die technischen Daten und die vertraglich festgelegten Vereinbarungen zwischen Besteller und Pekrun legen die Grenzen seiner bestimmungsgemäßen Verwendung fest. Die wichtigsten technischen Daten können Sie dem Typenschild entnehmen, dass an jedem Pekrun- Getriebe dauerhaft angebracht ist.

Abbildung 3 1



1. Typ: Serien-/Typenbezeichnung setzt sich zusammen aus Bauart und Größe

2. Auftrags- Nr.: Pekrun Auftragsnummer z.B. 12345

3. Serial- Nr.: fortlaufende Seriennummer z.B. 10000123

4. Teile Nr.: Material-/ Artikelnummer z.B. PART-012345

5. Baujahr: Jahr der Herstellung

6. Leistung: Leistungsangabe in kW

7. Übersetzung: i, z.B. 1 : 2,345

8. Antriebsdrehzahl: n_1 in min $^{-1}$

9. Abtriebsdrehzahl: n_2 in min $^{-1}$

10. Ölviskosität: ISO VG XXX in c/St/40°C

11. Ölmenge: Ölumlaufmenge bei Umlaufschmierung in l/min.

12. Ölfüllmenge: bei Getriebe mit Mindest-Ölfüllstand z.B. für Tauchschmierung

13. Gewicht: Gesamtgewicht in kg

	HINWEIS
	Weitere technische Daten finden Sie in der Maßzeichnung und dem technischen Datenblatt, welchen auftragsabhängig erstellt wird. (siehe Anhang)
	Typenschilder oder sonstige Hinweise auf dem Gerät dürfen weder entfernt noch unleserlich bzw. unkenntlich gemacht werden. Bei Zuwiderhandlungen erlischt jegliche Garantie und Herstellerverantwortung. Typenschilder der Anbauteile haben ebenfalls Gültigkeit.

4 Aufbau und Funktion

4.1 Aufbau

Diese BA gilt für Pekrun-Getriebe, die aus Stirnradgetriebe, Kegelradgetriebe, Planetengetriebe, Schneckengetriebe oder Kombinationen hieraus bestehen. Die Getriebe können sowohl 1-stufig als auch mehrstufig ausgeführt sein.

Der Aufbau des Getriebes ist aus der mitgelieferten Maß- bzw. Schnittzeichnung zu entnehmen.

Die drehmomentübertragenen Bauteile (außer An- bzw. Abtriebswellen) sind vollständig vom Gehäuse umschlossen. Die aus dem Gehäuse herausgeführten Wellenenden sind zum Anschluss in der weiteren Maschine bestimmt.

ACHTUNG

Sachschaden

Zerstörung des Getriebes oder von Bauteilen durch falsche Drehrichtung möglich.

Die Drehrichtung entnehmen Sie dem Drehrichtungspfeil am Getriebe oder der beiliegenden verbindlichen Maßzeichnung bzw. dem technischen Datenblatt zum Auftrag.

Ist in den mitgelieferten technischen Unterlagen keine Drehrichtung vorgegeben, kann das Getriebe grundsätzlich in beiden Drehrichtungen betrieben werden.

4.1.1 Gehäuse

Das Getriebegehäuse ist entweder aus Gusseisen oder aus Baustahl (geschweißte Ausführung) hergestellt. Es ist verwindungssteif ausgeführt.

Für die Kontrolle der Verzahnung sind Inspektionsöffnungen in Form von Schaulochdeckel oder Schaulochöffnungen vorgesehen.

Die Ölstandskontrolle (wenn anwendbar) erfolgt über ein seitlich angebrachtes Ölstandsfenster, Ölauge, Ölpeilstab oder Ölstandsanzeige.

Möglichkeiten zur Öleinfüllung bestehen über Bohrungen (z.B. für den Belüftungsfilter), sonstige Öffnungen bzw. Schaulochdeckel.

Für einen Ölwechsel ist eine Ölablassschraube (Flanschanschluss bzw. angebauter Kugelhahn bei ÖVA) zum Ablassen des Öls vorhanden.

Das Gehäuse ist mit ausreichend dimensionierten Transportnocken oder Transportösen versehen.

Die genaue Ausführung entnehmen Sie der auftragsabhängig erstellten Maß- bzw. Schnittzeichnung.

4.1.2 Verzahnung und Wellen

Je nach Anforderung und Einsatzfall werden in den Getrieben verschiedene Arten von Verzahnungen bzw. Kombinationen hieraus eingesetzt. Diese können aus Stirnrad- und Kegelradpaaren bzw. Planeten- und Schneckenradsätzen bestehen.

Die genaue Ausführung entnehmen Sie der auftragsabhängig erstellten Maß- bzw. Schnittzeichnung.

Die Zahnräder mit den Wellen (z.T. auch Hohlwellen) sind durch Passfederverbindungen, Presspassungen etc. miteinander gefügt.

Die Drehmomentübertragenen Bauteile werden aus Stahl (z.T. Buntmetall für Schneckenradsätze) hergestellt. Die genauen Werkstoffe werden bei der konstruktiven Auslegung anhand der bestimmungsgemäßen Verwendung festgelegt.

Die hohe Qualität der Verzahnungen bzw. Schneckenradpaare garantiert einen betriebssicheren Lauf und minimiert den Geräuschpegel.

4.1.3 Wellenlagerung

Normalerweise sind die Wellen des Getriebes in Wälzlagern gelagert. Je nach Anforderung und Einsatzfall kann auch eine Lagerung in Gleitlagern bzw. Lagerbuchsen erfolgen.

Die genaue Ausführung entnehmen Sie der auftragsabhängig erstellten Maß- bzw. Schnittzeichnung.

4.1.4 Schmierung

Die Art der Schmierung (Öl- oder Fettschmierung, Tauch- oder Druckschmierung), Ölzähigkeit und Ölmenge wird bei der konstruktiven Auslegung festgelegt.

ACHTUNG

Sachschaden

Schäden am Getriebe durch Betrieb ohne Ölschmierung

Achten Sie auf planmäßige und richtige Schmierung. Wenden Sie geeignete Schmierstoffe an. Hierdurch wird ein Höchstmaß an Betriebssicherheit und eine lange Lebensdauer der Getriebe erzielt

- Bringen Sie die ggf. gesondert gelieferten oder für den Transport entfernten Bauteile wie Manometer, Thermometer, Rohrleitungen usw. an.
- **Füllen Sie in jedem Falle Öl in das Getriebe ein.**
  (Ausnahme: bei mit Fett gefüllten Getrieben kontrollieren Sie den Füllstand)
- Gehen Sie zur Inbetriebnahme vor wie in **Kapitel 8** beschrieben.

Tauchschmierung

Ist in den mitgelieferten technischen Unterlagen keine besondere Schmierung vorgegeben, erfolgt eine ausreichende Ölversorgung der Zahnradpaare und Lager mit Hilfe der Verzahnung durch Tauchschmierung. Hierdurch sind die Getriebe besonders wartungsarm.

Druckschmierung

Eine Druckschmierung durch Ölpumpen wird vorgesehen bei:

a) Schmierstoffversorgung der Verzahnung und Lager bei hoher Umfangsgeschwindigkeit.

b) Kühlung durch Ölkühler

c) Wälzlagerschmierung für höhere Drehzahlen großer Lager.

d) Gleitlagerschmierung

e) Besondere Einbaulagen und bei Getrieben, bei denen keine Tauchschmierung möglich ist.

Die Druckschmierung erfolgt durch z.B.

- eine angeflanschte Ölpumpe direkt an eine Getriebewelle

oder

- eine am Getriebegehäuse befestigte Motorölpumpe.
- eine separat aufgestellte ÖVA
- eine zentrale kundenseitige Ölversorgung

Die Rohrleitungen bzw. Verbindungsleitungen sind fest am und im Getriebe verlegt.

Überwachung der Schmieranlage

Überwachen Sie folgende Betriebszustände für die einwandfreie Funktion des Ölkreislaufes:

a) Öldruck => Manometer / Druckschalter etc.

b) Öltemperatur => Zeigerthermometer / Widerstandsthermometer etc.

c) Öldurchflussmenge => Strömungsanzeiger / Strömungswächter etc.

ACHTUNG

Sachschaden

Schäden am Getriebe durch Betrieb ohne Ölschmierung

Schließen Sie bei Getrieben mit angebauter Ölversorgungsanlage vor Inbetriebnahme die vorgesehene Instrumentierung funktionstüchtig an.

HINWEIS

Beachten Sie für den Betrieb und die Wartung der Pumpe, der Filter sowie der Überwachungsinstrumente die im auftragsabhängig beigestellten Anhang angegeben Betriebsanleitungen.

4.1.5 Abdichtung

Radialwellendichtringe oder Labyrinthdichtungen (je nach Anwendung) verhindern an den herausgeführten Wellenenden, dass Öl aus den Getrieben austreten kann oder dass Verunreinigungen ins Getriebe eindringen können.

4.2 Funktionelle Beschreibung

Pekrun-Getriebe bestehen aus einem oder mehreren Zahnradpaaren (Verzahnungspaaren bzw. Schneckenradpaaren), die vollständig vom Gehäuse umschlossen sind. Ausgenommen hiervon sind die Wellenenden der An- bzw. Abtriebswellen. Diese sind zum Anschluss in der weiteren Maschine bestimmt und aus dem Gehäuse herausgeführt.

Die Zahnräder bzw. Schnecken dienen der unmittelbaren Übertragung von kleinsten bis größten Leistungen und Drehzahlen zwischen parallelen, sich kreuzenden oder sich schneidenden Wellen.

5 Anlieferung, innerbetrieblicher Transport

5.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

HINWEIS

Beachten Sie die Sicherheitshinweise in **Kapitel 2**: Sicherheit

GEFAHR

Lebensgefahr, Quetsch- und Schergefahr

Schwere Verletzungen durch schwebende Last!

Beim Transport und Auf-/Abladen des Getriebes kann es zum Verrutschen, Absturz und Herabfallen auf Personen durch unsachgemäßes Anschlagen der Last bzw. Auswahl nicht geeigneter Lastaufnahmemittel kommen. Es besteht die Gefahr des Quetschens und Scherens von Gliedmaßen, wenn Bediener zwischen Hindernisse und die Last kommen.

Halten Sie folgende Schutzmaßnahmen ein:

-Unterrichten Sie alle mit dem Transport und Aufstellen des Getriebes beauftragten Personen über die vorhandenen Restrisiken, insbesondere über die Auswahl von Lastaufnahmeeinrichtungen sowie das Anschlagen von Lasten.

-Vermeiden Sie jede Gefährdung des Personals:
Achten Sie darauf, dass keine Personen zwischen Hindernisse und die Last kommen. Halten Sie Sicherheitsabstände ein. Tragen Sie PSA.
Transportieren Sie das Getriebe langsam und vorsichtig, besonders in angehobenem Zustand.

-Achten Sie auf ordnungsgemäßes Anschlagen des Getriebes:
Halten Sie die Belastungsgrenzen der Anschlagmittel ein.
Verteilen Sie die Last gleichmäßig beim Anschlagen mit mehreren Strängen (Achtung: Schwerpunkt eventuell außermittig). Beachten Sie Hinweise zur Lastverteilung auf der Verpackung bzw. Maßzeichnung.

-Beauftragen Sie nur gründlich geschultes Personal mit dem Transport und Auf-/Abladen des Getriebes:
Halten Sie die Verfahrgeschwindigkeit möglichst gering.
Vermeiden Sie schnelles Wechseln zwischen Bewegen und Stoppen der Last und hieraus resultierendes Pendeln.

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch die Verwendung falscher Anschlagpunkte.

Heben Sie das Getriebe keinesfalls an den Wellenzapfen an. Auch nicht an den stirnseitigen Gewinden!

Ein Transportieren an den Rohrleitungen ist nicht zulässig.

Das Anschlagen darf nur an den hierfür vorgesehenen Transportnocken oder Transportösen am Gehäuse erfolgen.

Diese sind mit dem entsprechenden Symbol am Getriebe gekennzeichnet.

5.2 Anlieferung

	ACHTUNG
	Sachschaden **Beschädigung des Getriebes durch Korrosion möglich.** Öffnen Sie keinesfalls die Verpackung. Hierdurch verringert sich die Haltbarkeit der Getriebekonservierung. Wurde die Verpackung doch geöffnet lesen Sie bitte **Kapitel 6** dieser BA. *Im Zweifel halten Sie Rücksprache mit Pekrun.*

Der Inhalt der Lieferung ist in den Versandpapieren aufgeführt. Überprüfen Sie beim Empfang der Lieferung die Ware auf Transportschäden und Vollständigkeit.

Melden Sie uns Abweichungen von den Versandpapieren und/oder Transportschäden sofort schriftlich.

Das Getriebe wird im zusammengebauten Zustand betriebsfertig, jedoch ohne Ölfüllung, ausgeliefert. Zusätzliche Ausstattungen (wie z.B. Rohrleitungen, Ölkühler, Armaturen und Überwachungsinstrumente) werden gegebenenfalls getrennt verpackt ausgeliefert.

5.3 Innerbetrieblicher Transport

Der Transport des Getriebes hat so zu erfolgen, dass Personenschäden und Schäden am Getriebe vermieden werden.

Der Transport der Getriebeeinheit ist abhängig von den Gegebenheiten des Einsatzortes.

Beim Transport auf Paletten mit einem Gabelstapler ist besonders auf die Tragfähigkeit des Staplers zu achten. Für den sicheren Transport sorgen Sie für Standsicherheit auf den Gabeln.

	HINWEIS
	Für den Krantransport des Getriebes nutzen Sie unbedingt die vorgesehenen Anschlagpunkte am Getriebegehäuse. Diese sind mit dem entsprechenden Symbol am Getriebe gekennzeichnet.
	Für den Transport des Getriebes dürfen nur Lastaufnahmeeinrichtungen und Anschlagmittel gemäß EG- Richtlinie 2006/42/EG verwendet werden**.**
	Das Gewicht des Getriebes entnehmen Sie dem technischen Datenblatt im Anhang oder dem Typenschild des Getriebes. Achten Sie, für den sicheren Transport, auf den eventuell außermittigen Schwerpunkt und die Abmessungen des Getriebes. Siehe Maßzeichnung im Anhang dieser BA.

[pekrun]

Anlieferung, innerbetrieblicher Transport

	HINWEIS
	Achten Sie beim Anschlagen der Last auf ausreichende Tragfähigkeit der Anschlagmittel. Die Tragfähigkeit der verwendeten Anschlagmittel darf nicht überschritten werden. Beim Anschlagen mit mehreren Strängen dürfen nur 2 Stränge als tragend angenommen werden. Bei Seilen, Ketten und Hebebänder darf der Neigungswinkel ß=60° nicht überschritten werden.

Falsch –
Der Neigungswinkel ist >60°

Richtig –
Der Neigungswinkel ist <60°

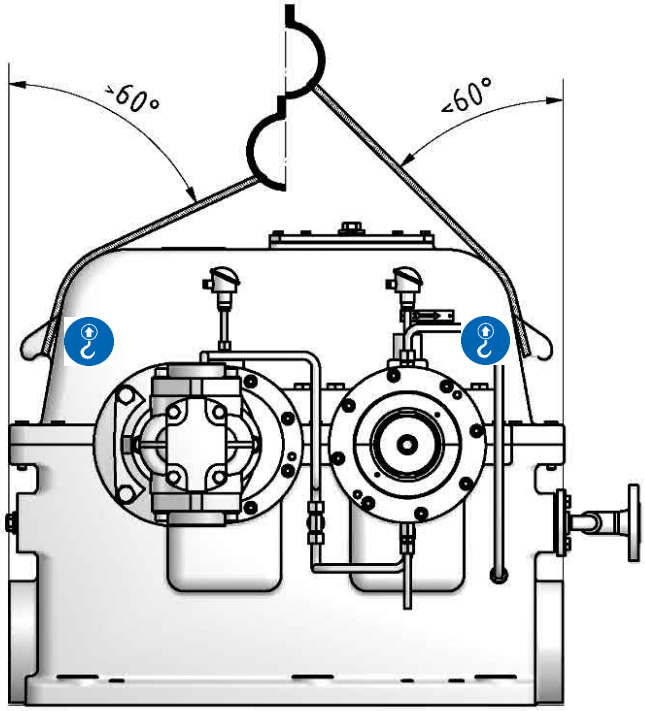


Abbildung 5-1

	ACHTUNG
!	**Sachschaden** **Beschädigung des Getriebes durch harte Stöße.** Vermeiden Sie harte Stöße beim Auf- oder Absetzen des Getriebes. Es können Bauteile oder Lager beschädigt werden.
	Beschädigung der angebauten Rohrleitungen bzw. Instrumente. Achten Sie beim Transport des Getriebes darauf angebaute Instrumente und Rohrleitungen nicht zu beschädigen.
	Umweltschäden **Der Transport des Getriebes sollte ohne Ölfüllung erfolgen.**

6 Lagerbedingungen

6.1 Sicherheit

GEFAHR

Lebensgefahr durch um- oder herabfallende Getriebe

Gefahr von einem um- oder herabfallenden Getriebe erschlagen oder eingequetscht zu werden. Gefahr der Abscherung von Gliedmaßen, wenn Personen zwischen Hindernisse und die Last kommen.

Stapeln Sie Getriebe nicht übereinander.

HINWEIS

Beachten Sie die Sicherheitshinweise in **Kapitel 2**: Sicherheit

6.2 Ablieferungszustand

Vor Auslieferung des Getriebes wird nach Möglichkeit in unserem Hause ein Probelauf durchgeführt. Hierfür wird ein Einlauf- und Korrosionsschutzöl eingesetzt.

Die Getriebe werden betriebsfertig geliefert:

Ablieferungszustand:

- ohne Ölfüllung (aus Sicherheitsgründen für den Transport)
- Fettschmierstellen sind mit Fett gefüllt (wenn anwendbar / Kontrolle vor Inbetriebnahme).
- Wellenenden, Hohlwellenbohrungen sind mit einer Schutzkonservierung versehen.
- Der Außenanstrich ist beständig gegen schwache Säuren und Alkalien, Öle und Lösungsmittel, Witterungseinflüsse. Er ist seewasserbeständig und tropenfest sowie temperaturbeständig bis 120°C (kurzzeitig bis 140°C).

6.3 Getriebelagerung

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch Vibration am Lagerort möglich.

Setzen Sie das Getriebe während der Lagerung keinen Vibrationen aus.

Wenn dies nicht möglich ist, sollten alle Wellen gelegentlich (monatlich) verdreht werden um Stillstandsmarkierungen zu vermeiden. Die Vorgehensweise ist abhängig vom Aufbau des Getriebes und den Gegebenheiten am Einsatzort.

Bei Getrieben mit Labyrinthdichtungen an den Wellenaustritten verschließen Sie die Spalte zum Gehäuse sofort wieder luftdicht.

(Halten Sie Rücksprache mit Pekrun.)

	ACHTUNG
!	**Sachschaden** **Beschädigung des Getriebes durch Korrosion möglich.** Öffnen Sie keinesfalls die Verpackung. Hierdurch verringert sich die Haltbarkeit der Getriebekonservierung. Der aufgebrachte Korrosionsschutz muss während der Lagerung erhalten bleiben. Er darf nicht beschädigt werden, sonst besteht Korrosionsgefahr. - Achten Sie darauf, dass der Anstrich nicht beschädigt wird. Beschädigungen am Lack führen zu Korrosion und zum Versagen des äußeren Schutzes. - Das Getriebe muss während der gesamten Lagerung luftdicht verschlossen sein um lange Lagerzeiten durch eine Innenkonservierung mit einem VCI-Konzentrat ohne Verlust des Korrosionsschutzes zu erhalten. - Überprüfen Sie die Innen- und Außenkonservierung bei längeren Zwischenlagerungen und erneuern Sie diese gegebenenfalls. (siehe **Kapitel 6.4** „Konservierung“)

Lagern Sie das Getriebe auf einem trockenen weichen Unterbau (z.B. Holz) waagerecht. Schützen Sie das Getriebe mit einer geeigneten Abdeckung.

Stapeln Sie Getriebe nicht übereinander.

Decken Sie das Getriebe bei einer Lagerung im Freien besonders sorgfältig ab. Achten Sie dabei darauf, dass sich weder Feuchtigkeit noch Fremdstoffe auf dem Getriebe ablagern können.

Die Temperatur in unmittelbarer Umgebung des Getriebes darf nicht unter 0°C und nicht über +20°C betragen. Ist dieser Temperaturbereich aus umgebungsbedingten Umständen nicht einzuhalten, halten Sie Rücksprache mit Pekrun.

6.4 Konservierung

Für lange Einlagerungen oder den Export einschließlich Abstellzeiten müssen Getriebe einer besonderen *Innenkonservierung* unterworfen werden. Es ist für extreme Bedingungen unzureichend, *nur eine Außenkonservierung* der besonders korrosionsempfindlichen blanken Außenflächen, wie z. B. Wellen-Stummel, Flansche oder dergl. allein vorzunehmen.

Grundsätzlich erfolgt die Innenkonservierung des Getriebes in unserem Werk durch das Einlauf- bzw. Korrosionsschutzöl beim Probelauf. Diesem Öl ist ein VCI-Konzentrat zugesetzt.

Der Korrosionsschutz erfolgt hierbei durch die Dampfphase des Inhibitors. Bei dieser Form der Innenkonservierung besteht der große Vorteil darin, das durch den Probelauf das Öl auch in schlecht zugänglichen Hohlräumen bzw. an versteckte Bauteilen gelangt und hier wirksam wird.

Durch den hohen Anteil an VCI-Konzentrat im verbleibenden Restöl und die vor dem Versand erfolgte luftdichte Verpackung ist ein Korrosionsschutz für normale Transportbedingungen und übliche Fracht- bzw. Lagerzeiten gewährleistet. In der Regel kann eine Reinigung / Spülung vor Inbetriebnahme entfallen. (siehe auch **Kapitel 6.4.1**)

In Sonderfällen, in denen die Hauptkomponenten nicht komplett vom Gehäuse umschlossen sind und hierdurch eine luftdichte Verpackung nicht sinnvoll bzw. möglich ist, besteht eine verkürzte Lagerdauer (siehe **Tabelle 6-1**). Ist in diesem Fall eine längere

[pekrun]

Lagerbedingungen

Lagerdauer erforderlich muss dies im Liefervertrag festgelegt werden und hier Sonderlösungen gefunden werden. (*Halten Sie Rücksprache mit Pekrun).*

VORSICHT

Der Umgang mit einem Korrosionsschutzinhibitor unterliegt den Vorschriften der Gefahrenstoff-Verordnung, der EG-Verordnung 1907/2006 sowie den EG-Richtlinien 2010/75/EU und 89/656/EWG.

-Tragen Sie bei Konservierungsarbeiten geeignete persönliche Schutzausrüstung (Schutzbrille, Schutzhandschuhe, Atemschutz).

- Lassen Sie Konservierungsarbeiten durch geeignete Fachkräfte durchführen.

- Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).

HINWEIS

Wenden Sie sich bei Fragen rund um die Konservierung an unsere Serviceadresse unter **Kapitel 1.6** dieser BA.

6.4.1 Innenkonservierung mit VCI-Konzentrat

WARNUNG

Verletzungsgefahr, Umweltschaden

Verletzungen durch austretende Dämpfe

Beim Öffnen des mit Korrosionsschutzinhibitor (VCI) konservierten Getriebes können leicht entzündliche Dämpfe entweichen.

-Vermeiden Sie in der Umgebung heiße Gegenstände, offene Flamme, Feuer und Funken.

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

Vermeiden Sie Unverträglichkeiten mit dem später verwendeten Betriebsöl:

Setzen Sie ausschließlich Mineralöle und Öle auf PAO- oder Esterbasis ein. Hierbei kann meist ein Spülen vor der Inbetriebnahme entfallen. (siehe **Kapitel 6.6**)

Bei Einsatz von Getriebeöl auf Polyglykolbasis (wenn zulässig):

Das Korrosionsschutzöl ist mit dem Betriebsöl nicht mischbar!

-Lassen sie das Korrosionsschutzöl komplett ab.

-Spülen Sie das Getriebe gründlich mit dem späteren Betriebsöl. (**Kapitel 6.6)**

-Füllen Sie das Betriebsöl ein (siehe **Kapitel 8**)

(Halten Sie Rücksprache mit Pekrun.)

[pekrun]

Lagerbedingungen

Vor Auslieferung des Getriebes wird in unserem Hause ein Probelauf durchgeführt.

Hierfür wird, wenn nicht anders vereinbart, ein Einlauf- und Korrosionsschutzöl

ISO VG 220 bzw. ISO VG 320 mit zugesetztem VCI- Konzentrat eingesetzt.

Angaben zu Haltbarkeit der Konservierung und Lagerzeiten siehe **Kapitel 6.5**.

Um die Haltbarkeit der Innenkonservierung zu verlängern gehen Sie wie folgt vor:

- Das im Getriebe verbliebene Öl muss nicht abgelassen werden.
- Kontrollieren Sie die Getriebetemperatur. Sie sollte ≥ 5°C sein.
- Mischen Sie außerhalb des Getriebes das VCI-Konzentrat mit Getriebeöl (späteres Betriebsöl) in empfohlener Menge. (wenn vom Hersteller vorgeschrieben)

	HINWEIS
!	Beachten Sie die Anwendungshinweise des Herstellers. (siehe aktuelles Datenblatt) Eine Pekrun- Empfehlung für die richtige Auswahl des Konzentrats entnehmen Sie der Schmierstofftabelle die dieser BA beigefügt ist. (siehe **Kapitel 8.4**). Je nach Hersteller kann das VCI-Konzentrat gemischt mit Getriebeöl (möglichst das spätere Betriebsöl) eingesetzt werden muss es aber nicht. Das Mischungsverhältnis entnehmen Sie bitte dem Datenblatt des VCI-Konzentrats. **Das freie Innenraumvolumen des Getriebes können Sie anhand der Getriebeabmessungen (LxBxH) näherungsweise errechnen.**

- Säubern Sie den Bereich um den Öl- Einfüllstutzen, Schaulochdeckel, Belüftungsfilter und alle vorhanden Öffnungen, die zum Einfüllen benutzt werden sollen.
- Öffnen Sie das Getriebe nach Möglichkeit an mehreren Stellen (z.B. am Öl-Einfüllstutzen, Belüftungsfilter, Schaulochdeckel), die über das Getriebe verteilt sind.
- Kontrollieren Sie den Getriebeinnenraum auf Feuchtigkeit und Korrosion. Sind Spuren von Feuchtigkeit zu erkennen, entfernen Sie diese und stellen sie die Ursachen fest. Bei beginnende Korrosion muss diese entfernt werden bevor eine Nachkonservierung erfolgt. *(Halten Sie Rücksprache mit Pekrun)*
- Füllen Sie das VCI-Konzentrat bzw. das VCI-Konzentrat-Getriebeöl-Gemisch an verschiedenen Stellen ein, um eine gleichmäßige Verteilung im Innenraum zu erreichen.
- Verschließen Sie den Öl- Einfüllstutzen und alle vorhandenen Öffnungen. und dichten Sie diese ab.
- Ersetzen Sie alle Belüftungsfilter durch Verschlussschrauben. (Bewahren Sie die Bauteile zur späteren Verwendung sicher auf)
- Dichten Sie alle Luftspalte (z.B. von Labyrinthdichtungen) mit geeigneten Mitteln (z. B. Klebeband) ab.

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch Korrosion möglich.

Da sich der Korrosionsschutz aus der Dampfphase ableitet, kann er nur voll wirksam werden, wenn das Getriebe luftdicht verschlossen ist.

Der Zeitraum zwischen dem Öffnen des Getriebes und dem erneuten luftdichten Verschließen sollte 1 Stunde nicht überschreiten.

Die Haltbarkeit der Innenkonservierung des Getriebes ist nun verlängert.

Sie beträgt bis zu 24 Monate. (siehe **Kapitel 6.5**. Lagerzeiten)

Dieser Prozess kann beliebig wiederholt werden.

Vor der Inbetriebnahme müssen folgende Punkte zusätzlich beachtet werden:

- Montieren Sie die vor der Konservierung entfernten Belüftungsfilter an die vorgesehenen Stellen. (siehe Schnitt- bzw. Dispositionszeichnung)

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

Verwenden Sie das Korrosionschutzöl nicht als Betriebsöl wenn
- der Anteil vom VCI-Konzentrat im Öl mehr als 5% beträgt.
- Pumpen, Filter oder elektronische Ausrüstung eingesetzt werden.
  (Halten Sie Rücksprache mit dem Hersteller der Bauteile)
- Betriebsöle auf Polyglykolbasis verwendet werden.

In diesem Fall muss das Getriebe vor Inbetriebnahme gespült werden. (siehe **Kapitel 6.6)**

6.4.2 Außenkonservierung

Sind zusätzliche Verpackungsmaßnahmen nicht erforderlich oder vorgesehen, führen Sie eine Außenkonservierung am Getriebe wie folgt durch:

blanke Außenflächen:

- Versehen Sie z.B. Getriebestummel, Flanschflächen, Wellenenden und dergl. mit einem grifffesten Wachsfilm. (bei Innenlagerung genügt auch ein weichfilmiges Konservierungsmittel) z.B. Tectyl 846, Tectyl 502 C oder ähnlich

Bei nicht vorgesehener zusätzliche Außenverpackung und für eine längere Lagerzeit führen Sie zusätzlich folgende Maßnahmen durch:

- Dichten Sie das Getriebe außen zusätzlich ab (Wellenaustritte, Ölanschlüsse, Belüftungsfilter und dergl.).

Zusätzlich empfehlen wir folgende Maßnahmen:

- Führen Sie eine Innenkonservierung mit einem VCI-Konzentrat durch. (siehe **Kapitel 6.4.1**)

6.5 Lagerzeiten

6.5.1 Ohne zusätzliche Verpackung

Die Lagerzeiten gelten für eine Lagerung draußen und unter Dach ohne zusätzliche Verpackung.

HINWEIS

Maßnahmen zur sicheren Lagerung:

Getriebeinnenraum nicht luftdicht verschlossen:

Die Lagerung soll nur derart erfolgen, dass Belüftungen oder andere Öffnungen so abgedeckt sind, dass kein Wasser in das Getriebeinnere durch Regeneinflüsse eindringen kann.

Getriebeinnenraum luftdicht verschlossen:

-Verschließen Sie alle Öffnungen am Getriebe. (einschließlich Labyrinthdichtungen an den Wellenaustritten)
-Ersetzen Sie alle Luftfilter durch Verschlussschrauben oder kleben Sie diese sorgfältig ab. (Vor Inbetriebnahme muss der Luftfilter wieder angebracht werden)

Standard Innenkonservierung mit VCI-Konzentrat

Tabelle 6-1

Getriebeabdichtung	Zeitpunkt der Konservierung	Lagerzeit Innen	Lagerzeit Außen
Getriebeinnenraum **nicht luftdicht** verschlossen	Auslieferung bis Inbetriebnahme:	4 Monate	2 Monate
Getriebeinnenraum **luftdicht** verschlossen	Auslieferung bis Inbetriebnahme	24 Monate	12 Monate
	Auslieferung bis Nachkonservierung	20 Monate	8 Monate
	Nachkonservierung bis Nachkonservierung	20 Monate	8 Monate
	Nachkonservierung bis Inbetriebnahme	24 Monate	12 Monate

Die Lagerzeit kann durch erneutes Einbringen von VCI-Konzentrat verlängert werden. (siehe **Kapitel 6.4.1**)

6.5.2 Mit zusätzlicher Verpackung

Werden längere Lagerzeiten, als in der Tabelle angegeben, gefordert, sind z.B. folgende Maßnahmen zu treffen:

- Verschließen Sie das innenkonservierte Getriebe an Wellendurchgängen und sonstigen Öffnungen wasserdampfdicht.

HINWEIS

Die Abdichtung des Getriebes ist so gemeint, dass die Wellendurchführungen und alle sonstigen Öffnungen wasserdampfdicht verschlossen sind.

- Bringen Sie eine ausreichende Menge Trockenmittel (möglichst mit Indikator) außerhalb des Getriebes an und Schweißen Sie es mit einer wasserdampfdichte Folie ein.

oder

- Verpacken Sie das innenkonservierte Getriebe exportmäßig (ohne Trockenmittel).

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch falsche Lagerung

Bei hermetisch dichten Verpackung bildet sich bei Temperaturschwankungen Schwitzwasser. Hier besteht die Gefahr von Rostbildung.

- Bringen Sie Trockenmittel innerhalb des Verpackungsraumes ein.

Trockenmittel sollen die relative Luftfeuchtigkeit möglichst geringhalten. Indikatoren oder Feuchtigkeitsanzeiger in Verbindung mit Trockenmitteln, zeigen das Klima bzw. den Feuchtegrad innerhalb der Verpackung an.

Bei längeren Lagerzeiten ist, entsprechend der Gesamtlagerzeit, eine geeignete Konservierung und zusätzliche Verpackung der Blankteile erforderlich.

Beschädigung des Getriebes durch zu lange Lagerzeiten

Die Langzeitlagerung ist auch von anderen Faktoren, wie Materialverformung und ähnlichen Erscheinungsbildern, gekennzeichnet. Sie können die Gesamtlagerzeit beeinflussen. Entsprechende Maßnahmen sind dann anzuordnen.

(Halten Sie Rücksprache mit Pekrun.)

HINWEIS

Konservierungs- und Verpackungsmaßnahmen zusammen bilden eine Einheit. So sind Abdichtmaßnahmen auch als Anteil zusätzlicher Verpackung anzusehen

Lassen Sie sich von Fachfirmen oder vom Amt für Seemäßige Verpackung (Hamburg) beraten welche zusätzlichen Verpackungsmaßnahmen und anzuwendende Verpackungsmaterialien geeignet sind.

6.6 Spülen vor Inbetriebnahme

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

Verwenden Sie das Korrosionschutzöl nicht als Betriebsöl wenn
- der Anteil vom VCI-Konzentrat im Öl mehr als 5% beträgt.
- Pumpen, Filter oder elektronische Ausrüstung eingesetzt werden.
  (Halten Sie Rücksprache mit dem Hersteller)
- Betriebsöle auf Polyglykolbasis verwendet werden.

In diesem Fall muss das Getriebe vor Inbetriebnahme gespült werden.

Zur Verwendung kommt die Ölsorte, die zum normalen Betrieb benutzt wird. Für die richtige Ölauswahl beachten Sie **Kapitel 8.4** dieser BA.

Spülen Sie das Getriebe mit Öl vor Inbetriebnahme (wie in **Kapitel 8** beschrieben) um Rückstände des Konservierungsmittels zu entfernen. Diese könnten zur Ölschaumbildung führen.

Gehen Sie wie folgt vor:

- Füllen Sie das Getriebeöl (75%-100% der normalen Ölmenge) durch die Schaulochdeckelöffnungen bzw. Öleinfüllöffnungen in das Getriebe ein.
- Beseitigen Sie eventuell vorbeifließendes Öl mit einem Ölbindemittel
- a) Bei Getrieben mit Tauchschmierung bzw. direkt angebauter Ölpumpe:

  Spülen Sie das Getriebe durch Drehen bzw. kurzen Betrieb des Getriebes

  Dauer des Spülvorgangs: 15…30 Minuten

  b) Bei Getrieben mit Ölumlaufschmierung durch Ölpumpe

  Spülen Sie das Getriebe durch den Betrieb der Ölpumpe

  Dauer des Spülvorgangs: ca. 1 Stunde
- Lassen Sie das Öl **möglichst unmittelbar nach dem Spülvorgang** sorgfältig aus dem Getriebe ab.

HINWEIS

Achten Sie hierbei auf vollständige Entleerung des Gehäuseunterteils bzw. aller Gehäuseinnenräume und der Geräte der Ölversorgungsanlage (wenn vorhanden).

- Füllen Sie für die Inbetriebnahme **frisches, neues Öl**, der gleichen Sorte und des gleichen Fabrikats, welches zur Spülung verwendet wurde, ein.
- Folgen Sie weiter den Maßnahmen zur Inbetriebnahme unter **Kapitel 8**.

[pekrun]

Lagerbedingungen

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

-Verwenden Sie nur unbenutzte Öle, die frei von Verunreinigungen sind. Verwenden Sie zum Befüllen einen Einfüllfilter. (Filterfeinheit max. 25 µm)

-Füllen Sie Öl nicht direkt aus Fässern in das Getriebe ein. Stellen Sie sicher, dass der Wasseranteil im Öl nicht zu hoch ist. Dies kann zur Schaumbildung im Betrieb führen.

Normal-Wert für frisches Öl <250 ppm H_2O.

Bei Zweifeln halten Sie Rücksprache mit dem Ölhersteller bzw. Pekrun.

Beschädigung des Getriebes durch Schmutz im Öl möglich.

Verwenden Sie nur Öle deren Reinheit mindestens der von Pekrun empfohlenen Reinheitsklasse entspricht. (siehe **Kapitel 8.4**)

Das Spülöl darf keinesfalls als Betriebsöl benutzt werden!

7 Aufstellbedingungen

7.1 Sicherheit

	HINWEIS
	Beachten Sie die Sicherheitshinweise in **Kapitel 2**: Sicherheit

7.2 Aufstellplan

	HINWEIS
	Berücksichtigen Sie bei der Aufstellung die beigefügte auftragsabhängige Maßzeichnung, den Rohrleitungs-, Hydraulik- oder Klemmenbelegungsplan (wenn vorhanden bzw. anwendbar).

7.3 Gesamtplatzbedarf

Achten Sie darauf, dass um das Getriebe herum ausreichend Raum für die Montage und für spätere Wartungs- und Pflegearbeiten vorhanden ist.

Achten Sie darauf, dass das Öl abgelassen werden kann und ausreichend Luftzufuhr besteht.

Halten Sie alle Inspektionsöffnungen frei zugänglich, um die Innenteile kontrollieren zu können.

	HINWEIS
	Beachten Sie den in dieser BA enthaltenen Rohrleitungsplan, wenn Verbindungsrohre für eine Ölversorgungsanlage zum Pekrun- Lieferumfang gehören

7.4 Abmessungen und Gewichte

	HINWEIS
	Die Angaben zum Gewicht sowie weitere technische Daten entnehmen Sie dem **Kapitel 3** (bzw. dem auftragsabhängig erstellten **technischen Datenblatt** bzw. der beigefügten **Maßzeichnung**. (im Anhang)

7.5 Fundament und Boden

Achten Sie darauf, dass die Aufstellfläche waagerecht und eben ist.

Für die maximale Abweichung der Plan- und Ebenheit der Grundplatte (Getriebeauflagefläche) empfehlen wir die Anlehnung an Toleranzklasse IT 7 nach DIN EN ISO 286-1. Die maximale Abweichung darf 0,1 mm pro 1 m nicht übersteigen.

Vermeiden Sie beim Anziehen der Befestigungsschrauben ein Verspannen des Getriebes.

Führen Sie das Fundament so aus, dass keine Resonanzschwingungen entstehen können. Die Festigkeit des Fundaments liegt im Verantwortungsbereich des Anlagenherstellers bzw. Endkunden.

Von benachbarten Fundamenten dürfen keine Erschütterungen bzw. Schwingungen übertragen werden.

Wenn das Getriebe auf einer Stahlkonstruktion montiert wird, muss dieses verwindungssteif sein. Es ist entsprechend der auf das Getriebe einwirkenden Kräfte auszulegen.

Ziehen Sie Befestigungsschrauben und Muttern mit dem vorgeschriebenen Drehmoment an. Verwenden Sie Schrauben mit einer Mindestfestigkeitsklasse 8.8 bzw. der spezifizierten Festigkeit. Die Ausführung der Ankerschrauben liegt in der Verantwortung des Anlagenherstellers.

7.6 Umgebungsbedingungen

Schützen Sie das Getriebe bei einer Aufstellung im Freien vor schädigenden Witterungseinflüssen.

Halten Sie die im Leistungs- bzw. Liefervertrag festgelegten Umgebungsbedingungen ein. Sprechen Sie uns bei Änderung dieser Bedingungen (auch einzelner Parameter wie z.B. Aufstellhöhe und Umgebungstemperatur) an. Wir prüfen die einwandfreie Eignung des gelieferten Getriebes (bzw. der Getriebeeinheit)

Eine Gewähr für den Betrieb in nicht vorgeschriebenen Umgebungsbedingungen kann unsererseits nicht übernommen werden.

7.7 Versorgungsanschlüsse

Folgende Versorgungsanschlüsse müssen Sie berücksichtigen:

(wenn anwendbar oder im Pekrun- Lieferumfang enthalten):

- *für die Schmierölversorgung*: Leitungen zu einer externen Ölversorgungseinheit und Anschlussverbindungen an das Getriebe
- *für die Getriebekühlung*: Leitungen zur Kühlwasserversorgung und Anschlussverbindungen an den Wasser-Ölkühler
- *für die Energieversorgung der Schaltzylinder*: hydraulische Versorgungsleitungen zu einer externen Hydraulikeinheit und Anschlüsse an die Schaltzylindern
- *für die Energieversorgung der elektrischen Komponenten*: Bereitstellung der im Leistungs- bzw. Liefervertrag festgelegten Energieversorgungsparameter und die Anschlüsse an diese.
- *für eine Ölversorgungsanlage*: sämtliche Versorgungsleitungen und Anschlüsse lt. beigelegtem Rohrleitungs-, Klemmbelegungs- bzw. Hydraulikplan.

	HINWEIS
	Beachten Sie die speziellen Betriebsanleitungen, Pläne, Zeichnungen und Layouts der verschiedenen Komponenten und Aggregate. Diese sind dieser BA im Anhang beigefügt (wenn im Lieferumfang enthalten).

7.8 Kundenseitige Sicherheitsvorkehrungen

GEFAHR

Lebensgefahr, Quetsch- und Schergefahr

Schwere Verletzungen durch schwebende Last!

Beim Transport und Auf-/Abladen des Getriebes kann es zum Verrutschen, Absturz und Herabfallen auf Personen durch unsachgemäßes Anschlagen der Last bzw. Auswahl nicht geeigneter Lastaufnahmemittel kommen. Es besteht die Gefahr des Quetschens und Scherens von Gliedmaßen, wenn Bediener zwischen Hindernisse und die Last kommen.

Halten Sie folgende Schutzmaßnahmen ein:

-Unterrichten Sie alle mit dem Transport und Aufstellen des Getriebes beauftragten Personen über die vorhandenen Restrisiken, insbesondere über die Auswahl von Lastaufnahmeeinrichtungen sowie das Anschlagen von Lasten.

-Vermeiden Sie jede Gefährdung des Personals:
Achten Sie darauf, dass keine Personen zwischen Hindernisse und die Last kommen. Halten Sie Sicherheitsabstände ein. Tragen Sie PSA.
Transportieren Sie das Getriebe langsam und vorsichtig, besonders in angehobenem Zustand.

-Achten Sie auf ordnungsgemäßes Anschlagen des Getriebes:
Halten Sie die Belastungsgrenzen der Anschlagmittel ein.
Verteilen Sie die Last gleichmäßig beim Anschlagen mit mehreren Strängen (Achtung: Schwerpunkt eventuell außermittig). Beachten Sie Hinweise zur Lastverteilung auf der Verpackung bzw. Maßzeichnung.

-Beauftragen Sie nur gründlich geschultes Personal mit dem Transport und Auf-/Abladen des Getriebes:
Halten Sie die Verfahrgeschwindigkeit möglichst gering.
Vermeiden Sie schnelles Wechseln zwischen Bewegen und Stoppen der Last und hieraus resultierendes Pendeln.

GEFAHR

Lebensgefahr durch rotierende und/oder bewegliche Teile

Gefahr von rotierenden und/oder sich bewegenden Bauteilen erfasst und eingezogen zu werden.

-Sichern Sie alle rotierenden Antriebsteile wie Kupplungen, Zahn- oder Kettenräder, Riementriebe gegen Berührung.

-Sichern Sie alle außenliegenden beweglichen Teile wie z.B. Schaltzylinder gegen Berührung.

-Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen)

	WARNUNG **Verbrennungsgefahr durch Berühren des Getriebes** **Schwere Verletzungen durch Verbrennungen möglich.** Während des Betriebes und noch einige Zeit nach dem Stillstand kann es zu schwere Verletzungen durch Berührungen von heißen Oberflächen (>55°C) kommen. -Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen) -Lassen Sie das Getriebe auf eine sichere Temperatur abkühlen, bevor Sie es berühren. -Tragen Sie geeignete Schutzhandschuh und Schutzkleidung.

7.9 Lokale Anforderung für die Anlieferung

Stellen Sie einen ausreichend dimensionierten Kran mit ausreichend dimensionierten Lastaufnahmeeinrichtungen für den Transport zur Verfügung.

Lassen Sie den Transport durch geeignete Fachkräfte durchführen.

	HINWEIS Beachten Sie die Hinweise in **Kapitel 5**: Auslieferung, innerbetrieblicher Transport.

8 Montage und Installation, Erstinbetriebnahme

8.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

	HINWEIS
	Beachten Sie die Sicherheitshinweise in **Kapitel 2**: Sicherheit

	WARNUNG
	Verletzungsgefahr bei Montage, Installation, Erstinbetriebnahme Es kann zu Quetschungen und Scheren von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteilen (z.B. Schaulochdeckel) kommen. Es kann durch Eingreifen in das Getriebeinnere oder bei der Montage an sich bewegenden Bauteilen zu Quetschungen und Scherungen von Gliedmaßen kommen. Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen. - Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel. - Tragen Sie PSA. - Lassen Sie die Montage, Installation und in Betrieb nehmen nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen. - Unterrichten Sie alle mit der Montage, Installation und in Betrieb nehmen beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2**: Sicherheit) **Halten Sie Sicherheitsabstände ein!**

	WARNUNG
	Verletzungsgefahr, Umweltschaden **Verletzungen durch austretende Dämpfe** Beim Öffnen des mit Korrosionsschutzinhibitor (VCI) konservierten Getriebes können leicht entzündliche Dämpfe entweichen. -Vermeiden Sie in der Umgebung heiße Gegenstände, offene Flamme, Feuer und Funken.

⚠	**VORSICHT** **Verletzungsgefahr durch schädliche Dämpfe bzw. Flüssigkeiten.** Beim Befüllen mit Öl besteht die Möglichkeit durch das Einatmen und die Berührung mit Schmierstoffen bzw. anderen Medien verletzt zu werden. Beim Öffnen der Schaulochdeckel bzw. den Arbeiten an der ÖVA kann es zu einer Gefährdung durch entweichende schädliche bzw. brennbare Gase und Austreten von Schmierstoffen kommen. Bei Arbeiten an mit Öl gefüllten Bauteilen z.B. den Rohrleitungen und im Getriebeinneren kann es zum Kontakt der Haut mit aggressiven Medien kommen. -Beachten Sie das Sicherheitsdatenblatt der eingesetzten Medien. Tragen Sie bei Ölwechselarbeiten geeignete persönliche Schutzausrüstung (Schutzbrille, Schutzhandschuhe). - Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).

⚠	**VORSICHT** **Verletzungsgefahr durch gefährlichen Dampf bzw. Flüssigkeiten.** Bei der Entfernung der Außenkonservierung besteht die Möglichkeit durch das Einatmen und die Berührung mit Gefahrstoffen verletzt zu werden. Der Umgang mit Lösungsmitteln unterliegt den Vorschriften der Gefahrenstoff-Verordnung, der EG-Verordnung 1907/2006 sowie den EG- Richtlinien 2010/75/EU und 89/656/EWG. -Tragen Sie bei Arbeiten mit Lösungsmitteln geeignete persönliche Schutzausrüstung (Schutzbrille, Schutzhandschuhe, Atemschutz). - Lassen Sie Die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).

8.2 Montage und Installation

HINWEIS

Stellen Sie zu Beginn der Montagearbeiten ausreichende Lastaufnahmeeinrichtungen, Anschlagmittel etc. zur Verfügung. Die Tragfähigkeit der Lastaufnahmemittel muss mindestens dem Getriebegewicht entsprechen.

Hinweise zum Transport entnehmen Sie bitte dem **Kapitel 5**

Die Montage hat mit großer Sorgfalt durch Fachkräfte zu erfolgen.

1. Entfernen Sie eventuell vorhandenes Verpackungsmaterial, vor Einbau des Getriebes (z.B. Klebebänder und Schutzkappen).
2. Entfernen Sie die Außenkonservierung mit einem geeigneten Lösungsmittel.

ACHTUNG

Sachschaden

Beschädigung der Wellenenden bei der Entkonservierung.

Das Entfernen der Konservierung darf keinesfalls durch Abschmirgeln geschehen.

Durch Abschmiergeln wird die Oberfläche der Wellenenden zerstört und die Verbindung in die weitere Anlage kann zu Problemen führen.

3. Nach längerer Einlagerung des Getriebes vor Inbetriebnahme entfernen Sie die Schaulochdeckel und Dichtungen durch lösen der Befestigungsschauben und bewahren Sie diese zur Wiederverwendung sicher auf.
4. Führen Sie eine Sichtkontrolle der Innenteile auf Korrosion durch.

ACHTUNG

Sachschaden

Bei bestehenden Korrosionsschäden wenden Sie sich unbedingt an die Pekrun-Serviceadresse **Kapitel 1.6** dieser BA.

Um weitere Schäden zu vermeiden, darf das Getriebe nicht in Betrieb genommen werden.

5. Verschließen Sie die Schaulochöffnungen wieder mit den vorhandenen Deckeln, Dichtungen und Schrauben. Die Dichtflächen müssen sauber und unbeschädigt sein.
6. Entfernen Sie die Innenkonservierung (wenn vorhanden).

HINWEIS

Grundsätzlich erfolgt die Innenkonservierung durch den Einsatz eines Korrosionsschutzöls mit VCI-Konzentrat beim Probelauf in unserem Haus.

In der Regel kann eine Reinigung / Spülung vor Inbetriebnahme entfallen. (Beachte **Kapitel 6.4.1**)

Prüfen Sie, ob das Getriebe vor Inbetriebnahme gespült werden muss:
- welches Konservierungsmittel wurde benutzt
- sind Konservierungsmittel- Restmengen im inneren des Getriebes vorhanden.
Beachten Sie **Kapitel 6.6**.

Im Zweifel halten Sie Rücksprache mit. Pekrun.
*(Serviceadresse **Kapitel 1.6**)*

8.2.1 Aufstellung des Getriebes

HINWEIS

Stellen Sie das Getriebes auf einem ebenen, sicheren, möglichst starren Fundament auf.

Für die maximale Abweichung der Plan- und Ebenheit der Grundplatte (Getriebeauflagefläche) empfehlen wir die Anlehnung an Toleranzklasse IT 7 nach DIN EN ISO 286-1. Die maximale Abweichung darf 0,1 mm pro 1 m nicht übersteigen. Dies verhindert eine Verformung im Wellenstrang.

Verwenden Sie zur sicheren Befestigung nur Schrauben, die der Anzahl und Größe der in der Maßzeichnung angegebenen Schraubenlöcher entsprechen.

Beachten Sie die Aufstellbedingungen unter **Kapitel 7**.

ACHTUNG

Sachschaden

Beschädigungen durch ungenaues Ausrichten möglich.

Eine Fehlausrichtung kann z.B. folgende Getriebeproblemen verursachen:

- Verklemmung der Lager
- nicht ausreichender Zahnflankenkontakt
- verringerte Lebensdauer
- große Schwingungen

Achten Sie darauf, dass die Wellen des Getriebes und der Arbeitsmaschine bei Betriebsbedingungen genau zueinander fluchten.

Die Verwendung von elastischen Kupplungen macht das Ausrichten nicht überflüssig

Bei starrer Getriebemontage müssen die Anschlussflansche der Rund- und Planlaufgenauigkeit der DIN SPEC 42955 entsprechen.

Die Ausrichtung von An- und Abtrieb hat je nach der Ausgleichsqualität der Übertragungselemente bezogen auf den Fluchtfehler zu erfolgen.

Gehen Sie wie folgt vor:

- Reinigen Sie vor dem Aufstellen des Getriebes die Auflageflächen am Getriebe und Fundament.
- Gleichen Sie Unebenheiten des Fundaments durch Blechzwischenlagen sorgfältig aus, um eine Verspannung des Gehäuses mit Sicherheit zu vermeiden.
- Nach Ausrichtung des Getriebes mit einer Wasserwage o.ä., montieren Sie die in der Maßzeichnung angegebenen Stifte.
- Bringen Sie, wenn nötig, seitliche Anschläge gegen Verschiebung des Getriebes an.

8.2.2 Montage von Kupplungen und weiteres Zubehör

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch starke Schläge und Stöße möglich.

Das Auftreiben durch starke Schläge oder Stöße ist unzulässig, da hierdurch die Lager, Sicherungsringe und dergleichen beschädigt würden.

-Beim Aufsetzten von Kupplungen, Scheiben, Zahnräder, Kettenräder o.ä., ziehen sie diese mit Hilfe der Gewindezentrierungen an den Wellenenden auf.

-Halten Sie die bei der Bestellung getroffenen Vereinbarungen für andere Befestigungsarten wie z.B. wie das Fügen durch Erwärmen der Kupplung ein.

Kupplung:

Reinigen Sie die Wellenenden sowie die Kupplungsteile vor Beginn der Montage sorgfältig.

Sichern Sie Kupplungen gegen axiales Verschieben.

HINWEIS

Beachten Sie bei Montage von Kupplungen die speziellen Betriebsanleitungen des Herstellers.

Getriebe mit Hohlwellenausführung:

Für *Getriebe mit Hohlwellenausführung* gelten die gleichen Fügebedingungen wie für das Aufsetzen von Kupplungen.

Ausrichten von Antriebsaggregaten bzw. -motoren:

Richten Sie das *Antriebsaggregat* möglichst exakt zur Mittelachse der Eingangswelle des Getriebes aus und setzen Sie diesen fest. Die Lebensdauer der Wellen, Lager und Kupplungen hängt von der Ausrichtgenauigkeit der Wellen zueinander ab.

	HINWEIS
	Die für das Ausrichten max. zulässigen Werte für Axial-, Radial- und Winkelversatz sind abhängig von der Kupplungsgröße, des Kupplungstyps und der Drehzahl. Entnehmen Sie diese der BA des Kupplungsherstellers.
	Beachten Sie bei der Montage des Antriebsaggregates bzw. des Motors die spezielle Betriebsanleitung des Herstellers.
	Wenn in der Maßzeichnung zulässige Querkräfte eingetragen sind, müssen sie innerhalb der zulässigen Grenzen bleiben.

8.2.3 Montage von Verrohrung

Bei Getrieben mit vorgesehener Ölversorgungsanlage müssen eventuell demontierte Rohrleitungen anhand des beigefügten Rohrleitungsplans montiert werden.

Gehen Sie wie folgt vor:

- Entfernen Sie alle Stopfen und Blindflansche. (wenn vorhanden)
- Kontrollieren Sie die Rohrleitung innen auf Sauberkeit. Wenn nötig reinigen Sie diese vor der Montage sorgfältig.
- Montieren Sie die Rohrleitung entsprechend dem beiliegenden Rohrleitungsplan.
- Ziehen Sie bei der Aufstellung der Getriebe die Flanschverschraubungen mit dem entsprechenden Drehmoment an.
- Gleichen Sie geringe Ausrichtfehler in den Ölleitungen mit einem Gummikompensator aus.
- **Rohrleitungen dürfen bei der Montage nicht verspannt werden.**
- Stützen Sie gegebenenfalls die Rohrleitungen mit geeigneten Rohrstützen ab.

	ACHTUNG
	Sachschaden **Beschädigung durch Verschmutzung in den Rohrleitungen möglich.** Lager und Verzahnungen können durch Verschmutzungen in den Rohrleitungen beschädigt werden. Beizen Sie sorgfältig alle Rohrleitungen die auf der Baustelle durch Schweißen angepasst wurden. **Bei der Montage der Anschlussverrohrung darf kein Schmutz in das Getriebe gelangen.**

8.2.4 Abschließende Arbeiten

Gehen Sie wie folgt vor:

- Nachdem Sie das Getriebe aufgestellt haben, kontrollieren Sie alle Schraubenverbindungen auf festen Sitz.
- Stellen Sie sicher, dass sich die Ausrichtung durch das Anziehen der Befestigungselemente nicht verändert hat.
- Überprüfen Sie anhand der Geräteliste und Zeichnungen, ob alle für den Transport entfernten Instrumente wieder angebaut sind.
- Überprüfen Sie die korrekte und sichere Montage von externen Versorgungsleitungen (z.B. Hydraulikleitungen zum Schaltzylinder / Wasserleitungen zum Kühler / Anschlussleitungen einer Ölversorgungsanlage) (wenn anwendbar). (vom Betreiber vorzusehen).
- Überprüfen Sie die Installation der Überwachungseinrichtungen. (Verriegelungen) (wenn vorhanden)
- Kontrollieren Sie die Schutzeinrichtung auf richtigen und festen Sitz.

8.3 Erstinbetriebnahme

8.3.1 Maßnahmen vor Erstinbetriebnahme

	ACHTUNG
	Sachschaden, Umweltschäden **Schäden durch auslaufendes Öl möglich.** In Fällen abnormer Einbaulagen, bei denen die Ölfüllung über der Schaulochöffnung steht, können Deckel und Schrauben mit einem Dichtungsmittel abgedichtet sein. Ein Abnehmen des Schaulochdeckels ist in diesem Falle erst nach Absenken des Ölpegels unter die Schaulochöffnung gestattet, da sonst das Öl ausfließt. **Jedes Lösen des Schaulochdeckels macht die Abdichtung mit neuem Dichtungsmittel notwendig**. (Beim Einsatz von Dichtungen bzw. O-Ringen ist dies nicht erforderlich)
	Sachschaden **Beschädigung des Getriebes durch ungeeignetes Betriebsöl möglich.** Die Ölviskosität entnehmen Sie dem Typenschild oder der beigefügten Maßzeichnung. Dieser BA ist eine Schmierstofftabelle beigefügt, die eine Pekrun- Empfehlung für die richtige Schmierstoffauswahl enthält (siehe auch **Kapitel 8.4**). -Zur Schmierung der Getriebe dürfen nur nachweislich gleichwertige Schmierstoffe verwendet werden. -Verwenden Sie nur unbenutzte Öle, die frei von Verunreinigungen sind. -Füllen Sie Öl nicht direkt aus Fässern in das Getriebe ein. -Stellen Sie sicher, dass der Wasseranteil im Öl nicht zu hoch ist. Dies kann zur Schaumbildung im Betrieb führen. Normal-Wert für frisches Öl <250 ppm H_2O. *Bei Zweifeln halten Sie Rücksprache mit dem Ölhersteller bzw. Pekrun*. **Beschädigung des Getriebes durch Schmutz im Öl möglich.** Verwenden Sie nur Öle deren Reinheit mindestens der von Pekrun empfohlene Reinheitsklasse entspricht. (siehe **Kapitel 8.4**) Beim Einfüllen bzw. bei der Montage der Anschlussverrohrung darf kein Schmutz in das Getriebe gelangen. Verwenden Sie zum Befüllen einen Einfüllfilter. (Filterfeinheit max. 25 µm)
	Sachschaden **Beschädigung des Getriebes durch internen Überdruck möglich.** Beim Betreiben des Getriebes ohne montierte Belüftungsfilter kann es zu Schäden an den Wellendichtringen kommen. Achten Sie bei Inbetriebnahme auf korrekt montierte Belüftungsfilter. Beachten Sie die mitgelieferte Maßzeichnung.

Gehen Sie wie folgt vor:

1. Schrauben Sie die Ölablassschraube heraus bzw. öffnen Sie den Ölablasshahn, um Reste des Einlauföls aus dem Getriebe in ein geeignetes Gefäß abzulassen und zu entsorgen. (wenn anwendbar)
2. Beseitigen Sie eventuell vorbeifließendes Öl mit einem Ölbindemittel. Beachten Sie bei der Entsorgung die jeweils gültigen Rechtsvorschriften.

Bei Getrieben mit Tauchschmierung bzw. integrierter ÖVA:

3. a)

- Lösen und entfernen Sie den Belüftungsfilter bzw. die Verschlußschraube an der Öleinfüllöffnung oder die Schaulochdeckelöffnung.(wenn anwendbar)
- Legen Sie die Schrauben bzw. Deckel und Dichtungen ab und legen Sie diese zur Wiederverwendung bereit.
- Füllen Sie Öl, entsprechend der vorgeschriebenen Viskosität, durch die Schaulochöffnung oder Öleinfüllbohrungen am Getriebe und an den Rohrleitungen in das Getriebe ein. Beachten Sie hierbei die Angaben in der auftragsabhängig erstellten Maßzeichnung.(wenn anwendbar)

HINWEIS

Ausstattung mit Ölpeilstab: Der angebrachte Ölpeilstab hat 2 Markierungen, zwischen denen sich der Ölstand stets halten soll. Füllen Sie das Öl bis zur oberen Markierung ein.

Ausstattung mit Ölschauglas bzw. Ölauge: Füllen Sie Öl bis zur Mitte des Schauglases ein.

Warten Sie beim Einfüllen des Öles genügend lang.

Das Öl sollte sich gleichmäßig verteilen und der endgültige Ölstand soll erkennbar sein.

Achten Sie hier besonders bei mehrstufigen Getrieben mit untereinander verbundenen Ölräumen auf eine gleichmäßige Verteilung, da sonst eventuell zu wenig Öl eingefüllt würde.

ACHTUNG

Sachschaden

Beschädigung des Getriebes oder der Ölpumpe durch Trockenlaufen möglich

Bei der Erstinbetriebnahme und bei Wieder-Inbetriebnahme nach längerem Stillstand kann es zu Sachschäden durch Trockenlaufen kommen, wenn sich die Ölpumpe oberhalb des Ölstands des Getriebes befindet oder die Beaufschlagung mit Schmieröl noch nicht ausreichend vorhanden ist.

Befüllen Sie die Ölpumpe mit Betriebsöl. Überwachen Sie den Öldruck. Beachten Sie die mitgelieferte Betriebsanleitung der Ölpumpe.

Befüllen Sie auch alle Öleinfüllöffnungen in der Rohrleitung. (wenn vorhanden) (Siehe Maßzeichnung)

	ACHTUNG
!	**Sachschaden** **Beschädigung des Getriebes durch falschen Ölstand möglich.** Der Ölstand (wenn anwendbar) ist mittels der Ölstandsüberwachung zu kontrollieren. *Ausstattung mit Ölpeilstab:* Der Ölstand soll mindestens die untere Markierung des Ölmessstabes oder Ölschauglases erreichen *Ausstattung mit Ölschauglas bzw. Ölauge:* Der Ölstand soll mindestens an der unteren Kante des Ölschauglases sichtbar sein. Die auf dem Typenschild, der Maßzeichnung, den technische Daten bzw. in anderen Druckschriften angegebene Ölmenge gilt als **Anhaltswert.** **Maßgebend für die einzufüllende Ölmenge ist nur die Ölstandsmarkierung am Ölschauglas bzw. am Ölpeilstab oder die Ölüberlauföffnung des Getriebes.** Bei Verwendung eines Zusatz- Ölbehälters ist das daran befindliche Ölschauglas bzw. der Ölpeilstab maßgebend. Der Ölstand ist von Zeit zu Zeit bei Stillstand des Getriebes und abgekühltem Öl zu kontrollieren. **Er darf niemals unter die untere Markierung am Ölpeilstab bzw. untere Kante des Ölschauglases absinken.**

Oder

Bei Getrieben mit Anschluss an eine externe ÖVA:

3. b)

- Lösen und entfernen Sie die Blindflansche samt Dichtungen bzw. entfernen Sie die für den Versand angebrachten Verschlussstopfen von den Getriebe- Rohranschlüssen.
- Montieren Sie die Anschlussverrohrung zur externen Ölversorgungsanlage und stellen Sie vor Inbetriebnahme sicher, dass die vorhandene externe Ölversorgungsanlage funktionstüchtig angeschlossen ist und in Betrieb ist. (wenn anwendbar)

4. Beseitigen Sie eventuell vorbei fließendes Öl mit einem Ölbindemittel.

8.3.2 Getriebe mit angebauter Rücklaufsperre bzw. geflanschter Ölpumpe

HINWEIS

Beachten Sie die speziellen Betriebsanleitungen, Pläne, Zeichnungen und Layouts der verschiedenen Komponenten und Aggregate. Diese sind dieser BA im Anhang beigefügt (wenn im Lieferumfang enthalten).

Für im Bauraum verbundene Rücklaufsperren und Ölpumpen erfolgt die Schmierung über das Getriebe.

Für Rücklaufsperren deren Bauraum vom Getriebe getrennt ist, füllen Sie vor Inbetriebnahme Öl bis Mitte Ölschauglas ein. Beachten Sie hierbei die Schmierstoffvorgaben des Herstellers.

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl oder falschen Ölstand möglich.

Die Schmierung der Rücklaufsperre erfolgt mit Öl gemäß den Angaben des Herstellers.

Der Ölstand ist von Zeit zu Zeit bei Stillstand des Getriebes und abgekühltem Öl zu kontrollieren.

Er darf niemals unter die untere Markierung absinken.

ACHTUNG

Sachschaden

Zerstörung des Getriebes oder von Bauteilen durch falsche Drehrichtung möglich.

An das Getriebe angebaute Rücklaufsperre und angeflanschte Ölpumpen (außer Universalpumpen) lassen nur eine Drehrichtung zu. Durch falsche Drehrichtung können diese zerstört werden.

Prüfen Sie bei der Aufstellung des Getriebes vor dem Ankuppeln des Antriebsaggregates und der Rücklaufsperre bzw. Ölpumpe die Übereinstimmung der Drehrichtung.

Die Drehrichtung entnehmen Sie im **Kapitel 3** den technischen Daten, dem Drehrichtungspfeil am Getriebe oder der beiliegenden verbindlichen Maßzeichnung.

Ist in den mitgelieferten technischen Unterlagen keine Drehrichtung vorgegeben, kann das Getriebe grundsätzlich in beiden Drehrichtungen betrieben werden.

Der Drehrichtungspfeil an der Getriebeeingangswelle muss mit der Drehrichtung des Antriebsaggregates bzw. des Motors übereinstimmen

8.3.3 Getriebe mit Kühlschlange/Wasser-Ölkühler

HINWEIS

Beachten Sie die speziellen Betriebsanleitungen, Pläne, Zeichnungen und Layouts der verschiedenen Komponenten und Aggregate. Diese sind dieser BA im Anhang beigefügt (wenn im Lieferumfang enthalten).

HINWEIS

Bei Getrieben mit eingebauter Kühlschlange und solchen mit Ölkühler sind vom Betreiber die erforderlichen Wasseranschlüsse herzustellen.

Verwenden Sie möglichst kalkarmes Wasser bzw. beachten Sie die Spezifikation zum Auftrag.

Die Durchlaufrichtung des Wassers ist bei Kühlschlangen beliebig.

ACHTUNG

Sachschaden

Bruchgefahr durch Überdruck möglich.

Durch zu hohen Wasserdruck in den Leitungen kann es zum Bruch am Wasserkühler kommen.

Der Wasserüberdruck darf max. 10 bar betragen (bzw. wie in den Auftragsunterlagen spezifiziert).

Gehen Sie wie folgt vor:

- Entfernen Sie vor Anschluss der Kühlschlange die Anschlussmuffen der Kühlschlange.
- Spülen Sie eventuelle Verunreinigungen aus.
- Installieren Sie eine Kühlwasserzufluss- und –abflussleitung.

HINWEIS

Die Lage der Anschlüsse entnehmen Sie der beigefügten Maßzeichnung und dem Rohrleitungsplan.

- Öffnen Sie für die Inbetriebnahme die Absperrventile für den Kühlmittelzufluss- und -abfluss vollständig.

HINWEIS

Die Wasser-Durchflussrichtung für separat aufgestellte Ölkühler ist entsprechend den Angaben auf den Kühlern vorzusehen.

ACHTUNG

Sachschaden

Beschädigung durch gefrorenes Kühlwasser möglich.

Bei Frostgefahr und längerem Stillstand des Getriebes ist das Kühlwasser abzulassen, Wasserreste sind mittels Druckluft auszublasen.

8.3.4 Getriebe mit Ventilation durch einen Kühlflügel

Kühlflügel samt Schutzhaube sind auf Dauer am Getriebe montiert. Die Schutzhaube verhindert eine unbeabsichtigte Berührung des Kühlflügels und hat außerdem die Aufgabe, die Kühlluft entlang der Oberfläche des Getriebes zu leiten.

GEFAHR

Lebensgefahr durch rotierende und/oder bewegliche Teile

Gefahr von rotierenden Bauteilen erfasst und eingezogen zu werden.

-Sichern Sie alle rotierenden Antriebsteile wie Kühlflügel gegen Berührung.

-Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen)

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch übermäßige Erwärmung möglich.

Bei Betrieb ist darauf zu achten, dass sowohl die Lufteintrittsöffnungen sowie Austrittsöffnungen ständig frei sind, andernfalls ist eine Kühlung nicht gewährleistet.

8.3.5 Getriebe mit Ölheizung

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch zu kaltes Betriebsöl möglich.

Eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang ist bei zu kaltem Getriebeöl (Abkühlen des Öles in der Stillstandsperiode auf Temperaturen nahe dem Stockpunkt) nicht gewährleistet.

Das Getriebeöl ggf. auch das Öl im Zusatzbehälter muss vor Inbetriebnahme auf ca. + 10°C aufgeheizt werden.

Sehen Sie eine Ölaufheizung durch elektrische Heizgeräte vor.

Ölheizung mit elektrischem Heizelement:

Um die Ölfüllung auf einer bestimmten Temperatur zu halten, überwachen Sie die Heiztemperatur wie folgt durch:

- Kontaktthermometer

  Über die "Min und Max Kontakte" wird die Heizung über ein Relais zu- und abgeschaltet.

oder

- Widerstandsthermometer (Pt100)
- Thermostate
- Heizkörper mit direkter thermostatischer Regelmöglichkeit

GEFAHR

Lebensgefahr beim Betrieb in explosionsfähiger Atmosphäre!

Die normale Ausführung der Geräte ist nicht für explosionsgefährdete Anlagen verwendbar.

Beim Einsatz in explosionsfähiger Atmosphäre ist eine Umrüstung nach Rücksprache mit dem Hersteller erforderlich.

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch Überhitzung des Heizkörpers möglich.

Stellen Sie sicher das das Heizelement im Betrieb vollständig vom Öl abgedeckt ist, weil es sonst zu einer Überhitzung kommen kann.

Sehen Sie eine Temperaturbegrenzung durch ein Thermostat, Widerstands- oder Kontaktthermometer vor:

Abschaltung der Heizung bei >40°C

HINWEIS

Alle Elektrogeräte haben mindestens eine Schutzklasse IP 54 nach DIN EN 60529:2000-09

	HINWEIS
	Die elektrische Verdrahtung der Heizung und Temperaturüberwachung führen Sie nach den Angaben der speziellen Betriebsanleitung für diese Instrumente durch. Diese sind dieser BA im Anhang beigefügt (wenn im Lieferumfang enthalten).

8.3.6 Getriebe mit weiteren Aufbaukomponenten

Die technischen Daten der Aufbaukomponenten entnehmen Sie der auftragsabhängig erstellten Geräteliste/Datenblätter.

	HINWEIS
	Die elektrischen Geräte zur Regelung und Steuerung verdrahten Sie entsprechend den Vorschriften der Gerätelieferanten. Für den Betrieb und die Wartung dieser Komponenten beachten Sie die beigefügten Betriebsanleitungen der Zulieferer.

8.3.7 Getriebe mit Schaltung

GEFAHR

Lebensgefahr durch rotierende und/oder bewegliche Teile

Gefahr von sich bewegenden Bauteilen erfasst und eingezogen zu werden.

-Sichern Sie alle außenliegenden beweglichen Teile wie z.B. Schaltzylinder gegen Berührung. Anschlussleitungen müssen sicher verlegt sein und dürfen nicht in den Gefahrenbereich von rotierenden und/oder beweglichen Teilen reichen.

-Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen)

WARNUNG

Verletzung der Augen durch Herausspritzen von unter Druck stehenden Flüssigkeiten

Beim Betrieb eines Getriebes mit hydraulisch betätigter Schaltung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen.

-Tragen Sie geeignete Schutzkleidung und Augenschutz.

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch Schaltvorgang im Betrieb möglich.

Das Getriebe darf nur im Stillstand geschaltet werden.

Gleichzeitig muss das Getriebe lastfrei sein. An- und Abtrieb müssen frei drehbar sein.

Eine Betätigung der Schaltzylinder darf nur möglich sein wenn keine Rotation der Wellen vorhanden ist und kein Drehmoment an den Wellen anliegt.

Es ist eine Verriegelung vorzusehen.

Der Zylinderdruck muss während des gesamten Schaltvorgangs bis zum Erreichen der jeweiligen Schaltposition aufrechterhalten bleiben.

Wenn erforderlich verändern Sie die Position der Schaltverzahnung durch Tippbetrieb des Antriebsaggregates, um das Einfädeln der Schaltverzahnung zu erleichtern.

Erst nachdem das vollständige Einlegen des Ganges in seine endgültige Stellung erfolgt ist darf das Antriebsaggregat freigegeben werden.

[pekrun]

Montage und Installation, Erstinbetriebnahme

Für die einwandfreie und sichere Funktion des Schaltvorgangs müssen vor Inbetriebnahme folgende Maßnahmen erfolgen:

Für alle schaltbaren Pekrun Getriebe:

- Stellen Sie sicher, dass eine Verriegelung vorgesehen ist, die gegen unbeabsichtigtes Anfahren während des Schaltvorgangs schützt.

Für Pekrun Getriebe mit Handschaltung:

Getriebe mit Handschaltung verfügen über einen Schalthebel, der mit einem Arretierknopf verriegelt ist.

Beim Schaltvorgang gehen Sie wie folgt vor:

- Entriegeln Sie den Arretierknopf.
- Bringen Sie den Schalthebel in die neue Position.
- Rasten Sie den Arretierknopf wieder vollständig in die vorgesehene Bohrung ein.

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch übermäßige Kräfte beim Schaltvorgang möglich

Nach dem Stillstand des Getriebes können die Zähne genau übereinanderstehen und kein Schaltvorgang möglich sein.

Üben Sie auf keinen Fall übermäßige Kräfte auf den Schalthebel aus, hierdurch kann es zu Beschädigungen der Schaltung und der Verzahnung kommen.

Verändern Sie die Zahnstellung durch Drehen der Antriebswelle von Hand. Hierdurch wird das Einrasten in den nächsten Gang erleichtert.

Für Pekrun Schaltgetriebe mit Schaltzylindern:

- Montieren sie die benötigten Hydraulik- bzw. Pneumatikleitungen zu den Schaltzylindern und stellen Sie sicher, dass diese sicher verlegt sind. (Verantwortung des Betreibers)

Die Endlagenüberwachung der Schaltzylinder erfolgt in der Regel kontaktlos durch Endschalter. Diese werden (wenn im Lieferumfang enthalten) von Pekrun am Getriebe montiert.

- Schließen Sie die Endschalter elektrisch an und integrieren Sie diese in die Steuerung.

HINWEIS

Die elektrischen Geräte zur Regelung und Steuerung verdrahten Sie entsprechend den Vorschriften der Gerätelieferanten.

Für den Betrieb und die Wartung dieser Komponenten beachten Sie die beigefügten Betriebsanleitungen der Zulieferer.

8.3.8 Hinweise zur Startphase von Antriebsmotoren für Getriebe

HINWEIS

Beachten Sie die spezielle Betriebsanleitung des Motor- Herstellers.

Antrieb durch drehzahlgeregelte Motoren:

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch ungleichmäßigen Anlauf oder Resonanzen möglich.

Durch stoßartigen Drehmomentanstieg kann es zum Aufschlagen von Zahnflanken im Getriebe kommen.

Die Drehzahlregelung zieht als Konsequenz nach sich, dass ganze Frequenzbereiche (im Hinblick auf Resonanzen) kritisch sein können. Hieraus können systembedingte unliebsame Resonanzeffekte resultieren.

Daher ist eine sehr gute Anpassung der Parameter, z.B. im Frequenzumformer, an den Prozess erforderlich.

Gleichzeitiger Antrieb durch 2 Motoren:

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch asynchron laufende Antriebsmotoren möglich.

Bei gleichzeitigem Antrieb eines Getriebes durch 2 oder mehr Motoren kann es zu Schäden an der Verzahnung kommen, wenn die Motoren asynchron laufen.

Stellen Sie den synchronen Lauf der Antriebsmotoren durch geeignete Maßnahmen sicher.

8.3.9 Erstanlauf bei Getrieben mit Fettschmierung

Für besondere Betriebsverhältnisse werden die Getriebe mit Fettschmierung vorgesehen. Vom Abnahmeprüfstand erhalten die Getriebe ihre Fettfüllung und gelangen auch mit dieser zur Auslieferung.

Die Inbetriebnahme eines solchen Getriebes kann erfolgen, sobald sich die Fettfüllung durch Nachprüfung an der Füllstand-Kontrollschraube bestätigt hat.

In Sonderfällen kann die Auslieferung auch ohne Fettfüllung erfolgen. Hier muss die Fettfüllung vor dem Erstanlauf vom Betreiber erfolgen.

Das Antriebsaggregat kann direkt gestartet werden, wenn alle Maßnahmen ab Pkt. 8.3.1 durchgeführt und beachtet wurden.(wenn anwendbar)

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch ungeeignetes Schmierfett möglich.

Bereits bei der konstruktiven Auslegung werden Art der Schmierung (Öl- oder Fettschmierung, Tauch- oder Druckschmierung), Ölzähigkeit und Ölmenge festgelegt.

Wird das Getriebe für einen anderen Einsatzfall verwendet, müssen ggf. Anpassungen getroffen werden z.B. Änderung der Fettqualität.

Halten Sie Rücksprache mit dem Schmierfett- Hersteller oder Pekrun wenn der Betrieb von den zwischen Besteller und Pekrun festgelegten Temperaturbereichen (wie im Leistungs- und Liefervertrag vereinbart) abweicht.

Die Fettschmierung ist für die Lebensdauer des Getriebes bestimmt.

Bei vorzeitigem Wechsel ist Rücksprache mit dem Hersteller erforderlich

HINWEIS

Wichtige technische Daten finden Sie auf den Typenschild, in der Maßzeichnung und dem technischen Datenblatt, welchen auftragsabhängig erstellt wird. (siehe Anhang)

8.3.10 Erstanlauf bei Getrieben mit Tauchschmierung

Das Antriebsaggregat kann direkt gestartet werden, wenn alle Maßnahmen ab Pkt. 8.3.1 durchgeführt und beachtet wurden.

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch zu kaltes Betriebsöl möglich.

Starten Sie das Antriebsaggregat nicht bei zu kaltem Getriebeöl.

Eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang ist bei zu kaltem Getriebeöl nicht gewährleistet.

Das Getriebeöl soll im Normalfall eine Mindesttemperatur von 10°C (50°F) haben.

Das Getriebeöl ggf. auch das Öl im Zusatzbehälter muss vor Inbetriebnahme auf ca. + 10°C (50°F) aufgeheizt werden.

Für andere Einsatzfälle müssen ggf. Anpassungen getroffen werden z.B. Änderung der Ölviskosität. Der Betrieb darf nur in den zwischen Besteller und Pekrun festgelegten Temperaturbereichen, wie im Leistungs- und Liefervertrag vereinbart wurde, erfolgen.

8.3.11 Erstanlauf bei Getriebe mit Öldruckschmierung

Dies gilt sowohl für Getriebe mit einer angebauten Motorölpumpe als auch für Getriebe, die an eine externe Ölversorgungsanlage (vom Endkunden bereitgestellt) angeschlossen sind.

WARNUNG

Verletzung der Augen von unter Druck stehenden Flüssigkeiten

Beim Betrieb eines Getriebes mit einer Öldruckschmierung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen.

-Beachten Sie die Montagehinweise unter **Pkt. 8.2.3**.
-Tragen Sie geeignete Schutzkleidung und Augenschutz.

HINWEIS

Die erforderlichen Betriebsparameter (Mindestschmieröldruck, erforderliche Öldurchflussmenge) entnehmen Sie bitte dem **Kapitel 3** dieser BA, der Maßzeichnung oder dem auftragsabhängig erstellten technischen Datenblatt (im Anhang).

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch zu kaltes Betriebsöl möglich.

Starten Sie das Antriebsaggregat nicht bei zu kaltem Getriebeöl.

Eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang ist bei zu kaltem Getriebeöl nicht gewährleistet.

Das Getriebeöl muss eine Mindesttemperatur von 10°C (50°F) haben.

Für andere Einsatzfälle müssen ggf. Anpassungen getroffen werden z.B. Änderung der Ölviskosität. Der Betrieb darf nur in den zwischen Besteller und Pekrun festgelegten Temperaturbereichen, wie im Leistungs- und Liefervertrag vereinbart wurde, erfolgen.

Öltemperatur ≥10°C (50°F)

Gehen Sie wie folgt vor:

- Führen Sie alle Maßnahmen ab Pkt. 8.3.1 durch.
- Beaufschlagen Sie das Getriebe über die Ölzulaufanschlüsse durch die externe ÖVA mit Schmieröl.

  oder

  Starten Sie die Motorölpumpe. (Beachten Sie die BA des Pumpenherstellers im Anhang)
- Überprüfen Sie ob die erforderlichen Betriebsparameter eingehalten werden.
- Nach mindestens 10 Minuten Vorlaufzeit starten Sie das Antriebsaggregat.

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch unzureichende Schmierung möglich.

Starten Sie das Antriebsaggregat erst wenn alle vorgegebenen Betriebsparameter (Schmieröldruck, Ölzulaufmenge, Öltemperatur) eingehalten werden. Dies gewährleistet eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang.

Der Mindestschmieröldruck beträgt P min = 0,5 bar.

Die Vorschmierphase bewirkt, dass alle Lager und Verzahnungen sicher mit Öl versorgt werden.

Für andere Einsatzfälle müssen ggf. Anpassungen getroffen werden z.B. Änderung der Ölviskosität. Der Betrieb darf nur in den zwischen Besteller und Pekrun festgelegten Betriebsparametern, wie im Leistungs- und Liefervertrag vereinbart wurde, erfolgen.

HINWEIS

Für den Betrieb und die Wartung der Pumpe, der Filter sowie der Überwachungsinstrumente sind die im auftragsabhängig beigestellten Anhang angegeben Betriebsanleitungen zu beachten.

8.3.12 Erstanlauf bei Getriebe mit Ölversorgungsanlage

Dies gilt für Getriebe die eine separat aufgestellte ÖVA besitzen. Durch Aufstellung der ÖVA auch außerhalb von Gebäuden kann es zu extremen Umgebungstemperaturen kommen.

WARNUNG

Verletzung der Augen von unter Druck stehenden Flüssigkeiten

Beim Betrieb eines Getriebes mit einer Öldruckschmierung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen.

-Beachten Sie die Montagehinweise unter **Pkt. 8.2.3**.

-Tragen Sie geeignete Schutzkleidung und Augenschutz.

HINWEIS

Die erforderlichen Betriebsparameter (Mindestschmieröldruck, erforderliche Öldurchflussmenge) entnehmen Sie bitte dem **Kapitel 3** dieser BA, der Maßzeichnung oder dem auftragsabhängig erstellten technischen Datenblatt (im Anhang).

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch zu kaltes Betriebsöl möglich.

Starten Sie das Antriebsaggregat nicht bei zu kaltem Getriebeöl.

Eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang ist bei zu kaltem Getriebeöl nicht gewährleistet.

Das Getriebeöl muss eine Mindesttemperatur von 15°C (59°F) haben.

Für andere Einsatzfälle müssen ggf. Anpassungen getroffen werden z.B. Änderung der Ölviskosität. Der Betrieb darf nur in den zwischen Besteller und Pekrun festgelegten Temperaturbereichen, wie im Leistungs- und Liefervertrag vereinbart wurde, erfolgen.

Öltemperatur <5°C (<41°F)

ACHTUNG

Sachschaden

Beschädigung an der Pumpe durch zu kaltes Betriebsöl möglich.

Starten Sie das Motorpumpenaggregat nicht bei zu kaltem Getriebeöl.

Das Getriebeöl muss eine Mindesttemperatur von 5°C (41°F) haben.

Bei Temperaturen unter 5°C (<41°F) müssen vor dem Start der Ölpumpe sekundäre Heizmaßnahmen erfolgen, da die Ölpumpen in diesen Temperaturbereichen nicht mehr zuverlässig fördern kann und eine Beschädigung nicht auszuschließen ist.

Es ist eine Verriegelung vorzusehen, wonach die Ölpumpe erst bei Öltemperaturen von mehr als 5°C (>41°F) eingeschaltet werden kann.

- Wärmen Sie das Getriebe, die öführenden Bauteile und ggf. den Ölvorratsbehälter mit sekundären Heizmaßnahmen (z.B. Heizlüftern) gleichmäßig auf.
- Überprüfen Sie die Öltemperaturen an verschiedenen Stellen.

Öltemperatur ≥5°C (41°F) <15°C (59°F)

- Nach Erreichen der Mindesttemperatur von ≥5°C (≥41°F) starten Sie die Ölpumpe.
- Schalten Sie, wie unter Pkt. 8.3.5 beschrieben, die vorgesehene Heizung ein.

HINWEIS

Das Umwälzen des Öls bewirkt ein gleichmäßiges Aufheizen.

Öltemperatur ≥15°C (59°F)

Gehen Sie wie folgt vor:

- Starten Sie zunächst die Ölpumpe und lassen Sie diese mindestens 30 Minuten laufen bevor Sie das Antriebsaggregat starten.
- Überprüfen Sie ob die erforderlichen Betriebsparameter eingehalten werden.
- Danach kann das Antriebsaggregat gestartet werden.

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch unzureichende Schmierung möglich.

Starten Sie das Antriebsaggregat erst wenn alle vorgegebenen Betriebsparameter (Schmieröldruck, Ölzulaufmenge, Öltemperatur) eingehalten werden. Dies gewährleistet eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang.

Der Mindestschmieröldruck beträgt P min = 0,5 bar.

Die Vorschmierphase bewirkt, dass alle Lager und Verzahnungen sicher mit Öl versorgt werden.

Für andere Einsatzfälle müssen ggf. Anpassungen getroffen werden z.B. Änderung der Ölviskosität. Der Betrieb darf nur in den zwischen Besteller und Pekrun festgelegten Betriebsparametern, wie im Leistungs- und Liefervertrag vereinbart wurde, erfolgen.

8.3.13 Maßnahmen nach Erstanlauf

	ACHTUNG
!	**Sachschaden** **Beschädigung am Getriebe möglich.** Setzen Sie das Getriebe sofort außer Betrieb, wenn die Lagertemperatur über den zulässigen Grenzwert steigt und Sie übermäßige Vibrationen oder unnormale Geräusche bemerken, um Getriebeschäden zu vermeiden. Wir empfehlen, in den ersten 12h bei Betrieb unter Last die Lagertemperaturen jede Stunde zu überprüfen. Dabei sollen die Lagertemperaturen im Leerlauf 75°C nicht überschreiten, unter Belastung max. 85°C.(wenn nicht anders im Leistung- und Liefervertrag festgelegt)

In der Anlaufphase soll das Getriebe möglichst für 12 Stunden **nicht** mit voller Belastung laufen. Ist der Lauf störungsfrei, kann die Belastung auf Volllast gesteigert werden. Dabei ist eine ständige Überwachung des Getriebes unerlässlich.

Gehen Sie wie folgt vor:

1. **in den ersten 6 Stunden: 50% der Last**
2. **von 6 bis 12 Stunden: 75% der Last**

Nach dem Erstanlauf des Getriebes nach ca. 12 Betriebsstunden führen Sie erste visuelle Kontrollen durch:

- Überprüfen Sie den Ölstand. (wenn anwendbar)
- Prüfen Sie das Getriebe und evtl. vorhandene Ölversorgungsanlage auf Dichtheit.
- Prüfen Sie alle Versorgungsleitungen (Hydraulik bzw. Wasser) und Anschlüsse auf Dichtheit.
- Prüfen Sie die Dichtheit der Wellenabdichtung.
- Prüfen Sie die Berührungsfreiheit der rotierenden Teile (Wellen, Kupplungen)
- Prüfen Sie die Berührungsfreiheit der beweglichen Teile (z.B. Schaltzylinder)
- Prüfen Sie alle Schutzeinrichtungen auf Funktionalität.

3. **nach 12 Stunden und nach Durchführung der Kontrollen: 100%, Volllast**

8.4 Schmierstoffempfehlung für Pekrun Getriebe

8.4.1 Anwendungsbereich

Diese Empfehlungen gelten nur für Pekrun- Getriebe der nachfolgend aufgeführten Typenreihen:

Stirnradgetriebe (außer Turbogetriebe),

Kegelradgetriebe (außer Mühlengetriebe),

Schneckengetriebe,

Planetengetriebe oder Kombinationen hieraus.

8.4.2 Schmierstoffempfehlung

In der Schmierstoffauswahltabelle sind eine Anzahl verschiedener Schmierstoffe entsprechend den Empfehlungen der Ölfirmen angegeben.

Die empfohlenen Öle durchlaufen die 12. Kraftstufe in der Verspannungsprüfmaschine nach DIN ISO 14635-1 ohne Umsprung in die Verschleißhochlage. Sie müssen der Anforderung der DIN 51517 Teil 3 (Schmieröle CLP) entsprechen.

Die angegebenen Öle sind legierte Mineralöle mit Wirkstoffzusätzen zur Erhöhung der Alterungsbeständigkeit und des Korrosionsschutzes, sowie zur Verbesserung des Verhaltens im Mischreibungsgebiet entsprechend der Kennzeichnung CLP nach DIN 51502.

Verwenden Sie für Pekrun- Getriebe nur Öle die, die oben genannten Qualitätsanforderungen erfüllen.

HINWEIS

Die Hinweise zur Ölgruppe und Ölviskosität auf Typenschildern, der Maßzeichnung und dem auftragsabhängigen technischen Datenblatt sind unbedingt einzuhalten.

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl möglich.

Maßgebend für die Ölauswahl ist stets die auf dem Typenschild des Getriebes angegebene Ölzähigkeit.

-Verwenden Sie zur Schmierung der Getriebe nur nachweislich gleichwertige Schmierstoffe. Verwenden Sie nur unbenutzte Öle, die frei von Verunreinigungen sind.

-Füllen Sie Öl nicht direkt aus Fässern in das Getriebe ein. Stellen Sie sicher, dass der Wasseranteil im Öl nicht zu hoch ist. Dies kann zur Schaumbildung im Betrieb führen.

Normal-Wert für frisches Öl <250 ppm H_2O.

(Bei Zweifeln halten Sie Rücksprache mit dem Schmierstoff-Hersteller/Lieferanten bzw. Pekrun.)

Sollen andere Öle als die vorgenannten zum Einsatz kommen, ist eine schriftliche Freigabe von Pekrun Getriebebau GmbH erforderlich. Eine Gewähr für die einwandfreie Eignung ausgewählter Ölsorten kann unsererseits nicht übernommen werden.

HINWEIS

Es ist Rücksprache mit Pekrun erforderlich, wenn bei der Bestellung der Hinweis unterlassen wurde, dass Umgebungstemperaturen unter 10°C (50°F), über 50°C (122°F) oder extreme Temperaturschwankungen oder Fremderwärmung des Getriebes auftreten.

In diesen Fällen müssen andere Ölzähigkeiten bzw. besondere Maßnahmen, wie Ölheizung der Ölkühlung vorgesehen werden.

Bei nachträglich veränderten Einsatzbedingungen ist eine schriftliche Freigabe, des zur Verwendung kommenden Schmierstoffes durch Pekrun, erforderlich.

8.4.3 Reinheitsklasse von Schmieröl

Für den Betrieb von Pekrun- Getrieben empfehlen wir Reinheitsklassen von -/18/14 nach ISO 4406/1999 (entspricht SAE-AS4059 Reinheitsklasse 9)

8.4.4 Schmierstofftabelle

Die Pekrun- Schmierstofftabelle wird ihnen zusammen mit dieser Betriebsanleitung zur Verfügung gestellt.

HINWEIS

Die neueste Revision der Pekrun- Schmierstofftabelle kann jederzeit unter der unter **Pkt.1.6** angegebenen Serviceadresse angefordert werden.

8.4.5 Wichtige Anwendungshinweise zur Schmierstofftabelle

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

Um optimale Schmiersicherheit zu gewährleisten, sollen Öle gleicher Art und Viskosität jedoch von unterschiedlichen Herstellern nicht gemischt werden.

Halten Sie Rücksprache mit dem Schmierstoff-Hersteller/Lieferanten.

Bei Grundölen der hier aufgeführten Wälzlagerfette handelt es sich um Mineralöle. Werden Polyglykolöle verwendet, muss auch das Fett auf das Polyglykolöl abgestimmt sein.

Öle auf Polyglykolbasis sind nicht mit Ölen auf Kohlenwasserstoffbasis – das heißt mit Mineralölen oder Polyalphaolefinen mischbar.

9 Bedienung

9.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

	HINWEIS
	Beachten Sie die Sicherheitshinweise in **Kapitel 2**: Sicherheit

9.2 Betriebsarten

- Leerlaufbetrieb

  Zum Einrichten und Probelauf.
- Produktionsbetrieb

  Betrieb der bestimmungsgemäßen Verwendung.

9.3 Spezielle Werkzeuge, Betriebsmittel, Materialien

Für den *Transport* benötigen Sie Lastaufnahmeeinrichtungen wie z.B. Ketten, Seile oder Hebebänder mit einer Mindesttragfähigkeit die dem Getriebegewicht entsprechen. Alle Lastaufnahmemittel müssen der Maschinenrichtlinie 2006/42/EG entsprechen.

Für die *Montage* benötigen Sie Handwerkzeuge wie z.B. Ringschlüssel, Drehmomentschlüssel usw. die der Größenordnung der eingesetzten Schrauben entsprechen.

Zum *Ausrichten und Messen* benötigen Sie Lineale, Wasserwaage, Messuhr, Fühlerlehre.

Für die *Getriebeschmierung* benötigen Sie geeignetes Öl entsprechend der beigefügten Pekrun- Schmierstofftabelle. Die Ölmenge entnehmen Sie dem Typenschild auf dem Getriebe.

Fundamentschrauben oder Ankerschrauben entsprechend der Größe der Ankerlöcher im Getriebefuß.

9.4 Inbetriebnahme

9.4.1 Inbetriebnahme nach einer planmäßigen Abschaltung

Getriebe mit Tauchschmierung:

Wenn das Getriebe nur kurzzeitig abgeschaltet war **(<1 Woche)** kann das Antriebsaggregat direkt wieder gestartet werden.

Getriebe mit Ölversorgungsanlage:

Bei kurzzeitig abgeschaltetem Getriebe **(<30 min)** gehen Sie wie folgt vor:

- Starten sie zunächst die Ölpumpe, um alle Lager und Zahnräder zu schmieren.
- Nach **ca. 10 min** Laufzeit der Pumpe kann das Antriebsaggregat gestartet werden.

9.4.2 Inbetriebnahme nach einem planmäßigen Stillstand

ACHTUNG

Sachschaden

Getriebeschaden durch Abschaltung der ÖVA.

Lassen Sie bei **kurzen Unterbrechungen** die Ölversorgungsanlage weiterlaufen.

Lassen Sie bei **längerem Stillstand** ebenfalls die Ölversorgungsanlage zunächst ca. 60 Minuten weiterlaufen. Damit vermeiden Sie einen Wärmestau.

Getriebeschaden durch Korrosion möglich.

Nehmen Sie das Getriebe bei **längeren Unterbrechungen (>1 Woche bis <6 Monate)** wöchentlich kurzzeitig in Betrieb um alle Innenteile mit Öl zu benetzen. Damit erhält das Getriebe für einen kurzen Zeitraum Korrosionsschutz.

Konservieren Sie das Getriebe bei einer **Außerbetriebsetzung** von mehr als **6 Monaten** wie in **Kapitel 6, Lagerbedingungen** beschrieben**.**

Getriebe mit Tauchschmierung:

Nach einem planmäßigen Stillstand **(>1 Woche bis <6 Monate)** des Getriebes gehen Sie wie folgt vor:

- Nehmen Sie das Getriebe wöchentlich kurzzeitig in Betrieb um alle Innenteile mit Öl zu benetzen.

- Das Antriebsaggregat kann direkt wieder gestartet werden.

Getriebe mit Ölversorgungsanlage:

Nach einem planmäßigen Stillstand **(>30 min bis <6 Monate)** des Getriebes gehen Sie wie folgt vor:

- Starten sie zunächst die Ölpumpe, um alle Lager und Zahnräder zu schmieren.
- Nach **ca. 10 min** Laufzeit der Pumpe kann das Antriebsaggregat gestartet werden.
- Bei einem Stillstand von **<6 Monate** ist wie unter **Pkt. 9.6** zu verfahren.

9.4.3 Wiederinbetriebnahme nach einem Not-Aus

ACHTUNG

Sachschaden

Stellen Sie sicher, dass am Getriebe, der Ölversorgungsanlage und weiterer angebauten Komponenten kein Schaden vorhanden ist.

Schäden sind vor Wiederinbetriebnahme zu beseitigen.

Prüfen Sie vor Wiederinbetriebnahme:

- Die Ausrichtung des Getriebes und des Antriebsaggregates (siehe **Kapitel 8**)
- Zustand der Kupplungen
- Ölstand
- Dichtheit der Rohrleitungen
- Dichtheit der Wellenabdichtung
- Auf festen Sitz der Schutzeinrichtungen
- Beachten Sie auch die Hinweise im **Kapitel 8** (Erstinbetriebnahme)

9.4.4 Wiederinbetriebnahme nach einem längeren Stillstand (Einlagerung)

Nach einem längeren Stillstand (Einlagerung) von **mehr als 6 Monaten** gehen Sie bei der Wiederinbetriebnahme wie folgt vor:

- Prüfen sie wie unter **Pkt. 9.4.3** beschrieben.
- Entfernen Sie Korrosionsschutzmittel wie in **Kapitel 8** beschrieben.
- Gehen Sie bei der Wiederinbetriebnahme vor, wie in **Kapitel 8** (Erstinbetriebnahme).

	HINWEIS
	Beachten Sie die Lagerbedingungen in **Kapitel 6**.

9.5 Inspektion und Wartung

Eine regelmäßige Inspektion und Wartung unserer Pekrun- Getriebe gibt Ihnen eine größtmögliche Betriebssicherheit.

Die Inspektion und Wartung des Getriebes darf nur im Stillstand erfolgen.

Gehen Sie wie folgt vor:

- Führen Sie einen Wartungsnachweis oder Wartungsplan. Es wird Ihnen helfen die vorgegebenen Wartungsintervalle einzuhalten.
- Lassen Sie eine regelmäßige Inspektion und Wartung der Getriebe nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.
- Unterrichten Sie alle mit der Inspektion und Wartung des Getriebes beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2: Sicherheit**)

	HINWEIS
	Beachten Sie den Inspektions- und Wartungsplan in **Kapitel 11**.

9.6 Außerbetriebnahme

Um das Getriebe außer Betrieb zu setzen, gehen Sie wie folgt vor:

- Schalten Sie das Antriebsaggregat ab.
- Lassen Sie die Außerbetriebnahme nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen
- Unterrichten Sie alle mit der Außerbetriebnahme des Getriebes beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2: Sicherheit**)
- Schließen Sie den Kühlwasserzufluss bei Getrieben mit Wasser– Ölkühler oder Kühlschlangen. Wenn Frostgefahr besteht, lassen Sie das Wasser aus dem Kühler oder der Kühlschlange ab. (siehe **Kapitel 8.3.3**)

ACHTUNG

Sachschaden

Getriebeschaden durch Abschaltung der ÖVA.

Lassen Sie bei **kurzen Unterbrechungen** die Ölversorgungsanlage weiterlaufen.

Lassen Sie bei **längerem Stillstand** ebenfalls die Ölversorgungsanlage zunächst ca. 60 Minuten weiterlaufen. Damit vermeiden Sie einen Wärmestau.

Nehmen Sie das Getriebe bei **längeren Unterbrechungen (>1 Woche bis <6 Monate)** wöchentlich kurzzeitig in Betrieb um alle Innenteile mit Öl zu benetzen. Damit erhält das Getriebe für einen kurzen Zeitraum Korrosionsschutz.

Konservieren Sie das Getriebe bei einer **Außerbetriebsetzung** von mehr als **6 Monaten** wie in **Kapitel 6, Lagerbedingungen** beschrieben**.**

10 Fehlersuche und -beseitigung

HINWEIS

Wenden Sie sich bitte mit allen technischen Fragen an unser Werk
Unsere Serviceadresse finden Sie in **Kapitel 1.6** dieser BA.

10.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

HINWEIS

Beachten Sie die Sicherheitshinweise in **Kapitel 2: Sicherheit**

WARNUNG

Verletzungsgefahr bei der Fehlersuche und -beseitigung

Es kann zu Quetschungen und Scheren von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteilen (z.B. Schaulochdeckel) kommen.

Es kann durch Eingreifen in das Getriebeinnere oder bei der Fehlersuche an sich bewegenden Bauteilen zu Quetschungen und Scherungen von Gliedmaßen kommen.

Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen.

- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel.
- Tragen Sie PSA.
- Lassen Sie die Fehlersuche und –beseitigung nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.
- Unterrichten Sie alle mit der Fehlersuche und –beseitigung beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2**: Sicherheit)

Besondere Vorsicht gilt bei der Fehlersuche im laufenden Betrieb!

Halten Sie Sicherheitsabstände ein!

Bei der Beseitigung von Störungen nehmen Sie grundsätzlich das Getriebe außer Betrieb!

10.2 Fehlerzustandserkennung

HINWEIS

Beachten Sie auch die Hinweise in **Kapitel 11: Instandhaltung**

Melden Sie während der Gewährleistungszeit auftretende Störungen umgehend an unsere Serviceadresse.

Bei nicht bestimmungsgemäßem Einsatz des Getriebes kann Pekrun keine Gewährleistung

[pekrun]

übernehmen. Das gleiche gilt für nicht mit Pekrun abgestimmten Modifikationen am Getriebe und Verwendung von nicht Original Pekrun- Ersatzteilen.

Für Störungen, die nicht eindeutig zu ermitteln sind, empfehlen wir, unseren Kundendienst über unsere Serviceadresse in Anspruch zu nehmen.

Beachten Sie folgendes:

- Lassen Sie die Fehlersuche und –beseitigung nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.
- Unterrichten Sie alle mit der Fehlersuche und –beseitigung beauftragten Personen über die vorhandenen Restrisiken (siehe Kapitel 2: **Sicherheit**)
- **Bei der Beseitigung von Störungen nehmen Sie grundsätzlich das Getriebe außer Betrieb.**
- Schalten Sie bei Arbeiten am Getriebe das Antriebsaggregat ab.
- Sichern Sie das Antriebsaggregat gegen unbeabsichtigtes in Betrieb nehmen und bringen Sie ein Hinweisschild an der Einschaltstelle an.

10.3 Erste Maßnahmen zur Störungsbeseitigung

Tabelle 10-1

Störung / Fehlermeldung	Mögliche Ursache(n)	Abhilfe
Veränderte Getriebegeräusche	Schäden an der Verzahnung	- Kundendienst einschalten. =>Verzahnung kontrollieren, ggf. beschädigte Bauteile auswechseln
	Defekte Lager	- Kundendienst einschalten. =>defekte Lager auswechseln
	Vergrößertes Lagerspiel	- Kundendienst einschalten. =>Lagerspiel einstellen
Betriebstemperatur zu hoch	Zu hoher Ölstand im Getriebe	- Ölstand korrigieren
	Kühler defekt	- Kühler kontrollieren =>ggf. auswechseln (BA des Kühlers beachten)
	Kühlwasserzufuhr defekt (bei Kühlschlangen - Ablagerungen)	- Kühlwasserzufuhr kontrollieren => Kühlschlangen reinigen, ggf. auswechseln BA Kühler beachten
	Kühlluftzufuhr defekt oder verunreinigt	- Kühlluftzufuhr kontrollieren, =>reinigen, BA Kühler beachten
	Leitungsfilter verschmutzt	- Leitungsfilter reinigen, BA Filter beachten
	Öl ist stark verschmutzt	- Kundendienst einschalten. =>Öl wechseln
	Überaltertes Öl	- Kundendienst einschalten. =>Öl wechseln

[pekrun]

Fehlersuche und -beseitigung

Störung / Fehlermeldung	Mögliche Ursache(n)	Abhilfe
	Ölleitung undicht Ölpumpe defekt	=>Ölführende Leitungen kontrollieren. ggf. abdichten - Ölpumpe kontrollieren => BA Ölpumpe beachten ggf. Ölpumpe Instand setzen bzw. auswechseln
Erhöhte Temperatur an den Lagerstellen	Defektes Lager Ölpumpe defekt Ölleitung undicht Überaltertes Öl Zu hoher oder zu niedriger Ölstand im Getriebe	- Kundendienst einschalten. =>defekte Lager auswechseln - Ölpumpe kontrollieren => ggf. auswechseln, BA Ölpumpe beachten - Kundendienst einschalten. =>Ölführende Leitungen kontrollieren, ggf. abdichten =>Öl wechseln - Ölstand korrigieren - Kundendienst einschalten.
Ölverlust aus dem Getriebe	Mangelhafte Abdichtung der Gehäusedeckel bzw. der Gehäuseteilfugen Radialwellendichtringe defekt	=>Gehäusedeckel bzw. Gehäuseteilfugen abdichten =>Wellendichtringe auswechseln
Öl schäumt im Ölsumpf Wasser im Öl	Ungeeignetes Öl bzw. kontaminiertes Öl (Wasser im Öl) Ölkühler bzw. Kühlschlange defekt Falsche Aufstellbedingungen (z.B. hohe Luftfeuchtigkeit)	- Kundendienst einschalten. =>Ölzustand untersuchen lassen - Kundendienst einschalten. =>Ölkühler bzw. Kühlschlange auf Leckagen kontrollieren, ggf. Leck beseitigen, Kühler bzw. Kühlschlange auswechseln. BA des Kühlers beachten. - Kundendienst einschalten.
Drucküberwachung löst Alarm aus	Der Öldruck ist unter den Mindestschmieröldruck (Standard 0,5 bar) abgefallen	- Ölstand bei Raumtemperatur kontrollieren =>ggf. Ölstand korrigieren - Ölfilter kontrollieren =>ggf. reinigen oder auswechseln - Kundendienst einschalten. - Ölpumpe kontrollieren => BA Ölpumpe beachten ggf. Ölpumpe Instand setzen bzw. auswechseln
Verschmutzungsanzeige des Ölfilters löst Alarm aus	Leitungsfilter ist verschmutzt	=>Bei umschaltbaren Leitungsfilter entsprechend BA umschalten,

[pekrun]

Fehlersuche und -beseitigung

Störung / Fehlermeldung	Mögliche Ursache(n)	Abhilfe
		=>verschmutzten Filtereinsatz reinigen
Schaltvorgang macht Geräusche bzw. funktioniert nicht	Es liegt ein Drehmoment an den Wellen an.	- Überprüfen ob an allen im Eingriff befindlichen Wellen kein Drehmoment anliegt, ggf. entlasten der Wellen.
	Die Wellen rotieren noch.	- Überprüfen ob alle Wellen still stehen ggf. Stillstand der Wellen herbeiführen
	Schäden an der Verzahnung der Schalträder	- Kundendienst einschalten. - Verzahnung kontrollieren, =>ggf. beschädigte Bauteile auswechseln
	Überwachungsinstrumente bzw. Endschalter sind defekt oder falsch ausgerichtet	- Kundendienst einschalten, - Endschalter kontrollieren und Installation überprüfen, => ggf. Endschalter Instand setzen oder auswechseln, BA des Endschalters beachten
	Schaltzylinder funktionieren nicht. Schaltzylinder sind defekt	-Schaltzylindereinheit auf Freigängigkeit bzw. behindernde Fremdkörper kontrollieren =>ggf. Beeinträchtigungen der Freigängigkeit beseitigen. - Kontrolle der Druckbeaufschlagung des Hydraulik- bzw. Pneumatikzylinders, => ggf Leitungen mit Druck beaufschlagen bzw. Leckagen beseitigen - Hydraulik- bzw. Pneumatikleitungen auf Leckagen kontrollieren, => ggf. Leck beseitigen bzw. Leitungen auswechseln - Kundendienst einschalten, - Schaltzylinder kontrollieren => ggf. defekte Bauteile auswechseln

11 Instandhaltung und Wartung

	HINWEIS
	Wenden Sie sich mit allen technischen Fragen an unser Werk Unsere Serviceadresse finden Sie in **Kapitel 1.6** dieser BA.

11.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

	HINWEIS
	Beachten Sie die Sicherheitshinweise in **Kapitel 2: Sicherheit**

	WARNUNG
	Verletzungsgefahr bei der Instandhaltung und Wartung Es kann zu Quetschungen und Scheren von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteilen (z.B. Schaulochdeckel) kommen. Es kann durch Eingreifen in das Getriebeinnere oder bei der Fehlersuche an sich bewegenden Bauteilen zu Quetschungen und Scherungen von Gliedmaßen kommen. Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen. - Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel. - Tragen Sie PSA. - Lassen Sie die Instandhaltung und Wartung nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen. - Unterrichten Sie alle mit der Instandhaltung und Wartung beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2**: Sicherheit) **Besondere Vorsicht gilt bei der Fehlersuche im laufenden Betrieb!** **Halten Sie Sicherheitsabstände ein!** **Bei der Beseitigung von Störungen nehmen Sie grundsätzlich das Getriebe außer Betrieb!**

11.2 Wartungsnachweis

Führen Sie einen Wartungsnachweis oder Wartungsplan. Es wird Ihnen helfen die vorgegebenen Wartungsintervalle einzuhalten.

11.3 Kontrollverfahren und Prüfvorrichtungen

Lassen Sie eine regelmäßige Inspektion und Wartung der Getriebe nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.

Regelmäßige Kontrollen aller Betriebsdaten wie z.B. Druck, Temperatur, Stromaufnahme, Verschmutzungsgrad der Leitungsfilter und weitere visuelle Prüfungen tragen dazu bei, Störungen frühzeitig zu erkennen und zu beseitigen.

Zur vorbeugenden Instandhaltung kann es sinnvoll sein ein Maschinendiagnosesystem einzusetzen, um einen Maschinenzustand festzustellen.

Mit Hilfe eines Schwingungsmesssystems lässt sich bei regelmäßiger Messdatenerfassung, eine Trendanalyse erstellen.

Mit weiteren Analysewerkzeugen lassen sich Schädigungen an Lager und Verzahnungen vor einem Totalausfall feststellen und nachweisen.

Die Schwingungsmessung und Auswertung kann durch Pekrun- Techniker erfolgen.

Bei der Auswertung durch Pekrun- Techniker, werden auch Ergebnisse vergleichbarer Pekrun- Getriebe mit einfließen und berücksichtigt.

11.4 Spezielle Werkzeuge, Betriebsmittel, Materialien

Kontaktthermometer zur Messung von Temperaturen.

Endoskop für die visuelle Innenraumkontrolle von Getrieben.

Stethoskop für die Überwachung von Laufgeräuschen im Getriebe.

Handelsübliche Handwerkzeuge wie z.B. Maulschlüssel, Ringschlüssel, Inbusschlüssel etc.

11.5 Inspektions- und Wartungsplan

HINWEIS

Die folgenden Angaben beziehen sich auf den Betrieb mit Mineralöl.

Tabelle 11-1

t = täglich, w = wöchentlich, m = monatlich, j = jährlich, 1/2= halbjährlich

Auszuführende Arbeiten	t	w	m	j
Kontrolle der Öltemperaturen	X*	X*		
Getriebe auf veränderte Geräusche kontrollieren		X		
Kontrolle der Überwachungsinstrumente am Getriebe und der ÖVA			X	
Ölstand kontrollieren			X	
Ölfilter reinigen bei Warnung der Verschmutzungsanzeige, spätestens			X	
Getriebe auf Dichtheit kontrollieren			X	
Rohrleitungen auf Dichtheit kontrollieren			X	
Ölversorgungsanlage auf Dichtheit und Funktionalität kontrollieren			X	
Zustand des Luft-Ölkühler kontrollieren				X
Zustand des Wasser-Ölkühler kontrollieren				X
Öl auf Wassergehalt kontrollieren				X
Kontrolle der Schutzeinrichtungen				X
Entlüftungsfilter reinigen				1/2
Kontrolle der Befestigungsschrauben auf festen Sitz				1/2
Kühlschlange auf Ablagerungen kontrollieren	zeitgleich mit Ölwechsel			
Ölfilter wechseln	zeitgleich mit Ölwechsel			
Ölwechsel	nach Tabelle 11-2 + 11-3			
Fettnachschmierung von Lagerstellen bzw. Dichtungen	nach 3000 Betriebsstunden oder spätestens nach 6 Monaten			
Komplette Getriebeinspektion				X

* Je nach Einsatzfall sollte die Öltemperatur auch täglich geprüft werden.

11.6 Schmierplan

11.6.1 Ölschmierung

Wichtige Informationen vor dem Ölwechsel:

⚠	**VORSICHT** **Verletzungsgefahr durch schädliche Dämpfe bzw. Flüssigkeiten.** Beim Ölwechsel besteht die Möglichkeit durch das Einatmen und die Berührung mit Schmierstoffen bzw. anderen Medien verletzt zu werden. - Beachten Sie das Sicherheitsdatenblatt der eingesetzten Medien. -Tragen Sie bei Ölwechselarbeiten geeignete persönliche Schutzausrüstung (Schutzbrille, Schutzhandschuhe). - Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).

!	**ACHTUNG** **Sachschaden** **Beschädigung des Getriebes durch ungeeignetes Betriebsöl.** Vermeiden Sie Unverträglichkeiten mit dem später verwendeten Betriebsöl. Um optimale Schmiersicherheit zu gewährleisten, sollen Öle gleicher Art und Viskosität jedoch von unterschiedlichen Herstellern nicht gemischt werden. Ein Mischen von Ölen verschiedener Sorten oder Hersteller ist nicht statthaft. Insbesondere dürfen synthetische Öle nicht mit Mineralölen oder anderen synthetischen Ölen vermischt werden. Bei einer Umstellung von Mineralöl auf Synthetiköl oder umgekehrt oder einer Umstellung von synthetischen Ölen einer bestimmten Basis auf ein synthetisches Öl einer anderen Basis: -Lassen Sie das alte Betriebsöl vollständig ab. - Spülen Sie das Getriebe gründlich mit dem späteren Betriebsöl. (siehe **Kapitel 6.6, Spülen vor Inbetriebnahme**) -Füllen Sie das neue Betriebsöl ein (siehe **Kapitel 8**) *Halten Sie Rücksprache mit dem Schmierstoff-Hersteller/Lieferanten.*

Verwenden Sie beim Ölwechsel grundsätzlich die vorher verwendete Ölsorte.

Bei einem Ölwechsel spülen Sie das Gehäuse und reinigen es gründlich.

Ölschlamm Abrieb und alte Ölreste müssen vor dem Befüllen mit frischem Öl restlos entfernt sein.

Bei besonderen Betriebsbedingungen, wie z.B. hoher Staub- oder Feuchtigkeitsgehalt der Umgebungsluft oder chemische Dämpfe kann ein häufigerer Ölwechsel erforderlich sein. Ebenso können günstigere Betriebsbedingungen die Standzeit des Öles verlängern. Beratung in Sonderfällen kann vom technischen Dienst der Ölfirmen in Anspruch genommen werden.

[pekrun]

Ölwechselintervall:

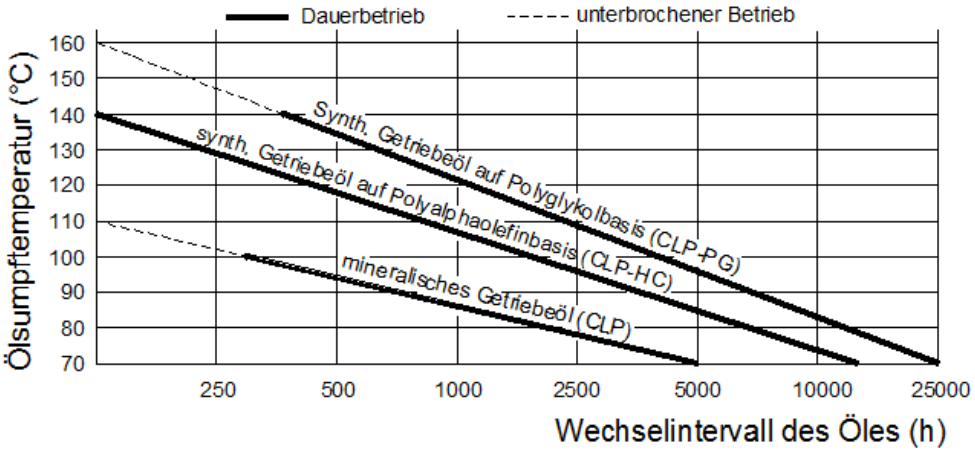
Richtwerte für Ölwechselintervalle können der Tabelle 11-2 entnommen werden. Diese gilt für normale Betriebsbedingungen und für eine Ölsumpftemperatur unter 70°C.

Tabelle 11-2

		SCHMIERSTOFFART			
		Mineralölbasis CLP	**synthetisch Polyalphaolefinbasis CLP - HC**	**synthetisch Polyglykolbasis CLP - PG**	**Fett**
1. Ölwechsel	**Schneckengetriebe**	500 h	100 bis 500 h	250 bis 1000 h	
	Stirnradgetriebe Kegelradgetriebe	1000 h	2000 h	5000 h	
folgende Ölwechsel	**Schneckengetriebe**	3000 bis 4000 h	5000 bis 7500 h	8000 bis 10000 h	5000 h
	Stirnradgetriebe Kegelradgetriebe	5000 h	12000 h	25000 h	8000 h
zeitliche Begrenzung	**Schneckengetriebe**	12 bis 18 Monate	2 bis 3 Jahre	4 bis 5 Jahre	2 Jahre
	Stirnradgetriebe Kegelradgetriebe				

Bei höheren Ölsumpftemperaturen können die Ölwechselintervalle nach Diagramm 11-3 bestimmt werden.

Diagramm 11-3



Beschreibung der Ölwechselarbeiten:

	WARNUNG
	Verbrühungsgefahr durch austretendes heißes Betriebsmedium **Schwere Verletzungen durch Verbrühungen möglich.** Während Ölwechselarbeiten direkt nach dem Betrieb und noch einige Zeit nach dem Stillstand kann es zu schwere Verletzungen durch Austreten von heißem Betriebsmedium (>55°C) kommen. - Lassen Sie Instandhaltungsarbeiten nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen. - Unterrichten Sie alle mit Instandhaltungsarbeiten beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2**: Sicherheit). - Tragen Sie beim Ölwechsel geeignete PSA (Schutzhandschuh/-brille).

	HINWEIS
	Das Ablassen des Öles soll unmittelbar nach dem Stillstand erfolgen, da dann das Öl noch warm und somit dünnflüssig ist. Fangen Sie das Altöl in geeigneten Gefäßen auf. Beseitigen Sie sofort eventuell entstandene Öllachen. Entsorgen Sie abgelassenes Altöl und Ölbindemittel sowie ölgetränkte Reinigungstücher gemäß den jeweiligen nationalen Umweltschutzbestimmungen.

- Benutzen Sie zum Ablassen des Öls ein geeignetes Auffanggefäß
- Bei Getrieben mit Kühlschlangen oder Wasser- Ölkühler, schließen Sie die Kühlmittelzufuhr.
- Wenn das Öl durch die Ölablassbohrung abgelassen wird, stellen Sie einen geeigneten Auffangbehälter unter den Ölablass.
- Stellen Sie sicher, dass beim Ablassen des Öls genügend Luft über den Belüftungsfilter ins Gehäuse dringen kann. Wenn nötig schrauben Sie den Belüftungsfilter heraus.
- Entsorgen sie sofort eventuell vorbeifließendes Öl mit einem geeigneten Ölbindemittel
- Schrauben Sie die Ölablassschraube wieder ein.
- Füllen Sie den Schmierstoff gemäß **Kapitel 8.4** in das Getriebe ein.

11.6.2 Fettschmierung:

Für besondere Betriebsverhältnisse werden die Getriebe mit Fettschmierung vorgesehen. Vom Abnahmeprüfstand erhalten die Getriebe ihre Fettfüllung und gelangen auch mit dieser zur Auslieferung.

	HINWEIS
	Die Fettschmierung ist für die Lebensdauer des Getriebes bestimmt. Bei vorzeitigem Wechsel ist Rücksprache mit dem Hersteller erforderlich.

HINWEIS

Getriebefett-Empfehlungen siehe Schmierstofftabelle für Pekrun Getriebe (Hinweise in **Kapitel 8.4.).**

11.6.3 Fettschmierung der Lager oder Abdichtungen:

An manchen Getrieben ist für die Lager oder die Abdichtungen herausgeführter Wellenenden Fettschmierung vorgesehen. Solche Stellen sind mit Druckschmiernippel versehen und bei Auslieferung der Getriebe mit Fett gefüllt.

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch ungeeignetes Schmierfett möglich.

Ein Mischen von Fetten verschiedener Seifengrundlagen ist nicht statthaft.

Halten Sie Rücksprache mit dem Schmierstoff-Hersteller/Lieferanten.

HINWEIS

Verwenden Sie zum Nachschmieren bzw. Erneuern des Fettes nur einwandfreie Marken-Wälzlagerfette. Hinweise hierzu finden Sie unter **Kapitel 8.4**.und in der Schmierstofftabelle für Pekrun- Getriebe.

Nach jeweils **3000 Betriebsstunden** ist eine Nachschmierung der Lagerstellen erforderlich, wobei die Zeitabstände nicht größer als **6 Monate** sein sollen.

HINWEIS

Abdichtungen an herausgeführten Wellenenden sind je nach Betriebsverhältnis ggf. häufiger nachzuschmieren.

Bei Erneuerung der gesamten Fettfüllung eines Lagers gehen Sie wie folgt vor:

- Waschen Sie dieses sorgfältig mit Waschbenzin o.ä. aus.
- Streichen Sie die Hohlräume des Wälzlagers mit Fett glatt aus.
- Füllen Sie den Lagergehäuseraum darüber hinaus zu 1/3 mit Fett, um eine übermäßige Erwärmung zu vermeiden.

HINWEIS

Bei langsam laufenden Wellen (n< 60 min-1) ist es zweckmäßig, den ganzen Lagergehäuseraum mit Fett zu füllen.

11.7 Beschreibung der Inspektions- und Wartungsarbeiten

HINWEIS

Für den Betrieb und die Wartung der nachfolgend aufgeführten Komponenten sind ebenfalls die im auftragsabhängig beigestellten Anhang angegeben Betriebsanleitungen zu beachten.

HINWEIS

Ersetzen Sie die bei der Montage- oder Demontage unbrauchbar gewordenen Schrauben. Achten Sie dabei auf gleiche Festigkeitsklasse und Ausführung.

Beachten Sie folgendes:

- Lassen Sie die Inspektion und Wartung nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.
- Unterrichten Sie alle mit der Inspektion und Wartung beauftragten Personen über die vorhandenen Restrisiken (siehe Kapitel 2: **Sicherheit**)
- **Während der Arbeiten nehmen Sie grundsätzlich das Getriebe außer Betrieb.**
- Schalten Sie bei Arbeiten am Getriebe das Antriebsaggregat ab.
- Sichern Sie das Antriebsaggregat gegen unbeabsichtigtes in Betrieb nehmen und bringen Sie ein Hinweisschild an der Einschaltstelle an.

11.7.1 Lüfter und Getriebereinigung

Durch starke Verunreinigung des Lüfters bzw. der Getriebeoberfläche, wird die Kühlwirkung erheblich herabgesetzt. Eine regelmäßige Reinigung der Lüfter und Getriebe ist deshalb erforderlich.

Achtung: Das Getriebe muss während der Reinigungsarbeiten außer Betrieb sein.

- Befreien Sie das Lüfterrad, die Lüfterhaube und das Schutzgitter z.B. mit einem harten Pinsel, von anhaftendem Schmutz.
- Reinigen Sie auf die gleiche Art und Weise die Gehäuseoberfläche des Getriebes mit z.B. einem Handfeger oder ähnlichem.

ACHTUNG

Sachschaden

Beschädigungen durch eindringende Feuchtigkeit

Die Reinigung des Getriebes mit einem Hochdruckreinigungsgerät ist **nicht zulässig**, da Feuchtigkeit in das Getriebe eindringen und zu Beschädigungen führen kann.

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch falsche Montage

Achten Sie bei der Remontage des Lüfters darauf, dass der Lüfter die Lüfterhaube nicht berührt.

11.7.2 Kühlschlange kontrollieren (wenn vorhanden)

Gehen Sie wie folgt vor:

- Trennen Sie die Kühlwasserzufluss- und –abflussleitungen
- Überprüfen Sie die Innenwand der Kühlschlange auf Ablagerungen.
- Bei Verschmutzung, reinigen Sie die Kühlschlange mit einem geeigneten Reinigungsmittel oder tauschen Sie ggf. die Kühlschlange gegen eine Neue aus.
- Schließen Sie die Kühlwasserzufluss- und -abflussleitung wieder an.

11.7.3 Luft- Ölkühler kontrollieren (wenn vorhanden)

- Entfernen Sie Verschmutzungen am Kühlaggregat.
- Kontrollieren Sie den Zustand der Verschraubungen und wechseln Sie diese ggf. aus.

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch falsche Montage

Achten Sie auf eine freie Luftzirkulation um den Kühler. Entfernen Sie ggf. störende Teile.

11.7.4 Wasser- Ölkühler kontrollieren (wenn vorhanden)

- Prüfen Sie die wasserführenden Leitungen auf Undichtigkeiten.
- Kontrollieren Sie den Zustand der Verschraubungen und wechseln Sie diese ggf. aus.

11.7.5 Leitungsfilter kontrollieren (wenn vorhanden)

- Prüfen Sie die optische Verschmutzungsanzeige.
- Reinigen Sie ggf. den Leitungsfilter mit einem geeigneten Reinigungsmittel.

11.7.6 Befestigungsschrauben kontrollieren

- Prüfen Sie alle Befestigungsschrauben mit einem Drehmomentschlüssel auf festen Sitz.
- Prüfen Sie die Schrauben auf das Anziehmoment gemäß Tabelle 11-4
- Unbrauchbar gewordene Schrauben sind durch neue mit gleicher Festigkeitsklasse zu ersetzen.

Tabelle 11-4 Anziehmomente für Schaftschrauben aus Stahl

ANZUGSTABELLE FÜR SCHAFTSCHRAUBEN				
	ANZIEHDREHMOMENT M_a [Nm] @ μ=0,14			
	GRÖSSE	8.8	10.9	12.9
REGELGEWINDE	M6	10	15	18
	M8	25	37	43
	M10	51	75	87
	M12	87	130	150
	M16	215	310	370
	M20	430	620	720
	M24	740	1060	1240
	M30	1500	2100	2500
	M36	2450	3450	4150
	M42	3950	5550	6650
	M48	5950	8400	10100
FEINGEWINDE	M8x1	27	40	47
	M10x1,25	54	79	93
	M12x1,25	96	140	165
	M12x1,5	92	135	155
	M16x1,5	230	340	390
	M20x1,5	480	690	800
	M24x2	810	1160	1350
	M30x2	1670	2370	2780

In den Tabellenwerten für Ma sind berücksichtigt:

-Reibungswert μges.= 0,14

-Ausnutzung der Mindeststreckgrenze = 90%

-Torsionsmoment beim Anziehen der Reibungsbeiwert von μges= 0,14 gilt für Schrauben und Muttern ohne Überzug und leicht geölt.

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch falsche Montage

Zusätzliche Schmierung der Gewinde verändert die Reibungszahl erheblich und führt zu unbestimmten Anziehverhältnissen!

11.7.7 Komplette Getriebeinspektion

Die komplette Getriebeinspektion sollten Sie dem Pekrun- Kundendienst übertragen. Unsere Techniker und Richtmeister können am zuverlässigsten beurteilen, ob und welche Bauteile des Getriebes ausgetauscht werden müssen.

12 Demontage und Entsorgung

12.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

Beachten Sie die jeweils geltenden Sicherheitsbestimmungen des Anwenderlandes. Umweltschutzbestimmungen zur Entsorgung.

HINWEIS

Beachten Sie die Sicherheitshinweise in **Kapitel 2: Sicherheit**

WARNUNG

Verletzungsgefahr bei der Demontage

Es kann zu Quetschungen und Scheren von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteilen (z.B. Schaulochdeckel) kommen.

Es kann durch Eingreifen in das Getriebeinnere an sich bewegenden Bauteilen zu Quetschungen und Scherungen von Gliedmaßen kommen.

Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen.

- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel.

- Tragen Sie PSA.

- Lassen Sie die Demontage und Entsorgung nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.

- Unterrichten Sie alle mit der Demontage und Entsorgung beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2**: Sicherheit)

Halten Sie Sicherheitsabstände ein!

VORSICHT

Verletzungsgefahr durch schädliche Dämpfe bzw. Flüssigkeiten.

Beim Ölablassen und Entsorgen besteht die Möglichkeit durch das Einatmen und die Berührung mit Schmierstoffen bzw. anderen Medien verletzt zu werden.

Beim Öffnen der Schaulochdeckel bzw. den Arbeiten an der ÖVA kann es zu einer Gefährdung durch entweichende schädliche bzw. brennbare Gase und Austreten von Schmierstoffen kommen.

Bei Arbeiten an mit Öl gefüllten Bauteilen z.B. den Rohrleitungen und im Getriebeinneren kann es zum Kontakt der Haut mit aggressiven Medien kommen.

-Beachten Sie das Sicherheitsdatenblatt der eingesetzten Medien.

Tragen Sie bei Ölwechselarbeiten geeignete persönliche Schutzausrüstung (Schutzbrille, Schutzhandschuhe).

- Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen.

- Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).

12.2 Demontage

Beschreibung der Demontagearbeiten:

- Lassen Sie die Demontagearbeiten nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.
- Unterrichten Sie alle mit der Demontage beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2: Sicherheit**)
- Nehmen Sie das Getriebe außer Betrieb. Beachten Sie auch **Kapitel 9**, **Außerbetriebnahme**.

  Um das Getriebe außer Betrieb zu setzen, schalten Sie das Antriebsaggregat ab.
- Schalten Sie die elektrische Versorgung für die Zubehöraggregate ab.
- Sichern Sie das Antriebsaggregat gegen unbeabsichtigte Inbetriebnahmen. Bringen Sie ein Hinweisschild an der Einschaltstelle an.
- Lassen sie zunächst das Öl in einen geeigneten Auffangbehälter ab. Beachten Sie hierzu die Hinweise in **Kapitel 11, Instandhaltung.**
- Trennen Sie die Antriebswelle vom Antriebsaggregat (z.B. Motor). Beachten Sie die BA des Anlagenherstellers.
- Trennen Sie die Abtriebswelle(n) von der Anlage. Beachten Sie die BA des Anlagenherstellers.
- Entfernen Sie die evtl. vorhandenen Rohrleitungen. Entsorgen Sie evtl. vorbeifließendes Öl mit einem geeigneten Ölbindungsmittel gemäß den geltenden Umweltschutzbestimmungen.
- Entfernen Sie alle vorhandenen Anschlussleitungen.
- Entfernen Sie alle Befestigungsschrauben.
- Reinigen und Entfetten Sie das Getriebe vor der Entsorgung.
- Das Getriebe kann nun mit geeigneten Lastaufnahmeeinrichtungen entfernt werden. Beachten Sie in **Kapitel 5** die Sicherheitshinweise und Innerbetrieblicher Transport.

12.3 Entsorgung

Beschreibung der Entsorgungsarbeiten:

Das Getriebe kann bei fachgerechter Entsorgung einer Wiederverwertung zugeführt werden.

Elektronikbaugruppen führen Sie einer Sonderdeponie, entsprechend den behördlichen Vorschriften, zu.

Wir empfehlen das Altöl von örtlichen Fachfirmen, gemäß den jeweils gültigen Umweltvorschriften des Anwenderlandes, entsorgen zu lassen.

[pekrun]

13 Ergänzende Unterlagen

13.1 Einbauerklärung

Inhalt und Aufbau der Einbauerklärung:

EG-Einbauerklärung

Im Sinne der EG- Richtlinie 2006/42/EG über Maschinen (Anhang II B)

Name und Anschrift des Herstellers:

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn

Hiermit erklären wir, dass die nachstehend beschriebene unvollständige Maschine

PRODUKTBEZEICHNUNG:	GETRIEBE
Serien- / Typenbezeichnung:	ASR… / BSR… / CSR… / ALG... / AGZ… / *AG* / *CH* / *GV* / *HS* / *KR* / *KS* / *KZ* / *LG* / *MK* / *PG* / *PL* / *SH* / *SO* / *SV* / *VG* / *VH* / *VN* / SN*../ SNU*../ SNO*../ SNV*../ SNC*../ SNA*../ SNAF*../ SW*../SHS*../ SDA*../ SVA*../.SZA*../ ZVA*../ SEO*.. / K*../KN*../ KNV*../ KNA*../ KS*../ / KW*../KZV*../ VKZ*../ SKV*.. / SSN *../ SSNV*../ SSW*../ KSN
Maschinen- / Seriennummer:	1**** / 1000****
Baujahr:	20**

den folgenden grundlegenden Anforderungen der Maschinenrichtlinie 2006/42/EG - einschließlich deren zum Zeitpunkt der Erklärung geltenden Änderungen - entspricht.

Vollständig erfüllte grundlegende Sicherheits- und Gesundheitsschutzanforderungen:

1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.4, 1.4.2.1, 1.5.1, 1.5.13, 1.5.15, 1.5.2, 1.5.3, 1.5.4, 1.5.6, 1.5.7, 1.5.9, 1.6.1, 1.6.2, 1.7.1.1, 1.7.2, 1.7.3, 1.7.4

Teilweise erfüllte grundlegende Sicherheits- und Gesundheitsschutzanforderungen:

1.2.6, 1.3.2, 1.3.3, 1.3.7, 1.3.8.1, 1.3.9, 1.4.1, 1.5.5, 1.5.8, 1.6.3

Folgende Rechtsvorschriften wurden angewandt:

Maschinenrichtlinie 2006/42/EG

Die Inbetriebnahme dieses Produkts ist so lange untersagt, bis die Maschine oder die Anlage, in welche dieses Produkt eingebaut werden soll oder von welcher es eine Komponente darstellt, den Bestimmungen aller relevanten Rechtsvorschriften entspricht.

Für das Produkt wurden die speziellen technischen Unterlagen gemäß Anhang VII Teil B erstellt, auf begründetes Verlangen können diese Unterlagen einer einzelstaatlichen Stelle übermittelt werden.

Bevollmächtigter für die Zusammenstellung der relevanten technischen Unterlagen (EU-Adresse):

Standort:	Iserlohn	Wuppertal
	Beate Schröder Köbbingser Mühle 14 58640 Iserlohn Deutschland	Annette Lindemann Köbbingser Mühle 14 58640 Iserlohn Deutschland

HINWEIS

Die Lieferung der Original- Einbauerklärung erfolgt gesondert. Diese erhalten Sie zusammen mit der Lieferung. Sie wird (wenn möglich) außen am Getriebe angebracht.

13.2 Zeichnungen und auftragsabhängige Unterlagen

Je nach Anforderungen und Einsatzfall variieren die mitgelieferten Unterlagen.

Diese legen die bestimmungsgemäße Verwendung fest und weisen auf auftragsbezogene Besonderheiten hin.

Folgende Unterlagen gehören zu dieser BA:

- Technisches Datenblatt (auftragsabhängig erstellt)
- Pekrun Schmierstoffempfehlungstabelle (SET)
- Original- Einbauerklärung

Folgende weitere Unterlagen werden im Einzelfall mitgeliefert:

- Maß- bzw. Schnittzeichnung / Maßblatt bzw. Dispositionszeichnung
- Ersatzteilliste
- Unterlagen zu Zubehörteilen
  (Betriebsanleitungen / sicherheitsrelevante Datenblätter)

Alle mitgelieferten Unterlagen sind Bestandteil dieser BA (siehe Pkt. 1.5.2)

[pekrun]

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany

Technisches Datenblatt

Technical datasheet

zur Betriebsanleitung
to the Operating Instructions

DEUTSCH / ENGLISCH

Geltungsbereich / *Scope*:			
Pekrun – Auftrags Nr. *Pekrun – order no.*	19396-20		
Kunden – Referenz *Customers - Reference*	4500494756; 2000064792 4001310647, 4001308822		
Getriebe / Typ *Gearbox / type*	ASR 450-R-CCW		
Pekrun - Teile Nr. / Serial Nr. *Pekrun - Part no. / serial no.*	PART-060562 / 10002292, 10002293		
Dokument-Nr. / *Document no*:	OFF-039793	Rev.:	-
erstellt am / *created by*:	23.05.2022	erstellt von / *created by*:	B. Schröder
Anhang zur *Annex to the*	**WERKNORM N9100** ***COMPANY STANDARD N9100***		

[pekrun]

Erstellt am/*created at*: 23.05.2022
Erstellt von/*created by*: B. Schröder

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[pekrun]

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Erstellt von/*created by*: B. Schröder

1. Allgemeine technische Daten
General technical data

Maße: *dimensions:*	ca. L= 2207 mm. B=1490 mm, H=1148 mm
Gewicht: *weight:*	3363 kg
Leistung: *rated power:*	P = 3600 kW
Antriebsdrehzahl: *input speed:*	n_1 = 1493 min^{-1}
Antriebsdrehzahl: *input speed:*	n_2 = 510,8 min^{-1}
Übersetzung: *transmission ratio:*	i = 2,9231 : 1
Service-Faktor: *Service factor:*	K_a = 2, DIN

2. Umgebungsbedingungen
Environmental conditions

Umgebungstemperatur: -16…+45°C
ambient temperature:

3. Schmierung
Lubrication

Typ: *type:*	Ölumlaufschmierung *Oil circulation lubrication*	
Schmierstoff: *lubricant:*	Ölviskosität: *oil viscosity:*	ISO VG 320
Schadenskraftstufe: *Scuffing resistance:*	12 (FZG-Test DIN 51354)	
Ölfüllmenge: *oil filling quantity:*	ca. 270 l	
Ölbedarf: *oil demand:*	ca. 56 l/min.	
Öldruck: *oil pressure:*	2 bar(g)	
Ölzulauftemperatur: *oil inlet temperature:*	+38…+47°C	

[pekrun]

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4. Grenz- und Einstellwerte zur Überwachung des Getriebes:
Limit and setting values for gearbox monitoring:

		Warnung *warning*	Abschaltung *shutdown*	Normal *normal*
Gehäuseschwingungen *Housing vibration*		[mm/s]	[mm/s]	[mm/s]
- horizontal *- Horizontal*	:	> 4,5	> 7,1	≤ 4,5
- vertikal *- Vertical*	:	> 4,5	> 7,1	≤ 4,5
Temperaturen *Temperatures*		[°C]	[°C]	[°C]
- Ölzulauf *- Oil inlet*	:	< 15… > 60	< 10…> 80	38 ... 47
Öldruck *Oil pressure*		[bar]	[bar]	[bar]
vor dem Getriebe *in front of the gearbox*	:	< 1,4	< 1,2	1,6…6

5. Wichtige zusätzliche Informationen:
Important additional information:

ACHTUNG / CAUTION

Sachschaden

Beschädigungen am Getriebe durch zu große Wellenverlagerung.

Die kundenseitig zu montierende Kupplung an der Antriebswelle muss im Betrieb eine Wellenverlagerung von bis zu 2 mm ausgleichen können!

Risk of property damage!

Risk of damage to the gearbox due to large shaft misalignment.!

The coupling to be mounted on the drive shaft by the customer must be able to compensate a shaft misalignment of up to 2 mm during operation!

HINWEIS / NOTE

Beachten Sie bei Montage von Kupplungen die speziellen Betriebsanleitungen des Herstellers.

When installing couplings, always follow the specific instructions from the manufacturer.

[pekrun]

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Erstellt von/*created by*: B. Schröder

6. Montageanleitung Verschleißhülse (Innenring)
Assembly instruction wear sleeve (inner ring)

Abmaße / Dimensions:

- Wellendurchmesser / shaft diameter: ø140m6 (+0,040 / +0,015)
- Verschleißhülse / wear sleeve: ø140 (+0,00 / -0,025)

Vorbereitung / Preparation:

1. Reinigen Sie Welle und O-Ring- Nut mit geeigneten Mitteln von allen Rückständen.
Clean shaft and O-ring groove from all residues using suitable means.
2. Glätten Sie eventuell vorhandene Grate und Riefen.
Smooth out any burrs and grooves that may be present.

Hilfsmittel, Personal / Auxiliary means, personnel

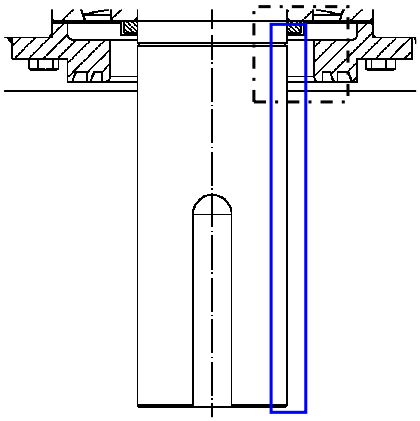
3. Fett / *grease* (z.B./*e.g.* Klüber Staburags NBU 12 K)
4. Induktionserwärmung / *induction heating*
5. Thermometer / *thermometer*
6. Hitzebeständige Handschuhe / *heat-resistant gloves*
7. Innenring / inner ring IR140x160x50 EGS PART-001292
(drallfrei geschliffen / *twist-free ground*)
8. 2x Wellendichtring / *shaft seal ring* DIN 3760-160x190x15-BAUMX7-FKM
9. 2x Schonhammer / *soft-face hammer*
10. 2x Messingdorn / *brass mandrel*
11. 2 Monteure / 2 fitters

Montage / Assembly

12. Die Temperatur der Welle muss kleiner 30°C sein.
Temperature of the shaft must be less than 30°C.

13. Fetten Sie das Wellenende leicht ein. (siehe blauer Bereich in Abbildung 1)
Lightly grease the shaft end. (see blue section in Figure 1)

Abbildung / Figure 1



[pekrun]

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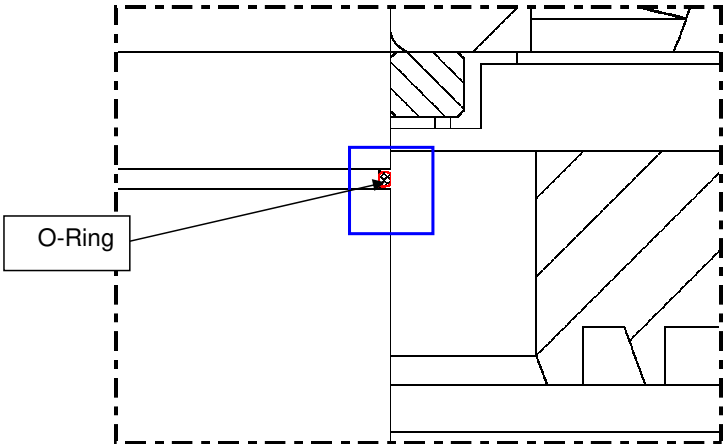
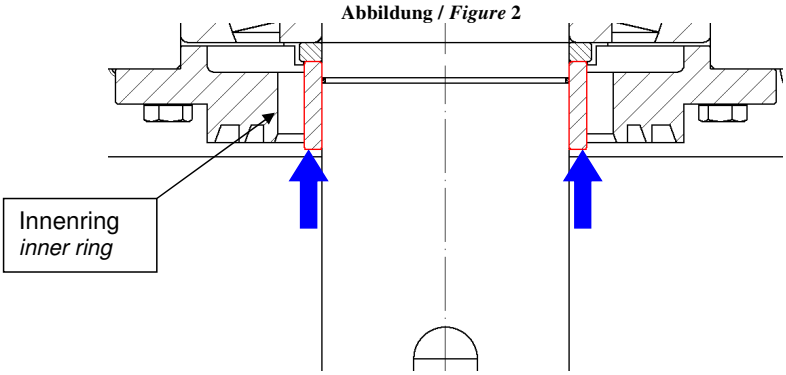
14. Fetten Sie den O-Ring ein.
    Grease the O-ring
15. Schieben Sie den O-Ring vorsichtig über die Welle bis in die Nut.
    Carefully push it over the shaft into the groove
16. Fetten Sie den O-Ring in der Nut noch einmal überall leicht ein.
    Lightly grease the O-ring in the groove once again

Ausschnitt aus Abbildung / Detail from figure 1



17. Erwärmen Sie den Innenring langsam auf 130°C.
    Slowly heat the inner ring to 130°C.
18. Nehmen Sie nun sofort den Innenring vom Erwärmungsgerät und schieben Ihn anschließend schnell über die Welle bis zum O-Ring.
    Immediately remove the inner ring from the heating device and then quickly slide it over the shaft to the O-ring.
19. Treiben Sie nun innerhalb von 15 Sekunden den Innenring gleichzeitig (auf 2 Seiten um 180° versetzt) mit den Messingdornen und Schonhammer axial über den O-Ring bis dieser am Anlagebund anliegt.
    Now, within 15 seconds, drive the inner ring simultaneously (offset by 180° on 2 sides) axially over the O-ring with the brass mandrels and soft-face hammer until the O-ring is in contact with the contact collar.

Abbildung / *Figure* 2



[pekrun]

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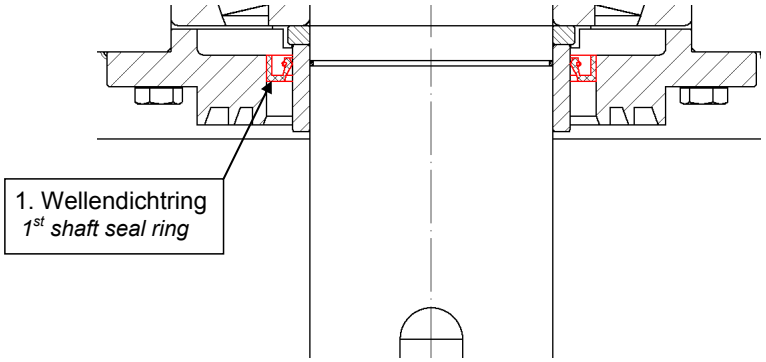
20. Lassen Sie den Innenring abkühlen und montieren anschließend den ersten Wellendichtring.
Allow the inner ring to cool down and subsequently install the first shaft seal ring.

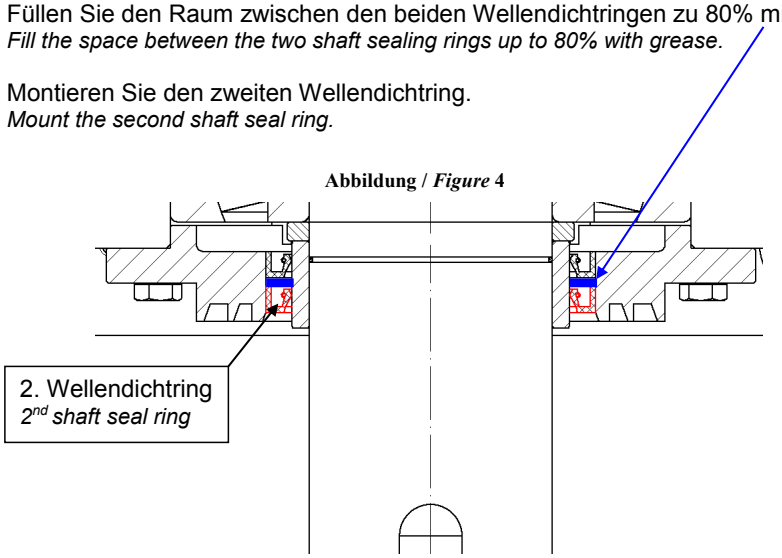
Abbildung / *Figure* 3



21. Füllen Sie den Raum zwischen den beiden Wellendichtringen zu 80% mit Fett.
Fill the space between the two shaft sealing rings up to 80% with grease.

22. Montieren Sie den zweiten Wellendichtring.
Mount the second shaft seal ring.

Abbildung / *Figure* 4



[pekrun]

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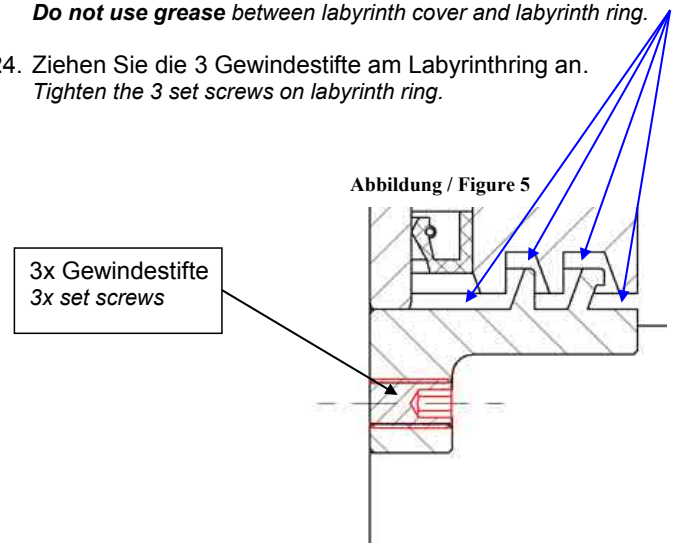
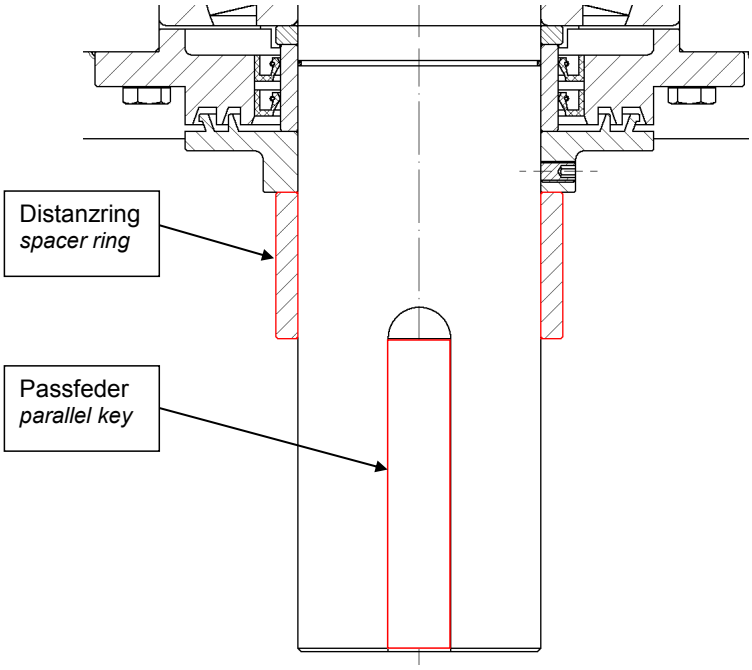
23. Montieren Sie den Labyrinthring.
    Mount the labyrinth ring.
    Verwenden Sie **kein Fett** zwischen Labyrinthdeckel und Labyrinthring.
    Do not use grease *between labyrinth cover and labyrinth ring.*

24. Ziehen Sie die 3 Gewindestifte am Labyrinthring an.
    Tighten the 3 set screws on labyrinth ring.

Abbildung / Figure 5



25. Montieren Sie Distanzring und Passfeder.
    Install the spacer ring and parallel key.



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WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

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Getriebeöle auf Mineralölbasis

Gear oil based on mineral oils
Huile à engrenages minérale
Óleos para engrenagens à base de óleos minerais
Aceite de base mineral
Tandwielolie op basis van minerale olie
Редукторные масла на минеральной основе

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	Shell	ADDINOL	Chevron
CLP 32	Degol BG 32	Alpha EP 32 Alpha VT 32 Optigear EP 32	Mobil DTE 24	RENOLIN ZAF B 32 HT	RENOLIN ZAF B 32 HT	–	Shell Tegula V 32	–	GST EP 32
CLP 46	–	Alpha SP 46 Optigear BM 46 Optigear EP 46	Mobil DTE 25	RENOLIN ZAF B 46 HT	RENOLIN ZAF B 46 HT	Klüberoil GEM 1-46 N	Shell Tellus S2 MA 46	–	GST EP 46
CLP 68	Degol BG 68	Alpha EP 68 Alpha SP 68 Optigear BM 68 Optigear EP 68	Mobilgear 600 XP 68	RENOLIN CLP 68 RENOLIN CLP 68 Plus	GEARMASTER CLP 68	Klüberoil GEM 1-68 N	Shell Omala S2 GX 68	Eco Gear 68 M	Meropa 68
CLP100	Degol BG 100	Alpha EP 100 Alpha SP 100 Optigear BM 100 Optigear EP 100	Mobilgear 600 XP 100	RENOLIN CLP 100 RENOLIN CLP 100 Plus	GEARMASTER CLP 100	Klüberoil GEM 1-100 N	Shell Omala S2 GX 100	Eco Gear 100 M Gear Oil 100 F	Meropa 100 Meropa XL 100 Meropa MG 100
CLP 150	Degol BG 150	Alpha EP 150 Alpha SP 150 Optigear BM 150 Optigear EP 150	Mobilgear 600 XP 150	RENOLIN CLP 150 RENOLIN CLP 150 Plus	GEARMASTER CLP 150	Klüberoil GEM 1-150 N	Shell Omala S2 GX 150	Eco Gear 150 M Gear Oil 150 F	Meropa 150 Meropa XL 150 Meropa MG 150
CLP 220	Degol BG 220	Alpha EP 220 Alpha SP 220 Optigear BM 220 Optigear EP 220	Mobilgear 600 XP 220	RENOLIN CLP 220 RENOLIN CLP 220 Plus RENOLIN CLP 220 VCI	GEARMASTER CLP 220	Klüberoil GEM 1-220 N	Shell Omala S2 GX 220	Eco Gear 220 M Gear Oil 220 F	Meropa 220 Meropa XL 220 Meropa MG 220
CLP 320	Degol BG 320	Alpha EP 320 Alpha SP 320 Optigear BM 320 Optigear EP 320	Mobilgear 600 XP 320	RENOLIN CLP 320 RENOLIN CLP 320 Plus RENOLIN CLP 320 VCI	GEARMASTER CLP 320	Klüberoil GEM 1-320 N	Shell Omala S2 GX 320	Eco Gear 320 M Gear Oil 320 F	Meropa 320 Meropa XL 320
CLP 460	–	Alpha EP 460 Alpha SP 460 Optigear BM 460 Optigear EP 460	Mobilgear 600 XP 460	RENOLIN CLP 460 RENOLIN CLP 460 Plus	GEARMASTER CLP 460	Klüberoil GEM 1-460 N	Shell Omala S2 GX 460	Eco Gear 460 M Gear Oil 460 F	Meropa 460 Meropa XL 460
CLP 680	–	Alpha EP 680 Alpha SP 680 Optigear BM 680	Mobilgear 600 XP 680	RENOLIN CLP 680 RENOLIN CLP 680 Plus	GEARMASTER CLP 680	Klüberoil GEM 1-680 N	Shell Omala S2 GX 680	Eco Gear 680 M Gear Oil 680 F	Meropa 680 Meropa XL 680
CLP 1000	–	Alpha SP 1000 Optigear BM 1000	–	–	–	Klüberoil GEM 1-1000 N	–	–	Meropa 1000

Beratung durch technischen Dienst / please consult technical service:

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

WERKNORM N8053

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Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -
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Synthetisches Getriebeöl auf Polyalphaolefinbasis

Synthetic gear oil based on polyalphaolefines
Huile à engrenages sur base de Poly-Alph-Oléfine
Óleo sintético de engrenagens à base de polialfaolefin
Aceite sintético con base polialfaolefinica
Synthetische reductiekast olie op Polyalpha basis
Синтетические редукторные масла на основе полиальфаолефина

DIN 51502	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	Shell	ADDINOL	Chevron
CLP HC 32	Alphasyn T 32 (CL HC)	Mobil SHC 624	RENOLIN Unisyn OL 32	RENOLIN Unisyn OL 32	Klübersynth GEM 4-32 N	–	Foodproof UNI 32 S	–
CLP HC 46	Alphasyn T 46 (CL HC)	Mobile SHC 625	RENOLIN Unisyn OL 46	RENOLIN Unisyn OL 46	Klübersynth GEM 4-46 N	–	Foodproof UNI 46 S	–
CLP HC 68	Alphasyn HTX 68 Optigear Synthetic PD 68 ES	Mobil SHC 626	RENOLIN Unisyn CLP 68	GEARMASTER SYN 68	Klübersynth GEM 4-68 N	–	Eco Gear 68 S-T	–
CLP HC 100	Alphasyn T 100 (HL HC) Optigear Synthetic PD 100 ES	Mobil SHC 627	RENOLIN Unisyn CLP 100	GEARMASTER SYN 100	Klübersynth GEM 4-100 N	–	Eco Gear 100 S	–
CLP HC 150	Alphasyn EP 150 Alphasyn HTX 150 Optigear Synthetic PD 150 ES	Mobil SHC 629 Mobil SHC Gear 150 Mobil SHC Elite 150	RENOLIN Unisyn CLP 150 RENOLIN UNISYN XT 150	GEARMASTER SYN 150	Klübersynth GEM 4-150 N	Shell Omala S4 GXV 150	Eco Gear 150 S	Meropa Synthetic EP 150
CLP HC 220	Alphasyn EP 220 Alphasyn HTX 220 Optigear Synthetic PD 220 ES	Mobil SHC 630 Mobil SHC Gear 220 Mobil SHC Elite 220	RENOLIN Unisyn CLP 220 RENOLIN UNISYN XT 220	GEARMASTER SYN 220	Klübersynth GEM 4-220 N	Shell Omala S4 GXV 220	Eco Gear 220 S	Meropa Synthetic EP 220
CLP HC 320	Alphasyn EP 320 Alphasyn HTX 320 Optigear Synthetic PD 320 ES	Mobil SHC 632 Mobil SHC Gear 320 Mobil SHC Elite 320	RENOLIN Unisyn CLP 320 RENOLIN UNISYN XT 320	GEARMASTER SYN 320	Klübersynth GEM 4-320 N	Shell Omala S4 GXV 320	Eco Gear 320 S	Meropa Synthetic EP 320 Meropa EliteSyn WL 320
CLP HC 460	Alphasyn EP 460 Alphasyn HTX 460 Optigear Synthetic PD 460 ES	Mobil SHC 634 Mobil SHC Gear 460	RENOLIN Unisyn CLP 460 RENOLIN UNISYN XT 460	GEARMASTER SYN 460	Klübersynth GEM 4-460 N	Shell Omala S4 GXV 460	Eco Gear 460 S	Meropa Synthetic EP 460
CLP HC 680	Alphasyn EP 680 Optigear Synthetic PD 680 ES	Mobil SHC 636 Mobil SHC Gear 680	RENOLIN Unisyn CLP 680 RENOLIN UNISYN XT 680	GEARMASTER SYN 680	Klübersynth GEM 4-680 N	–	Eco Gear 680 S	Meropa Synthetic EP 680 Meropa EliteSyn WL 680
CLP HC 1000	Alphasyn HTX 1000	Mobil SHC 639	RENOLIN UNISYN XT 1000	GEARMASTER SYN 1000	Klübersynth GEM 4-1000 N	–	–	–

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Biologisch abbaubare vollsynthetische Getriebeöle auf Esterbasis

Biological degradeable fully synthetic gear oils based on ester
Aceite de reductores, sintético biológicamente desintegrable, con base de Ester
Huiles à engrenages synthétiques biodégradables base ester
Biologisch afbreekbare volsynthetische reductiekastolie op Ester basis
Óleos de engrenagens totalmente sintéticos e biodegradáveis à base de éster
Биологически расщепляемые синтетические редукторные масла на основе эфира

DIN 51502	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	
CLP E 32	-	-	PLANTOHYD 32 S PLANTOSYN 32 HVI	ECO-HYD 32 S	-	
CLP E 46	-	-	PLANTOHYD 46 S PLANTOSYN 46 HVI	ECO-HYD 46 S	-	
CLP E 68	-	Mobil SHC Aware 68	PLANTOSYN 68 HVI	GEARMASTER ECO 68	Klüberbio EG 2-68	
CLP E 100	-	Mobil SHC Aware 100	PLANTOGEAR 100 HVI	GEARMASTER ECO 100	Klüberbio EG 2-100	
CLP E 150	-	Mobil SHC Aware 150	PLANTOGEAR 150 HVI	GEARMASTER ECO 150	Klüberbio EG 2-150	
CLP E 220	Performance Bio GE 220 ESS	-	PLANTOGEAR 220 S	GEARMASTER ECO 220	Klübersynth GEM 2-220	
CLP E 320	Performance Bio GE 320 ESS	-	PLANTOGEAR 320 S	GEARMASTER ECO 320	Klüberbio EG 2-320	
CLP E 460	-	-	PLANTOGEAR 460 S	GEARMASTER ECO 460	Klüberbio CA 2-460	
CLP E 680	-	-	PLANTOGEAR 680 S	GEARMASTER ECO 680	-	
CLP E 1000	-	-	-	-	-	

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Synthetisches Getriebeöl auf Polyglykolbasis

Synthetic gear oil based on polyglycols
Huile à engrenages sur base de Poly-Glycolle
Óleo sintético de engrenagens à base de poliglicol
Aceite sintético con base poliglicol
Synthetische reductiekast olie op Polyglycol basis
Синтетические редукторные масла на основе полиальфаолефина

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	Shell	ADDINOL	Chevron
CLP PG 32	-	-	-	RENOLIN PG 32	GEARMASTER PGP 32	Klübersynth GH 6-32	–	–	-
CLP PG 46	–	-	-	RENOLIN PG 46	RENOLIN PG 46	Klübersynth GH 6-46	–	–	-
CLP PG 68	-	-	-	RENOLIN PG 68	GEARMASTER PGP 68	Klübersynth GH 6-80	–	–	-
CLP PG 100	-	Optigear Synthetic 800/100	-	RENOLIN PG 100	GEARMASTER PGP 100	Klübersynth GH 6-100	–	Poly Gear PG 100	-
CLP PG 150	Degol GS 150	Alphasyn PG 150 Optigear Synthetic 800/150	Mobil Glygoyle 150	RENOLIN PG 150	GEARMASTER PGP 150	Klübersynth GH 6-150	Shell Omala S4 WE 150	Poly Gear PG 150	Meropa Synlube WS 150 Meropa EliteSyn WS 150
CLP PG 220	Degol GS 220	Alphasyn GS 220 Alphasyn PG 220 Optigear Synthetic 800/220 Optigear Synthetic 1300/220	Mobil Glygoyle 220	RENOLIN PG 220	GEARMASTER PGP 220	Klübersynth GH 6-220	Shell Omala S4 WE 220	Poly Gear PG 220	Meropa Synlube WS 220 Meropa EliteSyn WS 220
CLP PG 320	Degol GS 320	Alphasyn GS 320 Alphasyn PG 320 Optigear Synthetic 800/320	Mobil Glygoyle 320	RENOLIN PG 320	GEARMASTER PGP 320	Klübersynth GH 6-320	Shell Omala S4 WE 320	Poly Gear PG 320	Meropa Synlube WS 320 Meropa EliteSyn WS 320
CLP PG 460	Degol GS 460	Alphasyn GS 460 Alphasyn PG 460 Optigear Synthetic 800/460 Optigear Synthetic 1300/460	Mobil Glygoyle 460	RENOLIN PG 460	GEARMASTER PGP 460	Klübersynth GH 6-460	Shell Omala S4 WE 460	Poly Gear PG 460	Meropa Synlube WS 460 Meropa EliteSyn WS 460
CLP PG 680	Degol GS 680	Alphasyn GS 680 Optigear Synthetic 800/680 Optigear Synthetic 1300/680	Mobil Glygoyle 680	RENOLIN PG 680	GEARMASTER PGP 680	Klübersynth GH 6-680	Shell Omala S4 WE 680	Poly Gear PG 680	Meropa Synlube WS 680 Meropa EliteSyn WS 680
CLP PG 1000	–	Optigear Synthetic 800/1000	Mobil Glygoyle 1000	RENOLIN PG 1000	GEARMASTER PGP 1000	Klübersynth GH 6-1000	–	–	–

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Getriebeöle für die Nahrungsmittelindustrie

Gear oils for the food industry
Huiles à engrenages pour industrie alimentaire
Óleo de engrenagens para a indústria alimentar
Aceite de reductores para industria alimenticia
Reductiekastolie voor de levensmiddelen industrie
Редукторные масла для пищевой промышленности

DIN 51502	Castrol	Mobil	bremer & leguil	FUCHS LUBRITECH	KLÜBER LUBRICATION	ADDINOL
CLP E 32	CASSIDA FLUID GL 150	-	Rivolta F.L. 50	CASSIDA FLUID HFS 32	-	Foodproof UNI 32 S
CLP E 46	Optileb HY 46 (HLP HC 46)	-	Rivolta F.L. 75	CASSIDA FLUID HFS 46	-	Foodproof UNI 46 S
CLP E 68	Optileb HY 68 (HLP HC 68)	-	Rivolta F.L. 100	CASSIDA FLUID HFS 68	Klüberoil 4 UH1-68 N	Foodproof UNI 68 S
CLP E 100	Optileb GT 100	Mobil SHC Cibus 100	Rivolta F.L. 125	CASSIDA FLUID HFS 100	Klüberoil 4 UH1-100 N Klübersynth UH1 6-100	Foodproof UNI 100 S
CLP E 150	Optileb GT 150	Mobil SHC Cibus150 Mobil Glygoyle 150	Rivolta F.L. 170	CASSIDA FLUID GL 150	Klüberoil 4 UH1-150 N Klübersynth UH1 6-150	Foodproof UNI 150 S
CLP E 220	Optileb GT 220 (HC) Optileb GT 1800/220 (PG)	Mobil SHC Cibus 220 Mobil Glygoyle 220	Rivolta F.L. 250	CASSIDA FLUID GL 220	Klüberoil 4 UH1-220 N Klübersynth UH1 6-220	Foodproof UNI 220 S (HC), Foodproof CLP 220 WX (min)
CLP E 320	Optileb GT 320 (HC)	Mobil SHC Cibus 320 Mobil Glygoyle 320	Rivolta F.L. 400	CASSIDA FLUID GL 320	Klüberoil 4 UH1-320 N Klübersynth UH1 6-320	Foodproof UNI 320 S (HC), Foodproof CLP 320 WX (min)
CLP E 460	Optileb GT 460 (HC) Optileb GT 1800/460 (PG)	Mobil SHC Cibus 460 Mobil Glygoyle 460	Rivolta F.L. 500	CASSIDA FLUID GL 460	Klüberoil 4 UH1-460 N Klübersynth UH1 6-460	Foodproof UNI 460 S
CLP E 680	Optileb GT 680 (HC) Optileb GT 1800/680 (PG)	Mobil Glygoyle 680	CASSIDA FLUID GL 680	CASSIDA FLUID GL 680	Klüberoil 4 UH1-680 N Klübersynth UH1 6-680	Foodproof UNI 680 S
CLP E 1000	-	Mobil Glygoyle 1000	-	-	Klübersynth UH1 6-1000	Foodproof UNI 1000 S

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Sonstige Schmierstoffe

Other lubricants
D'autres lubrifiants
Otros lubricantes

Outros lubrificantes
Andere smeermiddelen
Другие смазочные материалы

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION		ADDINOL	Chevron
Lithiumverseifte Wälzlagerfette Lithiumgrease; Lithium saponifiés huiles pour roulements; Grasa de base lítica para rodamientos, Wentellagervetten verzeept met lithium; Massas de sabão de lítio para rolamentos de esferas de rolos; Литий мыльная основа смазки для подшипников									
KPSK-20	Aralub HLP 2	Spheerol EPL 2 Tribol GR 100-2 PD Optileb GR UF 1 (H1, NLGI 1)	Mobilux EP 2	RENOLIT LZR 2	LAGERMEISTER LP 2	CENTOPLEX 2 EP	Shell Gadus S2 V220 2	EP Mehrbereichsfett LM 2 EP	Multifak EP 2
Öl für Rücklaufsperren Oils for return flow safety device; Huiles pour cliquets de retour; Aceite para antiretornos; Olie voor terugloop-blokkades; Óleo para bloqueios de retorno; Масла для предохранительного устройства обратный поток									
HLP 32	Vitam GF 32	Hyspin AWS 32 Hyspin ZZ 32 Optileb HY 32 (H1)	Mobil DTE 24	RENOLIN B 10 VG 32 RENOLIN ZAF B 32 HT RENOLIN ZAF D 32 HT RENOLIN MR 32 MC	RENOLIN B 10 VG 32 RENOLIN ZAF B 32 HT RENOLIN ZAF D 32 HT RENOLIN MR 32 MC	LAMORA HLP 32	Shell Tellus S2 MX 32 Shell Tellus S3 M 32	Hydrauliköl HLP 32	Rando HD 32 Clarity Hydraulic Oil AW 32 (ashless)
Fließfette für fettgeschmierte Getriebe Fluid grease for grease lubricated gear units; Graisses pour réducteurs graissés; Grasa fluída para reductores lubricados con grasa; Vloiebare vetten voor met vet gesmeerde tandwielkasten; Massas lubrificantes fluídas para engrenagens lubrificadas por massa lubrificante; Смазка Жидкость для консистентной смазкой редукторов									
GP00K-20	–	Spheerol EPL 00 Tribol GR 100-00 PD Optileb GR UF 00 (H1)	Mobil Chassis Grease LBZ	RENOLIT GFW 00	GEARMASTER LXG 00	MICROLUBE GB 00 Klübersynth BEM 44-4600	–	Fliessfett SGR 4-00-9 P	Multifak EP 00

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Korrosionsschutzinhibitor (VCI- Konzentrat)

Anti-corrosion inhibitor (VCI- concentrate)
Inhibiteur de corrosion (concentré de VCI)
Inhibidor de la corrosión (concentrado de VCI)
Inibidor anti-corrosão (concentrado de VCI)
Anti-corrosie remmer (VCI- concentraat)
антикоррозийный ингибитор (концентрат VCI)

	Castrol	FUCHS	
	CORROSION INHIBITOR N 213	ANTICORID VCI UNI O 40	
!	Anwendung nach Pekrun- Vorschrift: Konservierung mit VCI- Konzentrat + Hersteller: Produkt Information Application according to Pekrun instruction : Preservation with VCI- concentrate + Manufacturer: Product Information Application: Selon la réglementation Pekrun: Conservation avec concentrado de VCI + Fabricant: Informations sur le produit Aplicación: Según normativa Pekrun: Conservación con concentrado de VCI + Fabricante: Información del producto Aplicação: De acordo com o regulamento Pekrun: Preservação com concentrado de VCI + Fabricante: Informações do produto Toepassing volgens Pekrun-regelgeving: conservering met VCI-concentraat + Fabrikant: Productinformatie Применение: Согласно правилам Pekrun: Консервация ингибитором с концентратом VCI + Производитель: Информация о продукте		

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Anhang zur Schmierstofftabelle für Pekrun Getriebe
Annex to the List of lubricants for Pekrun gears

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Mischbarkeit von Ölen / Miscibility of oils:

DE Öle auf Polyglykolbasis sind nicht mit Ölen auf Kohlenwasserstoffbasis - d.h. mit Mineralölen oder Polyalphaolefinen mischbar.

EN Oils based on polyglycols are not mixable with oils based on hydrocarbons, that means with mineral oils or polyalphaolefine oils!

FR Des huiles sur base de Poly-Glycolle ne peuvent pas être mèlangées avec des huiles sur base de carbone, c.-à-d. des huiles minérales ou des huiles sur base de Poly-Alpha-Oléfine.

ES Los aceites con base poliglicol no se mezclaran con aceites de base hidrocarburo, es decir aceites minerales o polialfaolefinicos

NI Olien op basis polyglycol kunnen niet worden vermengd met olien op basis van koolwaterstof - dat will zeggen met minerale olien of olien op basis van polyalfaolefine!

RU Масла на основе полигликоля нельзя смешивать с маслами на основе углерода - т.е. с минеральными маслами или полиальфаолефинами

PT Óleos à base de poliglicol não são misturáveis com óleos à base de hidrocarboneto, isto é, com óleos minerais ou com óleos à base de polialfaolefin.

Schmiersicherheit / Lubrication safety:

DE Um optimale Schmiersicherheit zu gewährleisten, sollen Öle gleicher Art und Viskosität jedoch von unterschiedlichen Herstellern nicht gemischt werden. Gegebenenfalls ist mit den Lieferanten Rücksprache zu halten.
Bei Grundölen der hier aufgeführten Wälzlagerfette handelt es sich um Mineralöle. Werden Polyglykolöle verwendet, muss auch das Fett auf das Polyglykolöl abgestimmt sein.

EN In order to guarantee an optimal performance, oils of the same kind and viscosity, but of different manufacturers should not be mixed. When necessary please consult the supplier.
The base oils of the mentioned rolling bearing greases are mineral oils. If polyglycol oils are used, the grease has to correspond with the polyglycol oil.

FR Pour garantir une securité de graissage optimale on ne doit pas mélanger les huiles de la même sorte et de la même viscosité, mais de fabricants différents. Le cas échéant il faut consulter le fournisseur.
Les huiles de base des graisses de roulement ici mentionnées sont des huiles minérales. Quand on emploie des huiles sur base de Poly-Glycolle, l'huile de base de la graisse doit être accordée à l'huile sur base de Poly-Glycolle.

ES Con el fin de garantizar una correcta lubricación, se utilizarán siempre aceites del mismo tipo y viscosidad, no mezclando nunca aceites de distintos fabricantes. En caso de duda, consultar con el proveedor.
La grasa pra rodamientos tiene un aceite de base mineral. Si se utiliza aceite poliglicol, la grasa deberá se compatible con el aceite.

NI Om opitmale smeerveiligheid te kunnen garanderen mogen oliën van het gelijke type en met een gelijke viscositeit, die echter van verschillende producenten stammen, niet worden gemengd. Zo nodig dient contact op te worden genomen met de leverancier.
Bij de basisoliën van de hier genoemde wentellagervetten gaat het om minerale oliën. Wanneer oliën op basis van poliglycol worden gebruikt, moet ook het vet zijn afgestemd op olie op basis van poliglycol.

RU Для обеспечения оптимальной надежности смазки следует не мешать масла одного и того же типа и вязкости разных производителей. При необходимости, следует проконсультироваться с поставщиками. Масляными основами приведенных здесь смазок для подшипников качения являются минеральные масла.
Если будут использоваться масла на полигликольной основе, то необходимо будет подобрать консистентную смазку, подходящую к таким маслам.

PT De modo a garantir a maior segurança de lubrificação, os óleos do mesmo tipo e viscosidade mas de fabricantes diferentes não devem ser misturados. Eventualmente deverá consultar o fornecedor. Os óleos base para as massas dos rolamentos de esferas de rolos aqui mencionados são óleos minerais. Se forem utilizados óleos à base de poliglicol, a massa lubrificante deverá ser igualmente compatível com o óleo à base de poliglicol.

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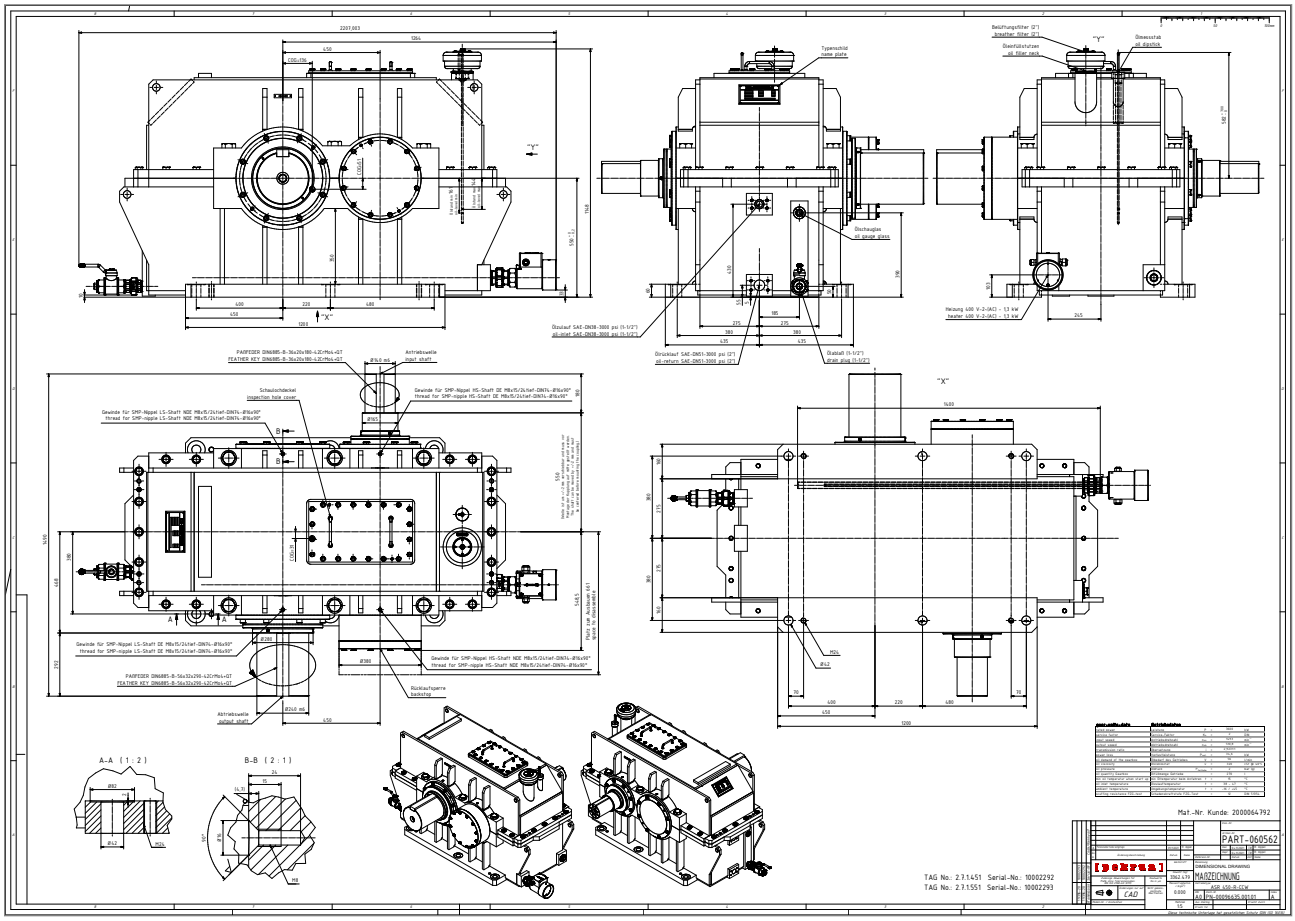
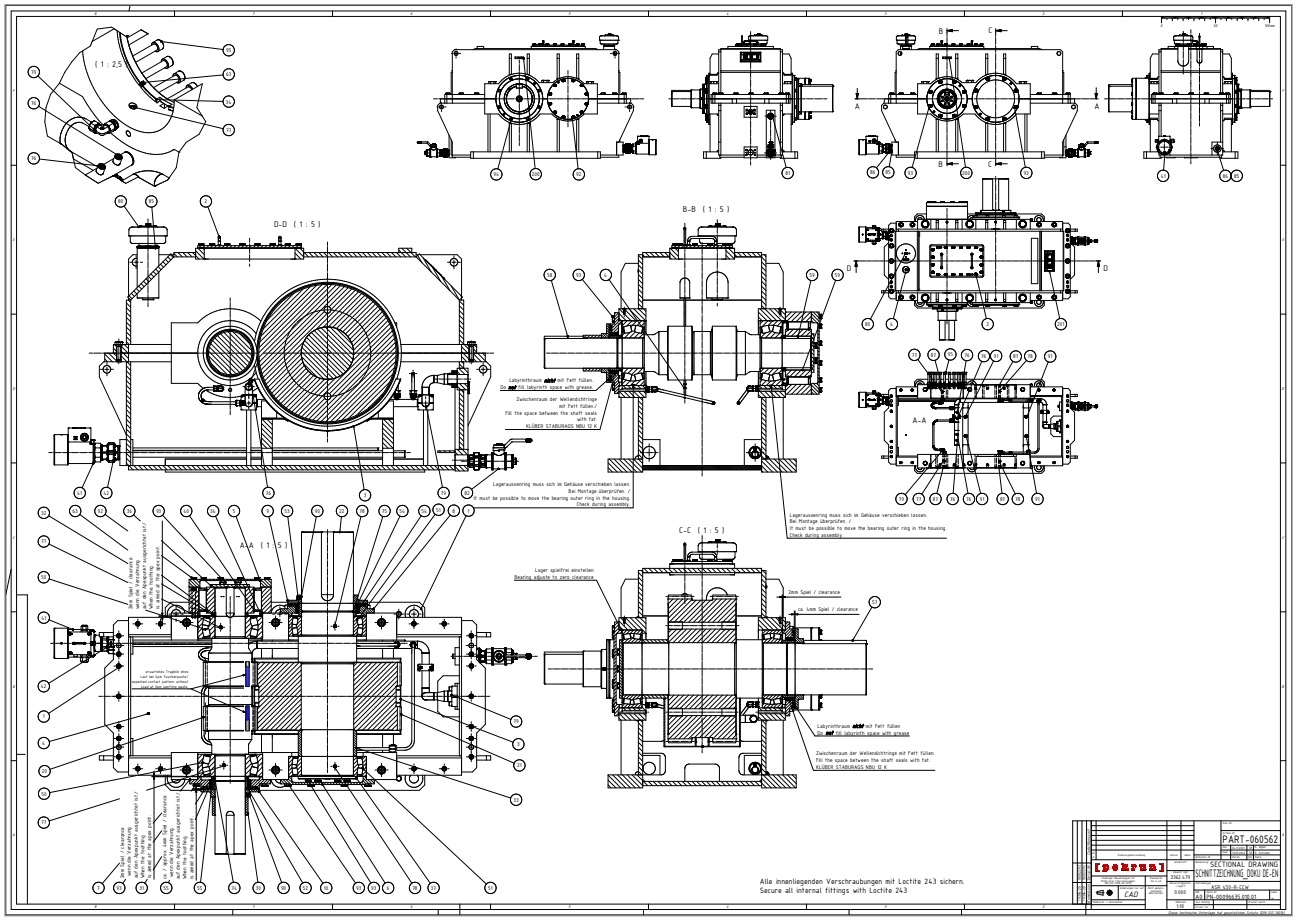

Mat.-Nr. Kunde: 2000064792
PART-060562
MAIZEZEICHNUNG
TAG No.: 2.7.1.451 Serial-No.: 10002292
TAG No.: 2.7.1.551 Serial-No.: 10002293


D-D (1:5)
B-B (1:5)
A-A (1:5)
C-C (1:5)
Labyrinthraum nicht mit Fett füllen.
Do not fill labyrinth space with grease.
Zwischenraum der Wellendichtringe mit Fett füllen./
Fill the space between the shaft seals with fat.
KLÜBER STABURAGS NBU 12 K
Lagerausseenring muss sich im Gehäuse verschieben lassen.
Bei Montage überprüfen. /
It must be possible to move the bearing outer ring in the housing.
Check during assembly.
Lager spielfrei einstellen
Bearing adjuste to zero clearance
2mm Spiel / clearance
ca. 1mm Spiel / clearance
Alle innenliegenden Verschraubungen mit Loctite 243 sichern.
Secure all internal fittings with Loctite 243
PART-060562
SECTIONAL DRAWING
SCHNITTZEICHNUNG DOKU DE-EN
AGS 450-B-CCW
CAD

[pekrun]	Kommission:	2.0.19396-20.1	Stücklisten-Nr.:	PART-060562	GETRIEBE ASR 450-R-CCW		Blatt:	1
	GetriebeTyp:	ASR 450 -R-CCW	Maßzeichnung-Nr.:	PN-00096635.001.01				
	Übersetzung:	2,9231:1	Schnittzeichnung-Nr.:	PN-00096635.010.01		Revision (Name/Datum)	von:	4
	Name/Datum:	Appel/04.11.2021				A R. Appel/05.11.2021		

Pos.	Stk.		Bezeichnung / Beschreibung	Artikel Nr. / Dokument Nr.
1	1		GEHÄUSE	PART-057677
				PN-00077526.005.01 -
2	1		SCHAULOCHDECKEL MIT GRIFF	PART-054719
				PN-00074215.005.01 -
3	1		ÖLWANNE	PART-057700
				PN-00077580.000.01 -
4	1		ÖLPEILSTAB KOMPLETT	PART-057347
				PN-00076785.005.01 -
5	1		DECKEL 290	PART-057243
				PN-00076539.000.01 -
6	1		DECKEL 360	PART-057228
				PN-00076520.000.01 -
7	1		LABYRINTHDECKEL 300	PART-057239
				PN-00076533.000.01 -
8	1		LABYRINTHDECKEL 360	PART-057234
				PN-00076524.000.01 -
9	1		LABYRINTHRING	PART-057235
				PN-00076526.000.01 -
10	1		LABYRINTHRING	PART-057238
				PN-00076532.000.01 -
20	1		RITZELWELLE 26	PART-057699
				PN-00077578.000.01 -
				PN-00077579.009.01 -
21	1		STIRNRAD 76	PART-057696
				PN-00077575.000.01 -
22	1		RADWELLE	PART-057585
				PN-00077353.000.01 -
30	1		DISTANZRING	PART-057236
				PN-00076528.000.01 -
31	1		DISTANZRING	PART-057237
				PN-00076529.000.01 -
32	1		DISTANZRING	PART-057240
				PN-00076535.000.01 -

[pekrun]	Kommission:	2.0.19396-20.1	Stücklisten-Nr.:	PART-060562	GETRIEBE ASR 450-R-CCW		Blatt:	2
	GetriebeTyp:	ASR 450 -R-CCW	Maßzeichnung-Nr.:	PN-00096635.001.01				
	Übersetzung:	2,9231:1	Schnittzeichnung-Nr.:	PN-00096635.010.01		Revision (Name/Datum)	von:	4
	Name/Datum:	Appel/04.11.2021				A R. Appel/05.11.2021		

Pos.	Stk.		Bezeichnung	Artikel Nr.
			Beschreibung	Dokument Nr.
33	1		DISTANZRING	PART-057586
				PN-00077354.000.01 -
34	1		DISTANZRING	PART-057352
				PN-00076799.000.01 -
36	1		ENDSCHEIBE	PART-051274
				PN-00068494.000.01 -
37	1		ENDSCHEIBE	PART-057227
				PN-00076519.000.01 -
40	1		FREILAUF E-FC5045	PART-057433
				SC-00076947.009.01 -
41	1		TAUCHHEIZKÖRPER-CSN EX R2"-EL=1400	PART-057342
42	1		ROHRVERSCHRAUBUNG	PART-057346
50	2		WÄLZLAGER DIN635	PART-057211
51	2		WÄLZLAGER DIN635	PART-057212
52	1		INNENRING	PART-001292
53	1		INNENRING	PART-001300
54	2		RADIALWELLENDICHTRING	PART-019776
55	2		RADIALWELLENDICHTRING	PART-014878
57	1		PAßFEDER	PART-057337
58	1		PAßFEDER	PART-057336
59	2		PAßFEDER	PART-057590
63	1		SPANNSTIFT	PART-028305

[pekrun]	Kommission:	2.0.19396-20.1	Stücklisten-Nr.:	PART-060562	GETRIEBE ASR 450-R-CCW		Blatt:	3
	GetriebeTyp:	ASR 450 -R-CCW	Maßzeichnung-Nr.:	PN-00096635.001.01				
	Übersetzung:	2,9231:1	Schnittzeichnung-Nr.:	PN-00096635.010.01		Revision (Name/Datum)	von:	4
	Name/Datum:	Appel/04.11.2021				A R. Appel/05.11.2021		

Pos.	Stk.		Bezeichnung / Beschreibung	Artikel Nr. / Dokument Nr.
74	1		O-RING	PART-057513
75	1		O-RING	PART-018892
76	4		BLENDE	PART-016279 PN-00034550.000.01 -
77	2		BLENDE	PART-015292 PN-00033574.000.01 -
78	2		BLENDE	PART-016489 PN-00034788.000.01 -
79	1		ROHRLEITUNG INNEN KOMPLETT	PART-057686 PN-00077549.005.01 -
80	1		BELÜFTUNGSFILTER	PART-033181
81	1		ÖLAUGE	PART-013240
82	1		ÖLABLASS	PART-057341 PN-00076762.005.01 -
85	2		DICHTRING	PART-001230
86	1		VERSCHLUßSCHRAUBE	PART-013869
87	4		VERSCHLUßSCHRAUBE	PART-001366
90	6		GEWINDESTIFT	PART-013278
91	4		SCHRAUBE	PART-013986
92	12		SCHRAUBE	PART-011927
93	26		SCHRAUBE	PART-003989

[pekrun]	Kommission:	2.0.19396-20.1	Stücklisten-Nr.:	PART-060562	GETRIEBE ASR 450-R-CCW		Blatt:	4
	GetriebeTyp:	ASR 450 -R-CCW	Maßzeichnung-Nr.:	PN-00096635.001.01				
	Übersetzung:	2,9231:1	Schnittzeichnung-Nr.:	PN-00096635.010.01		Revision (Name/Datum)	von:	4
	Name/Datum:	Appel/04.11.2021				A R. Appel/05.11.2021		

Pos.	Stk.		Bezeichnung	Artikel Nr.
			Beschreibung	Dokument Nr.
94	8		SCHRAUBE	PART-003973
95	24		SCHRAUBE	PART-010868
200	2		DREHRICHTUNGSPFEIL GROSS	PART-002302
				PN-00020759.000.01 -
201	1		PEKRUN STANDARD TYPENSCHILD GROSS	PART-028768
				PE-00045948.000.01 C

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Betriebsanleitung

Artikel-Nummer: 2119931402134040605
Ex-Heizkörper

Typ		: 95F/HC-Exdet1,3T3/T200°C/RBE
Leistung	(kW)	: 1,3
Leistungstoleranz	(%)	: +5/-10
Spannung		: 400 V, 2~

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1 Angaben über das Erzeugnis

Bezeichnung	**: Ex-Heizkörper**
Typ	**: 95F/HC-Exdet1,3T3/T200°C/RBE**
EG-Baumusterprüfbescheinigung	**: BVS 15 ATEX E 143 X**
	: IECEx BVS 15.0117X
Kennzeichnung	**: Ex II 2G Ex db eb IIC T3**
	Ex II 2D Ex tb IIIC T200°C
	Druckfeste Kapselung (d)
	Erhöhte Sicherheit (e)
	Schutz durch Gehäuse (t)
Temperaturklasse	**: T3**
Auslegung / Abnahme	**: …**
Einbaulage	**: waagerecht, Fühlerschutzrohre oben**
Einsatzbereich	**: Zone 1 oder Zone 21**
Zul. Umgebungstemp. am Anschlusskopf	**: -40/ +50°C**
Schutzart	**: IP 65**
Zeichnungsnummer	**: Handskizze**

2 Bestimmungsgemäßer Gebrauch

Ex-Gerät, Baureihe 95F/..-Exdet.T., entsprechend EG-Baumusterprüfbescheinigung BVS 15 ATEX E 143 X. Einsatzbereich: Zone 1 oder Zone 21.

Das Ex-Gerät dient zum Erwärmen der unter Betriebsdaten angegeben Flüssigkeit innerhalb der vorgegebenen Grenzen. **Abweichungen hiervon sind nicht erlaubt.**

Dazu werden die Heizelemente des Ex-Gerätes in Rohrleitungen, Behälter oder ähnlichem eingeführt.

3 Sicherheit

Beachten sie die grundlegenden Hinweise dieser Betriebsanleitung bei Aufstellung und Betrieb.
Die Betriebsanleitung muss vor Montage und Inbetriebnahme vom Monteur sowie dem zuständigen Betreiber vollständig gelesen und verstanden werden.

Heben sie die Betriebsanleitung zum späteren Gebrauch auf.
Geben sie sie Betriebsanleitung an jeden nachfolgenden Besitzer und Betreiber weiter.

Bedingt durch die hohen Medientemperaturen können am Ex-Gerät im Bereich des Flansches /der Kühlstrecke Oberflächentemperaturen **bis 200°C** auftreten. Es besteht Verbrennungsgefahr. Bauseitig müssen geeignete Maßnahmen zum Schutz vor Verbrennung getroffen werden.

Nehmen Sie keine Modifikationen am Produkt vor.
Modifikationen können Schutzeinrichtungen unwirksam machen und zu Personen- und Sachschäden führen.
Modifikationen führen zum Erlöschen der Konformität.

Beachten sie die Einbaulage des Ex-Gerätes oder die Strömungsrichtung des zu beheizenden Mediums, wenn diese vorgegeben sind.

Befolgen sie die in dem jeweiligen Land gültigen Gesetzesvorschriften über den Betrieb der Druckgeräte.

Führen sie wiederkehrende Prüfungen nach den nationalen Bestimmungen durch.
Überprüfen sie Sicherheitsrelevante Bauteile vor Inbetriebnahme auf Funktion.

Führen sie eine jährliche Funktionsprüfung der Sicherheitsvorrichtungen durch.
In Abhängigkeit vom Einsatz und Umgebung auch in einem kürzeren Intervall.

4 Anschluss- und Leistungsdaten

Ein direkter Anschluss von Aluminiumleitern an die Anschlussklemmen ist nicht zulässig.
Die Anschlussleitung muss einen Mindestquerschnitt von 1,5 mm² haben.
Die Anschlussleitung muss für erhöhte Temperaturen (Isolierstofftemperatur mindestens 85°C) geeignet sein.

Elektrische Daten		
Leistung	(kW)	**: 1,3**
Leistungstoleranz	(%)	**: +5/-10**
Stufen		**: 1**
Spannung		**: 400V, 2~**
Verschaltung		**: Dreieck**
Kabelverschraubung		**: 2x M20x1,5 ; -55…+160°C, IP66, Edelstahl**
		5…9mm (Dichteinsatz mit Inlet)
		9…14mm (Dichteinsatz ohne Inlet)
		1x für Anschluss Ex-Heizkörper
		1x für Regler und Begrenzer
Heizelemente		
Art der Heizelemente		**: Hochleistungspatrone verdichtet**
Rohrdurchmesser	(mm)	**: 32**
Material Patrone		**: 1.4571**
Einbaulänge	(mm)	**: 1.400**
davon unbeheizt	(mm)	**: 50**
Kühlstrecke	(mm)	**: ohne**
Ø-Rohrbündel	(mm)	**: 50**
Betriebsdaten		
Medium		**: Getriebe-Öl, ruhend**
Einbauort		**: Behälter**
Betriebstemperatur	(°C)	**: 40**
Min. zul. Temperatur	(°C)	**: 0**
Max. zul. Temperatur	(°C)	**: 80**
Betriebsdruck	(bar g)	**: …**
max. zul. Druck	(bar g)	**: 0,5**
Prüfdruck	(bar g)	**: …**

4 Anschluss- und Leistungsdaten

Flansch

Norm	**: ISO228, G2“**
Dichtung	**: Novapress universal**

Temperaturüberwachung

Regler	**: 0-100°C, 230V ~, 16A**
Temperaturbegrenzer	**: 0-150°C, 230V ~, 16A**

Der Begrenzer ist auf 80°C eingestellt und verlackt.
Begrenzereinstellung ist vom Hersteller vorgenommen und darf nicht verändert werden.
Regler und Begrenzer sind direkt verschaltet.

Anschlusskopf	**: GGG40.3, lackiert**

Für den Betrieb sind eine Niveauüberwachung und eine elektrische Steuerung erforderlich. Diese Sicherheitsvorrichtungen sind nicht im Lieferumfang des Ex-Gerätes enthalten. Sie müssen durch den Errichter angebracht und eingestellt werden. Hierzu die Anweisungen unter „Errichtungshinweise“ in dieser Betriebsanleitung beachten.

5 Errichtungshinweise

1. Einbauort / Einbauverhältnisse

Das Ex-Gerät muss so in einen geeigneten Behälter eingebaute werden, dass die Heizelemente die Wärme ungehindert abgeben können. Die unbeheizte Länge des Ex-Gerätes und die Einbauverhältnisse müssen aufeinander abgestimmt sein. Die beheizte Länge des Ex-Gerätes muss sich mindestens 50 mm im Medium befinden. Ein Heizen innerhalb des Behälterstutzens ist nicht zulässig. Abweichungen hiervon können zum Wärmestau mit Überhitzung / unwirksam werden der Temperaturbegrenzung führen.

Das Ex-Gerät muss so in den Behälter eingebaut werden, dass sich die Fühlerschutzrohre für Regler und Begrenzer oberhalb des Patronenrohres im Medium befinden.

Für den Betrieb sind eine Niveauüberwachung und eine elektrische Steuerung erforderlich. Diese Sicherheitsvorrichtungen sind nicht im Lieferumfang des Ex-Gerätes enthalten. Sie müssen durch den Errichter angebracht, eingestellt und an eine bauseitig zu errichtende Steuerung angeschlossen werden.

2. Temperaturbegrenzer

Der Temperaturbegrenzer wurde bereits durch den Hersteller angebracht. Die Einstellung der Auslösetemperatur wurde bereits vorgenommen und darf nicht mehr geändert werden

3. Niveauüberwachung

Die Niveauüberwachung muss so angebracht werden, dass eine Mindestüberwachung des Ex-Gerätes von 50 mm mit dem zu erwärmenden Medium sichergestellt ist. Das Ansprechen der Niveauüberwachung muss das Abschalten des Ex-Gerätes zur Folge haben.

Durch diese Maßnahme muss sichergestellt werden, dass das Ex-Gerät nicht trockenlaufen kann und/oder eine zu niedrige Füllhöhe die sichere Anschaltfunktion des Begrenzers, z.B. durch Trockenlauf des Begrenzerfühlers, aufhebt.

4. Elektrische Steuerung

Das Ex-Gerät muss mit einer elektrischen Steuerung betrieben werden. Bei Abschaltung einer Sicherheitsvorrichtung (Temperaturbegrenzer, Strömungsüberwachung oder Niveauüberwachung) muss das Ex-Gerät über einen separaten Abschaltweg (Schütz) der Steuerung sicher vom Netz getrennt werden. Dieser separate Abschaltweg muss unabhängig von betrieblich erforderlichen Mess- und/oder Steuerungsvorrichtungen funktionieren.

5. Anforderungen an die Sicherheitsvorrichtungen

Überwachungseinrichtungen (Temperaturbegrenzer, Niveauüberwachung) müssen entsprechend den einschlägigen Bestimmungen funktions- und zuverlässigkeitsgeprüft sein.

Im Geltungsbereich der Richtlinie RL2014/34/EU müssen sie entweder:

- Entsprechend RL2014/34/EU zertifiziert sein (Prüfungsgrundlage DIN EN 50495 SIL 1)
- Im Rahmen der Bewertung des Schutzkonzeptes für die Anlage durch den Errichter/Betreiber separat entsprechend RL2014/34/EU bewertet werden.

6. Anordnung Anschlusskopf

Der Anschlusskopf des Ex-Gerätes darf nicht in unmittelbarer Nähe (<2m) aufgeladener strömender Teilchen (Hochspannungselektrode, Ionisator, Produktstrom der nicht innerhalb eines geschlossenen metallischen Rohres geführt wird) angeordnet werden.

7. Umgebungstemperaturbereich

Während des Betriebes dürfen die in dieser Anleitung angegebenen minimalen bzw. maximalen Umgebungstemperaturen am Anschlusskopf nicht über- oder unterschritten werden. Bei abweichenden Umgebungstemperaturen muss das Ex-Gerät abgeschaltet werden.

8. Ungehinderte Wärmeabgabe Anschlusshaube

Die Anschlusshaube darf nicht mit einer Wärmeisolierung versehen werden, da sonst der Anschlussbereich überhitzt wird.

9. Bauseitig muss ein **Überdruck- Sicherheitsventil** vorgesehen werden.

10. **Nachträgliche Lackierung**
    Eine nachträgliche Lackierung oder Pulverbeschichtung des Ex-Gerätes ist verboten.

11. **Anforderung an das Medium**
    Es dürfen keine Verunreinigungen oder Fremdkörper in das Ex-Gerät / die Anlage gelangen. Das Medium muss frei von Verunreinigungen sein. Ablagerungen, abrasiver Verschleiß oder ähnliches sind nicht zulässig. Installieren sie geeignete Maßnahmen, z.B. Filter etc.

    Es muss sichergestellt sein, dass innerhalb des Behälters oder der Rohrleitung keine explosionsfähigen Gemische die Oberfläche der Heizelemente erreichen kann.

12. **Entleerung**
    Errichten sie geeignete Möglichkeiten zum Entleeren des Behälters.

13. **Anforderung an die Kabelverschraubung**
    Wenn die durch den Hersteller montierte Kabel- und Leitungseinführung ausgetauscht werden sollte muss eine geeignete Kabel- und Leitungseinführungen mit einer zusätzlichen Dichtung oder einem zusätzlichen Dichtungsmittel verwendet werden.

6 Montage

Vor der Verwendung des Ex- Gerätes muss eine Sichtprüfung auf Transportschäden erfolgen.
Die Verwendung eines beschädigten Ex-Gerätes ist nicht zulässig.

Das Ex-Gerät muss entsprechend der vorgegebenen Einbaulage fest montiert und betrieben werden.

Die Transportmittel und Hebezeuge sind so auszuwählen, dass die Heizelemente bei Transport und Einbau nicht verbogen oder beschädigt werden können.

Das Ex-Gerät darf nur an geeigneten Konstruktionen befestigt werden, die auf das Gewicht des Ex-Gerätes ausgelegt sind. Zum Heben und zum Einbau des Ex-Gerätes dürfen nur Transportmittel und Werkzeuge, die für die Belastung geeignet sind, eingesetzt werden
Zum Heben dürfen nur Lastaufnahmemittel verwendet werden, die ausreichend dimensioniert sind und keine Beschädigungen aufweisen.
Es ist genügend Freiraum einzuplanen, damit ein späterer Ausbau des Ex-Gerätes möglich ist. Die Längenausdehnung bei der Aufheizung ist zu berücksichtigen.
Es sind geeignete Dichtungen, Schrauben und Muttern zu verwenden. Das Ex-Gerät ist langsam und bei gleichzeitigem Ausrichten in die endgültige Montageposition zu bringen.

Montagehinweis:

- Verwenden Sie einen geeigneter Maulschlüssel.
- Setzen sie den Maulschlüssel nur am Sechskant des Gewindeflansches an.
  Auf keinen Fall darf die Kraft über den Anschlusskopf eingeleitet werden.
- Das Gewinde muss in einwandfreiem Zustand sein.
- Schrauben sie den Gewindeflansch fest ein.
- Nachziehen nach dem ersten Aufheizen (falls notwendig).

Das Ex-Gerät ist fest zu montieren.

7 Installation

Die im Weiteren beschriebenen Tätigkeiten dürfen nur durch eine Elektrofachkraft durchgeführt werden.
Für die Installation und Errichtung sind die Bestimmungen EN 60079-14 (VDE 0165 Teil 1) zu beachten. Sie darf nur von Personen die mit dem **Explosionsschutz** vertraut sind bzw. von entsprechend unterwiesenen Fachkräften durchgeführt werden. Hierüber ist vom Errichter eine Installationsbescheinigung auszustellen.

In TT- oder TN-Systemen muss eine Fehlerstrom-Schutzeinrichtung (RCD) verwendet werden, deren Bemessungs-Ansprech-Fehlerstrom 100 mA nicht überschreitet.
Fehlerstrom-Schutzeinrichtungen mit einem Bemessungs-Ansprech-Fehlerstrom von 30 mA sind vorzuziehen.
In IT-Systemen ist eine Isolations-Überwachungseinrichtung zu verwenden, die die Einspeisung abschaltet, sobald der Isolationswiderstand nicht größer 50 Ohm je Volt der Bemessungsspannung ist.

- Die Anschlussspannung muss mit der auf dem Typenschild angegebenen Spannung übereinstimmen.
- Die am Einsatzort geforderte Temperaturklasse muss mit der Angabe der Temperaturklasse auf dem Typenschild übereinstimmen.
- Bei der Auswahl der Anschlussquerschnitte, Belastungen, Absicherung usw. sind die einschlägigen Bestimmungen zu beachten. (s. u.a. VDE 0100, VDE 0298-4)

Elektrischer Anschluss

Ein direkter Anschluss von Aluminiumleitern an die Anschlussklemmen ist nicht zulässig.
Die Anschlussleitung muss einen Mindestquerschnitt von 1,5 mm² haben.
Die Anschlussleitung muss für erhöhte Temperaturen (Isolierstofftemperatur mindestens 85°C) geeignet sein.

1. Die 4 Deckelschrauben lösen.
2. Den Deckel des Anschlusskastens abnehmen.
3. Die Kabel durch die Kabelverschraubungen in den Anschlusskasten einführen.
4. Die Mutter der Kabelverschraubung fest anziehen, um die Zugentlastung und Schutzart sicherzustellen. (Kabel und Verschraubungen müssen aufeinander abgestimmt sein, so dass die geforderte Schutzart sichergestellt wird.)
5. Kabel gemäß Schaltplan an die Ex-Anschlussklemmen anschließen
6. Schutzleiterklemmen anschließen.
7. Schutzleiterverbindung herstellen.
8. Äußere PA-Verbindung herstellen.
9. Anschlüsse auf festen Sitz prüfen.
10. Deckel des Anschlusskastens wieder aufsetzen
11. Die 4 Deckelschrauben fest anziehen. (ca. 2Nm)

8 Inbetriebnahme

Wichtige Hinweise:

Die Temperaturklasse wird vom Hersteller festgelegt. Die örtlichen und betrieblichen Verhältnisse sind vorzugeben.
Die Inbetriebnahme ist nur zulässig, wenn das Ex-Gerät entsprechend den im Kapitel ERRICHTUNGSHINWEISE angegebenen Vorgaben eingebaut wurde. Die geforderten Sicherheitseinrichtungen (Temperaturbegrenzer und Niveauüberwachung) müssen korrekt eingebaut, eingestellt und funktionsfähig sein.

1. Vor dem Einschalten sicherstellen, dass die Temperaturüberwachungen angeschlossen sind.
2. Vor dem Einschalten sicherstellen, dass die Anschlusshaube ordnungsgemäß verschlossen ist.
3. Vor dem Einschalten sicherstellen, dass das Ex-Gerät mit dem zu erwärmenden Medium gefüllt ist, bzw. dass er vom Medium ausreichend überdeckt wird.

9 Beheben von Störungen

Die im Weiteren beschriebenen Tätigkeiten dürfen nur durch eine Elektrofachkraft, die mit dem Explosionsschutz vertraut ist, durchgeführt werden.

- Elektrische Absicherung außerhalb des Ex-Bereiches kontrollieren.
- Feuererlaubnis einholen, wenn vor Ort zu Messzwecken die Anschlusshaube geöffnet werden muss.

Störung: Ex-Gerät wird nicht warm

Behebung:
- Sicherungen kontrollieren
- Spannung kontrollieren
- Steuerung kontrollieren
- Die bauseitige Temperaturregelung ist auf eine zu niedrige Temperatur eingestellt
  → Regelung richtig einstellen.
- Der Temperaturbegrenzer hat das Gerät abgeschaltet.
  → Ursache ermitteln, Fehler beseitigen, Begrenzer zurücksetzen.

- Das Ex-Gerät nach Fehlerbeseitigung erneut in Betrieb nehmen.

10 Reparatur

Reparaturen dürfen nur nach schriftlicher Freigabe durch die Schniewindt GmbH & Co. KG durchgeführt werden.

Es dürfen nur vom Hersteller (Schniewindt GmbH & Co. KG) zugelassene Ersatzteile verwendet werden.

Eine Reparatur an den zünddurchschlagsicheren Spalten darf nur durch den Hersteller erfolgen. Die Reparatur von zünddurchschlagssicheren Spalten entsprechend den Werten der Tabelle 3 der IEC 60079-1:2014 ist nicht zulässig.

11 Instandhaltung und Wartung

Überprüfen sie die Sicherheitsvorrichtung (Temperaturbegrenzer, Niveauüberwachung), entsprechend den einschlägigen Bestimmungen auf Funktion. **Eine jährliche Überprüfung wird empfohlen. In Abhängigkeit vom Einsatz und Umgebung auch in einem kürzeren Intervall.** Um den Forderungen des Ex-Schutzes zu genügen, muss das Ex-Gerät verschlossen bleiben.

Das Ex-Gerät sollte jährlich einer visuellen Prüfung unterzogen werden. Wir empfehlen, die im Weiteren genannten Prüfungen und Kontrollen anfangs in kleinen Intervallen zu prüfen.

Für den einwandfreien Betrieb ist das Ex-Gerät auf folgende Sachverhalte zu untersuchen:

- ✓ Isolationswerte messen
- ✓ Widerstandswerte (Ω) messen
- ✓ Temperaturregler und / oder –begrenzer auf Funktion überprüfen, durchmessen
- ✓ Sichtkontrolle auf Beschädigungen
- ✓ Sichtkontrolle auf Ablagerungen oder Verkrustungen auf der Heizelementen
- ✓ Sichtkontrolle auf Dichtigkeit
- ✓ Sichtkontrolle des elektrischen Anschlussraumes (Feuchtigkeit, Rost, .. verringern die Isolationswerte und müssen entfernt werden.)

Ablagerungen oder Verkrustungen auf den Heizelementen können das Ex-Gerät zerstören und müssen entfernt werden.
Die Reinigung muss sorgfältig durchgeführt werden, damit die Oberfläche nicht beschädigt wird.

Führen sie eine jährliche Funktionsprüfung der Sicherheitsvorrichtungen durch.
In Abhängigkeit vom Einsatz und Umgebung auch in einem kürzeren Intervall.

12 Demontage

- Anlage nur demontieren, wenn keine Explosionsgefahr besteht. (Feuererlaubnis)
- Anlage abschalten und gegen unbeabsichtigtes Einschalten sichern.
- Ex-Gerät auf Raumtemperatur abkühlen lassen.
- Anschlussleitung abschließen und entfernen.

13 Lagerung

Der Lagerraum muss trocken und staubfrei sein.
Stellen Sie sicher, dass die Lagertemperaturen zwischen -40°C und +40°C liegen.
Vor dem Einlagern muss sichergestellt sein, dass beim Transport oder bei einer Zwischenlagerung keine Feuchtigkeit in den Anschlussraum eingedrungen ist.
Alle Öffnungen müssen dicht verschlossen werden, um ein Eindringen von Staub/Feuchtigkeit zu verhindern.
Der Anschlussraum muss dicht verschlossen sein, die Leitungseinführungen müssen ggf. mit Blindstopfen versehen werden.

Geben sie ein Trocknungsmittel in den Anschlussraum, um vorhandene Feuchtigkeit aufzunehmen.
Verwenden sie nur chemisch indifferente Trockenmittel (z.B. Silikagel).
Wechseln sie das Trockenmittel in den vorgeschriebenen Abständen. Beachten sie die Hinweise des Trockenmittel-Herstellers.

Bei der Lagerung über einen längeren Zeitraum (mehrere Monate) ist systembedingt damit zu rechnen, dass der Isolationswiderstand sinkt.
Das Ex-Gerät darf erst in Betrieb genommen werden, wenn sichergestellt ist, dass der Isolationswiderstand, in Anlehnung an die Norm DIN 44874, Teil 1, Abs. 5.3, größer ist

$$\mathbf{Riso} \geq \frac{\mathbf{2\ M\Omega}}{\textbf{Anzahl der eingebauten Rohrheizkörper}}$$

Gemessen im kalten Zustand mit 500V Gleichspannung.

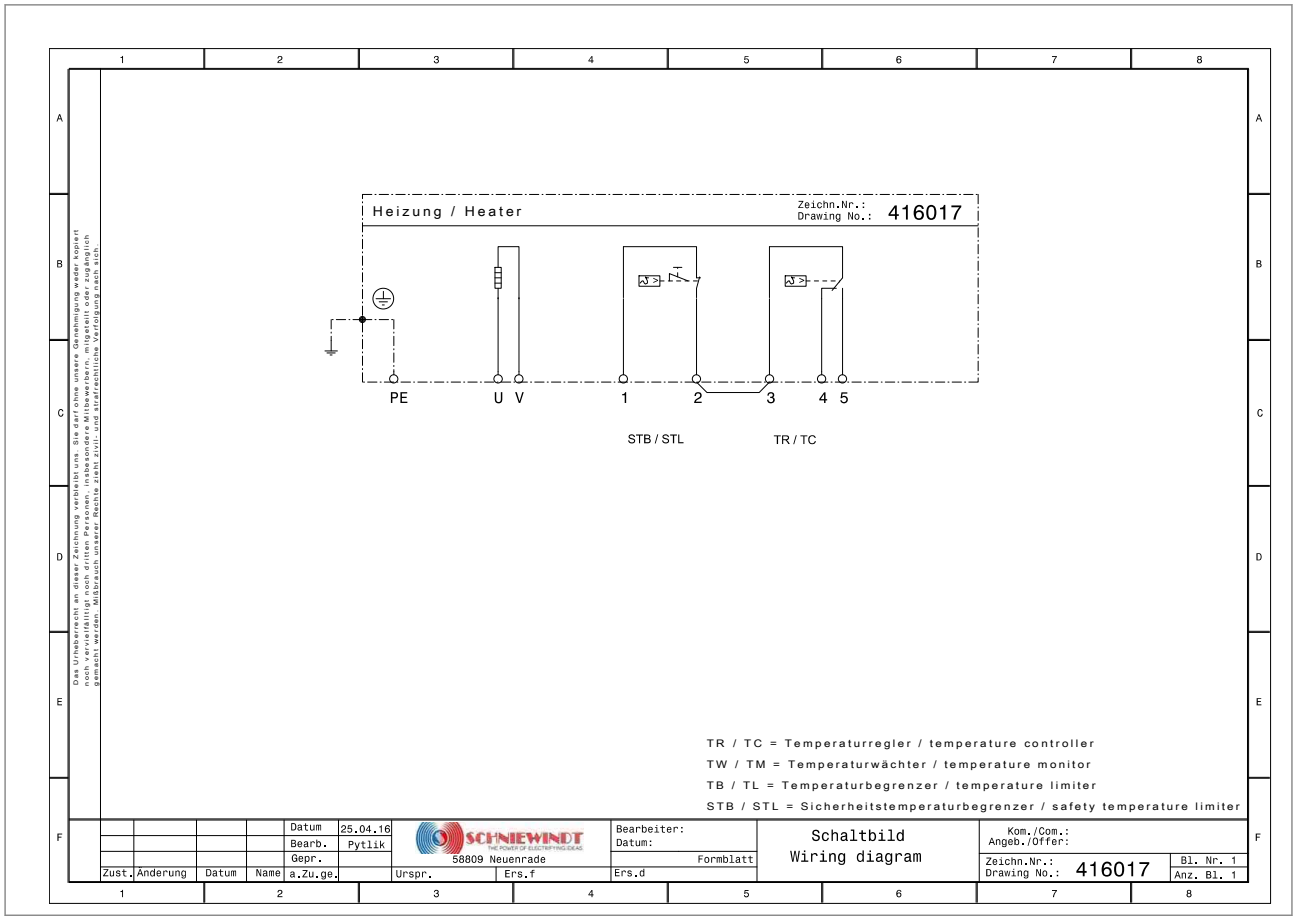
14 Entsorgung

- Problematische Ablagerungen gemäß den örtlich geltenden Vorschriften entfernen.
- Das Ex-Gerät gemäß den örtlich geltenden Vorschriften entsorgen.
- Metalle und Kunststoffe sortenrein zur Wiederverwertung oder Verschrottung geben.

15 Normen

Die angewandten Normen sind der beigefügten Konformitätserklärung zu entnehmen. Das Gerät wird in Übereinstimmung mit folgenden internationalen Normen gefertigt:

⇒	EN 60079-0	: Allgemeine Anforderungen
⇒	EN 60079-1	: Druckfeste Kapselung „d“
⇒	EN 60079-7	: Erhöhte Sicherheit „e“
⇒	EN 60079-31	: Schutz durch Gehäuse „t“


Heizung / Heater
Zeichn.Nr.:
Drawing No.: 416017
PE
U V
1
2
3
4 5
STB / STL
TR / TC
TR / TC = Temperaturregler / temperature controller
TW / TM = Temperaturwächter / temperature monitor
TB / TL = Temperaturbegrenzer / temperature limiter
STB / STL = Sicherheitstemperaturbegrenzer / safety temperature limiter
Datum 25.04.16
Bearb. Pytlik
Gepr.
Zust. Änderung Datum Name
a.Zu.ge.
SCHNIEWINDT
58809 Neuenrade
Urspr. Ers.f
Bearbeiter:
Datum:
Formblatt
Ers.d
Schaltbild
Wiring diagram
Kom./Com.:
Angeb./Offer:
Zeichn.Nr.:
Drawing No.: 416017
Bl. Nr. 1
Anz. Bl. 1

SCHNIEWINDT
THE POWER OF ELECTRIFYING IDEAS

EU-Konformitätserklärung / EU declaration of conformity

Wir/ We **Schniewindt GmbH & Co. KG**
Schöntaler Weg 46, 58809 Neuenrade

erklären in alleiniger Verantwortung, dass das Produkt /
hereby declare in sole responsibility that the product

CSN® Ex Heizkörper / CSN® Ex Heater
95**/**-Exde* ***T*/T***°C

Kennzeichnung/ marking: Ex II 2G Ex db eb IIC T. und / and optional
Ex II 2D Ex tb IIIC T…°C

auf das sich diese Erklärung bezieht, den Bestimmungen der folgenden Richtlinie entspricht /
to which this declaration relates is in accordance with the provisions of the following directive

2014/34/EU **„ATEX- Richtlinie“ / „ATEX- Directive“**
2014/30/EU **„EMV- Richtlinie“ / „EMC- Directive“**

Angewandte harmonisierte Normen / Applied harmonised standards:

EN60079-0:2012+A11:2013	EN60079-1:2014
EN60079-7:2015	und / and optional EN60079-31:2014
EN61000-6-2:2005/AC:2005	EN61000-6-4:2007+A1:2011

EU-Baumusterprüfbescheinigung nach Anh. III/EC type examination certificate according to Ann. III
BVS 15 ATEX E 143 X der / from
DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Kennnummer / identification number: 0158

Produktionsüberwachung nach Anhang VII/Production surveillance according to Annex VII:
BVS 15 ATEX ZQS/E401 der / from
DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Kennnummer / identification number: 0158

Neuenrade, den 12.11.2018

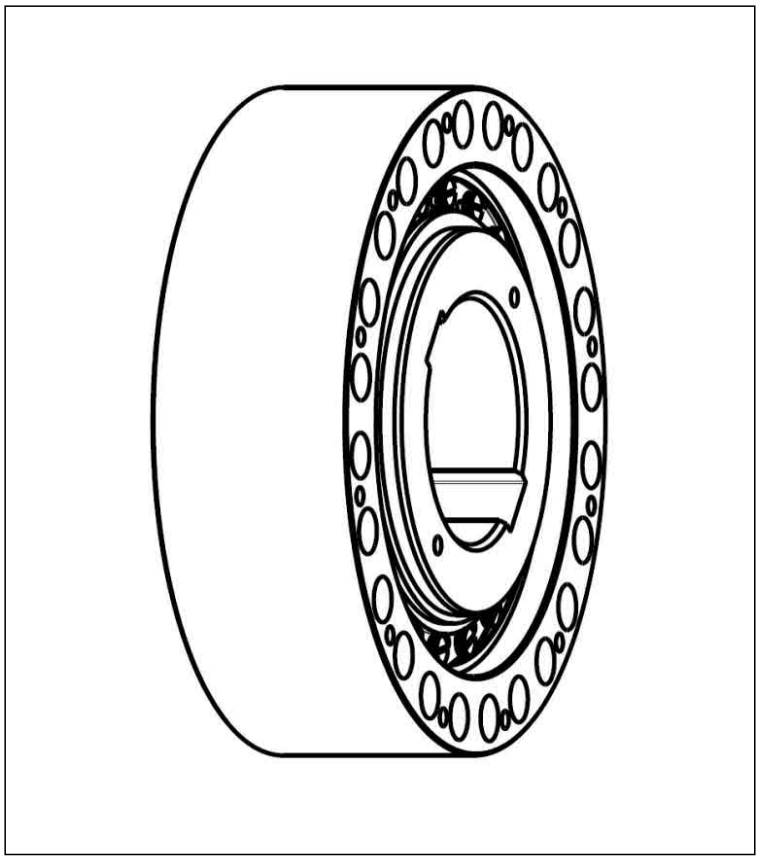
Dr. Karl Kaluza

Leiter des Qualitätsmanagements/
Head of Quality Management

9_KE95Exdet_I_EXAM

CE Erklärungen 26.10.2018.xlsm

Montage - und Wartungsanleitung
Typen FC5045



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Altra Industrial Motion

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Ausgabedatum: 30.04.2019 GB
Revision: 0
U:\EngUsers\!ProduktDoku\1AAA_Einbauerklaerung_Wartungsanleitung_Konformitaetserklaerung\1AAA_Wartungsanleitungen\Orginal_Worddatei\M1260D_0_FC5045.docx

Allgemeine Sicherheitshinweise

⚠	**WARNUNG**	**Verletzungsgefahr durch bewegte Bauteile!** Angetriebene, rotierende Bauteile können schwerste Verletzungen verursachen! Deshalb während des Betriebes: ➢ Aufenthalt von Personen im Gefahrenbereich oder in seiner unmittelbaren Umgebung ist strengstens untersagt! ➢ Sicherheitsvorrichtungen und/oder –funktionen nicht außer Betrieb setzen, nicht unbrauchbar machen oder umgehen Vor Betreten des Gefahrenbereiches: ➢ Energieversorgung ausschalten und gegen Wiedereinschalten sichern ➢ Stillstand nachlaufender Bauteile abwarten

⚠	**GEFAHR!**	**Gefahr durch unsachgemäßen Betrieb!** ➢ Umbauten an der Freilaufkupplung sind nicht zulässig und können die Sicherheit beeinträchtigen ➢ Alle Arbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden ➢ Reparatur- und Wartungsarbeiten dürfen nur bei Stillstand der Maschine ausgeführt werden. Die Maschine ist hierzu gegen Wiederanfahren zu sichern!

⚠	**WARNUNG**	**Verletzungsgefahr durch fehlerhafte Montage!** Fehlerhafte Montage und Wartung kann zu Sach- und schweren Personenschäden führen! Montage-, Wartungs- und Reparaturarbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden!

⚠	**WARNUNG**	**Verletzungsgefahr bei unzureichender Qualifikation!** Unsachgemäßer Umgang kann zu erheblichen Personen- und Sachschäden führen. Deshalb: ➢ Jegliche Tätigkeiten immer nur durch die dafür benannten Personen durchführen lassen

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1 Allgemeines

1.1 Informationen zur Montage- und Wartungsanleitung

Diese Montage- und Wartungsanleitung gibt wichtige Hinweise zum Einbau und zur Inbetriebnahme des Freilaufes.

Voraussetzung für sicheres Arbeiten ist die Einhaltung aller angegebenen Sicherheits- und Handlungsanweisungen.

Darüber hinaus sind die für den Einsatzbereich der Freilaufkupplung geltenden örtlichen Unfallverhütungsvorschriften und allgemeinen Sicherheitsbestimmungen einzuhalten.

Die Montage- und Wartungsanleitung vor dem Einbau und der Inbetriebnahme sorgfältig durchlesen! Sie ist Produktbestandteil und muss in unmittelbarer Nähe des Einbauortes für das Personal jederzeit zugänglich aufbewahrt werden. Zusätzlich sind alle Sicherheitshinweise der Montage- und Wartungsanleitung zu beachten.

1.2 Symbolerklärung

Warnhinweise sind in dieser Montage- und Wartungsanleitung durch Symbole gekennzeichnet. Die Hinweise werden durch Signalworte eingeleitet, die das Ausmaß der Gefährdung zum Ausdruck bringen. Die Hinweise unbedingt einhalten und umsichtig handeln, um Unfälle, Personen- und Sachschäden zu vermeiden.

	GEFAHR!	… weist auf eine unmittelbar gefährliche Situation hin, die zum Tod oder zu schweren Verletzungen führt, wenn sie nicht gemieden wird.
	WARNUNG	… weist auf eine möglicherweise gefährliche Situation hin, die zum Tod oder zu schweren Verletzungen führen kann, wenn sie nicht gemieden wird.
	ACHTUNG	… weist auf eine möglicherweise gefährliche Situation hin, die zu geringfügigen oder leichten Verletzungen führen kann, wenn sie nicht gemieden wird.
	VORSICHT	… weist auf eine möglicherweise gefährliche Situation hin, die zu Sachschäden führen kann, wenn sie nicht gemieden wird.
	HINWEIS	… hebt nützliche Tipps und Empfehlungen sowie Informationen für einen effizienten und störungsfreien Betrieb hervor.

1.3 Hersteller

STIEBER GmbH, D-69126 Heidelberg, Hatschekstr. 36, Deutschland
Tel +49 (0) 6221 3047-0, Fax -31

1.4 Beschriftung

Stirnseite des Außenringes

- Herstellername
- Typenbezeichnung
- Herstelldatum (codiert)

1.5 Umweltschutz

Energie: Der Freilauf verbraucht keine elektrische Energie.

Materialien: Stahl

Recycling: Stahlteile sind zu 100% wiederverwertbar.

2 Sicherheit

2.1 Bestimmungsgemäße Verwendung

Freilaufkupplungen des Typs FC5045 sind drehrichtungsabhängig selbsttätig schaltende Kupplungen. Sie übertragen das Drehmoment kraftschlüssig. Sie können als Überholkupplungen und als Rücklaufsperren in Maschinen und Anlagen eingesetzt werden.

Mitnahmebetrieb einer Überholkupplung:

Bei Betrieb der antreibenden Maschinenelemente in Mitnahmerichtung werden das antreibende Maschinenelement und das angetriebene Maschinenelement durch die Überholkupplung kraftschlüssig miteinander verbunden. In diesem Betriebszustand kann eine Leistung übertragen werden.

Überholbetrieb einer Überholkupplung:

Die Überholkupplung löst die kraftschlüssige Verbindung vom antreibenden Maschinenelement und angetriebenem Maschinenelement automatisch, wenn das angetriebene Maschinenelement eine höhere Drehzahl als das antreibende Maschinenelement aufweist. Ist das angetriebene Maschinenelement mit dem Innenring des Freilaufs verbunden, wird ab einer definierten Drehzahl der kontaktfreie Betrieb gewährleistet, sodass ab dieser Drehzahl die Verschleißfreiheit aller funktionsrelevanten Bauteile garantiert ist.

Sperrbetrieb einer Rücklaufsperre:

Bei Betrieb der Maschinenwelle in Sperrrichtung werden die Maschinenwelle und das drehmomentabstützende Maschinenelement durch die Rücklaufsperre kraftschlüssig miteinander verbunden. In diesem Betriebszustand wird ein Drehmoment übertragen werden.

Überholbetrieb einer Rücklaufsperre:

Die Rücklaufsperre löst die kraftschlüssige Verbindung von Maschinenwelle und drehmomentabstützendem Maschinenelement automatisch, wenn die Maschinenwelle in Überholrichtung betrieben wird. Dabei wird ab einer definierten Drehzahl der Maschinenwelle der kontaktfreie Betrieb innerhalb der Rücklaufsperre gewährleistet, sodass ab dieser Drehzahl die Verschleißfreiheit aller funktionsrelevanten Bauteile garantiert ist.

2.2 Verantwortung des Betreibers

Der Betreiber der Maschine, in welche die Freilaufkupplung eingebaut ist, unterliegt den gesetzlichen Pflichten zur Arbeitssicherheit.

Die am Einsatzort geltenden Bestimmungen sowie die Sicherheits- und Unfallverhütungsvorschriften der Berufsgenossenschaft sind zu beachten. Insbesondere gilt, dass der Betreiber:

- sich über die geltenden Arbeitsschutzbestimmungen informiert
- in Betriebsanweisungen die notwendigen Verhaltensanforderungen für den Betrieb der Maschine, in welche die Freilaufkupplung eingebaut ist, am Einsatzort umsetzt
- die Zuständigkeiten für die Installation, Bedienung, Wartung und Reinigung der Maschine, in welche die Freilaufkupplung eingebaut ist, eindeutig regelt
- dafür sorgt, dass alle Mitarbeiter, die am oder mit der Maschine, in welche die Freilaufkupplung eingebaut ist, beschäftigt sind, die Betriebsanleitung gelesen und verstanden haben. Darüber hinaus muss er das Personal in regelmäßigen Abständen im Umgang mit der Maschine schulen, in welche die Freilaufkupplung eingebaut ist und über die möglichen Gefahren informieren. Weiterhin ist der Betreiber verantwortlich, dass die Maschine, in welche die Freilaufkupplung eingebaut ist:
    - stets in technisch einwandfreiem Zustand ist
    - gemäß angegebener Wartungsintervalle instandgehalten wird
    - alle Sicherheitseinrichtungen regelmäßig auf Vollständigkeit und Funktionsfähigkeit überprüft werden

2.3 Montage- und Wartungspersonal

⚠	**WARNUNG**	**Verletzungsgefahr bei unzureichender Qualifikation!** Unsachgemäßer Umgang kann zu erheblichen Personen- und Sachschäden führen. Deshalb: ➢ Jegliche Tätigkeiten immer nur durch die dafür benannten Personen durchführen lassen

Ausgebildete Fachkräfte sind Personen, die auf Grund ihrer Ausbildung, Erfahrung und Unterweisung sowie ihrer Kenntnisse über einschlägige Normen, Bestimmungen, Unfallverhütungsvorschriften und Betriebsverhältnisse von dem für die Sicherheit der Anlage

Verantwortlichen berechtigt worden sind, die jeweils erforderlichen Tätigkeiten auszuführen und dabei mögliche Gefahren erkennen und vermeiden können. Unter anderem sind auch Kenntnisse über Erste-Hilfe-Maßnahmen und die örtlichen Rettungseinrichtungen erforderlich.

2.4 Persönliche Schutzausrüstung

Beim Umgang mit der Maschine, in welche die Freilaufkupplung eingebaut ist, ist das Tragen persönlicher Schutzausrüstung erforderlich, um Gesundheitsgefahren zu minimieren.

Vor allen Arbeiten ist die notwendige Schutzausrüstung wie Arbeitsschuhe, Handschuhe, Schutzbrille, etc. ordnungsgemäß anzulegen und während der Arbeit zu tragen.

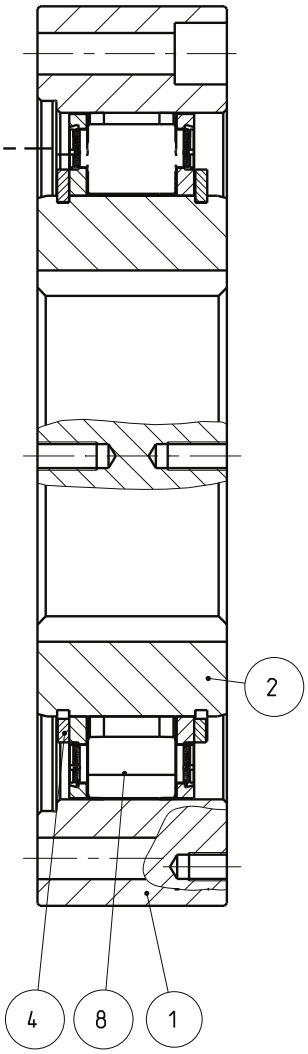
2.5 Einsatzgrenzen

Typ FC5045	Bohrung [mm]	max. Dreh-moment [Nm	Überholdrehzahl [min-1]		zulässige Rundlauf-abweichung Außenring zur Welle [mm	Planlauf Außenring-aufnahme zur Welle [mm]	Anzahl/ Größe Befesti-gungs-schrauben
			min.	max.			
	140	76000	330	1600	0,6	0,15	24xM16

- Grenzen Umgebungstemperatur: –20°C bis +80°C
- maximale Betriebstemperatur: 90°C
- Überholbewegung: Maschinenwelle (Innenring)
- erforderliche Toleranz Maschinenwelle: Ø h6 oder j6
- erforderliche Toleranz Außenringzentrierung (Innen-Ø): Ø h6 oder g6
- Öl-Schmierung: freigegebene Öle laut Stieber Produktkatalog / WN900
- Fett-Schmierung: freigegebene Fette laut Stieber Produktkatalog / WN900

3 Aufbau und Funktion

3.1 Aufbau



Pos. 1	Außenring
Pos. 2	Innenring
Pos. 4	Sicherungsring
Pos. 8	Käfig

Abb.1a Aufbau

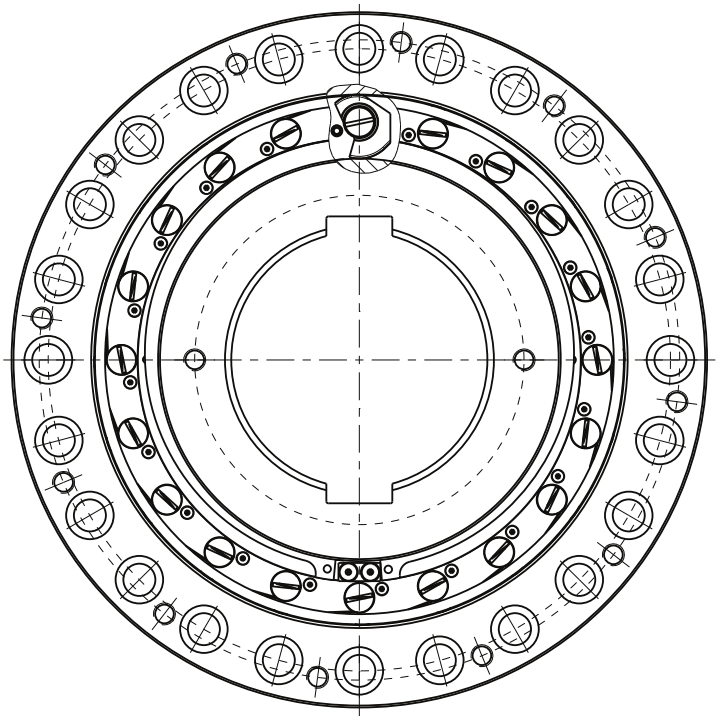


Abb.1b Aufbau

3.2 Funktionsweise

Bei der Drehmomentübertragung über die Freilaufkupplung werden der Außenring (1) und der Innenring (2) kraftschlüssig gekoppelt. Dazu werden Klemmkörper verwendet, deren äußere Kontur die kraftschlüssige Kopplung realisiert. Die Klemmkörper sind in einem Käfig integriert und werden durch Federn in den Kontakt zum Außen- und Innenring gepresst. Die Federn sorgen für ein schnelles Ansprechverhalten der Freilaufkupplung zum Beginn der Drehmomentübertragung.

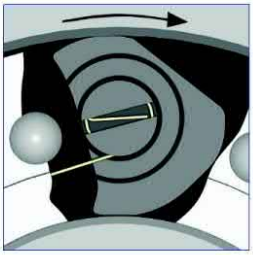


Abb.2 Drehmomentübertragung

Im Überholbetrieb, oberhalb der min. zulässigen Überholdrehzahl, bewirkt die Zentrifugalkraft in Verbindung mit der Klemmkörpergeometrie ein rückstellendes Drehmoment, welches die Klemmkörper gegen die Federkraft verdreht. Auf diese Weise wird eine berührungsfreie Position realisiert, sodass der verschleißfreie Betrieb der Freilaufkupplung bewerkstelligt werden kann. Die minimal zulässige Überholdrehzahl darf nur kurzzeitig während der Start- oder Abschaltphase der Maschine unterschritten werden, da ansonsten die verschleißbedingte Beschädigung der Kontaktpartner zum Ausfall der Freilaufkupplung führen kann.

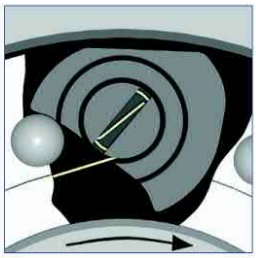


Abb.3 berührungsfreie Position

4 Transport und Verpackung

⚠	**WARNUNG**	**Verletzungsgefahr durch Herunterfallen oder Umkippen der Freilaufkupplung!** Das Gewicht der Freilaufkupplung kann einen Menschen verletzen und schwere Quetschungen verursachen! Deshalb: ➢ Benutzen Sie eine Palette auf der die Freilaufkupplung mit einem Stapler bewegt werden kann ➢ Verwenden Sie geeignetes Hebezeug (Schlingen, etc.), das für das Gewicht der Freilaufkupplung ausgelegt ist

	HINWEIS	Zur Entsorgung der Transport- und Verpackungsmaterialien sind die lokalen Entsorgungsbestimmungen zu beachten!

Die Freilaufkupplungen des Typs FC5045 sind in einer VCI-Luftpolsterfolie verpackt. Die Freilaufkupplung wird in einem Karton auf einer Palette verschickt.

Die Freilaufkupplung wird mit einer Transportsicherung montiert mitgeliefert (siehe Abb. 4), welche das Auseinanderfallen der Freilaufkomponenten verhindert.

Transportschäden an der Verpackung und / oder der Freilaufkupplung sind unverzüglich bei der jeweiligen Transitgesellschaft zu melden!

Das Auspacken der Freilaufkupplung muss in sauberer und trockener Umgebung erfolgen!

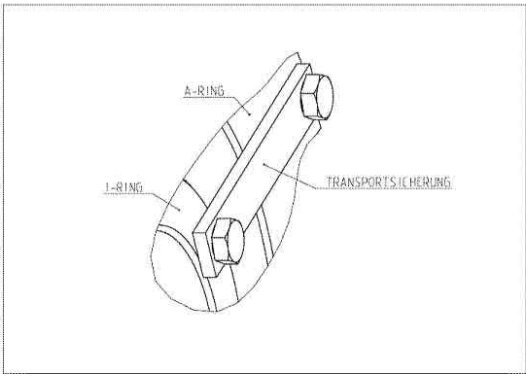


Abb. 4: Transportsicherung

5 Lagerung

5.1 Kurzzeitlagerung

Die Rücklaufsperre des Typs FC5045 ist in einer VCI-Luftpolsterfolie verpackt. Die VCI-Luftpolsterfolie ist in regelmäßigen Abständen zu überprüfen. Die Häufigkeit richtet sich nach den Umweltbedingungen (Temperatur, Feuchtigkeit, Salzgehalt der Luft, ...) am Lagerungsort.

Die maximale Lagerungszeit (Kurzzeitlagerung) beträgt 6 Monate. Darüber hinaus muss die Rücklaufsperre mit einem Langzeitlagerung-Korrosionsschutz versehen werden.

Packstücke unter folgenden Bedingungen lagern:

- Nicht im Freien aufbewahren
- Trocken und staubfrei lagern
- Keinen aggressiven Medien aussetzen

- Vor Sonneneinstrahlung schützen
- Mechanische Erschütterungen vermeiden
- Lagertemperatur: −10 bis +60 °C
- Relative Luftfeuchtigkeit: max. 95%, nicht kondensierend

5.2 Langzeitlagerung

Dazu muss die Freilaufkupplung zusammen mit Trockenmittel in eine Folie eingeschweißt und mit einem Feuchtigkeitsanzeiger versehen werden. Nach spätestens einem Jahr oder aber in Abhängigkeit von den Umweltbedingungen (Temperatur, Feuchtigkeit, Salzgehalt der Luft, ...) am Lagerungsort, muss der Korrosionsschutz überprüft werden.

Packstücke unter folgenden Bedingungen lagern:

- Nicht im Freien aufbewahren
- Trocken und staubfrei lagern
- Keinen aggressiven Medien aussetzen
- Vor Sonneneinstrahlung schützen
- Mechanische Erschütterungen vermeiden
- Lagertemperatur: −10 bis +60 °C
- Relative Luftfeuchtigkeit: max. 95%, nicht kondensieren

6 Installation

6.1 Prüfen der Drehrichtung

⚠	**WARNUNG**	**Verletzungsgefahr durch fehlerhafte Montage!** Fehlerhafte Montage und Wartung kann zu Sach- und schweren Personenschäden führen! Montage-, Wartungs- und Reparaturarbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden!

⚠	**WARNUNG**	**Verletzungsgefahr durch bewegte Bauteile!** Angetriebene, rotierende Bauteile können schwerste Verletzungen verursachen! Deshalb während des Betriebes: ➢ Aufenthalt von Personen im Gefahrenbereich oder in seiner unmittelbaren Umgebung ist strengstens untersagt! ➢ Sicherheitsvorrichtungen und/oder –funktionen nicht außer Betrieb setzen, nicht unbrauchbar machen oder umgehen Vor Betreten des Gefahrenbereiches: ➢ Energieversorgung ausschalten und gegen Wiedereinschalten sichern ➢ Stillstand nachlaufender Bauteile abwarten

M1260D_0	Montage- und Wartungsanleitung	Stieber Altra Industrial Motion

!	**VORSICHT**	**Verletzungsgefahr durch herabfallende Bauteile!** Bei demontierter Transportsicherung kann der Außenring oder Innenring herabfallen. Außenring und Innenring axial fixieren.

Die Leerlauf-Drehrichtung ist durch FREE auf dem Käfig (8) gekennzeichnet. Ein Drehrichtungswechsel ist durch Umdrehen des Innenrings samt Käfig zu erreichen.

Arbeitsschritte:

- Freilaufkupplung mit FREE nach OBEN auf Montagetisch ablegen
- Transportsicherung entfernen
- Innenring (2) inklusive Käfig (8) aus dem Außenring (1) heben, dazu geeignete Hebemittel an Hebegewinde des Innenringes anbringen
- Innenring inklusive Käfig (8) mit FREE nach UNTEN auf Montagetisch ablegen
- die Klemmkörper des Freilaufkäfigs mit einer Montagehilfe (O-Ring/ Kabelbinder) in Abhebestellung fixieren (siehe Abb. 5 und 6)

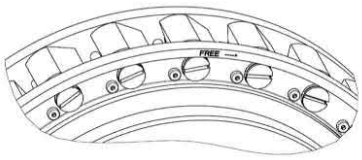


Abb. 5: Klemmkörper in „Eingriff“

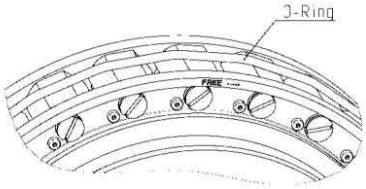


Abb. 6: Klemmkörper „abgehoben“

- Innenring (2) mit Käfig (8) in Außenring (1) einsetzen bis die Hälfte des Klemmkörpers verdeckt wird

i	**HINWEIS**	Die Montagehilfe (O-Ring/ Kabelbinder) muss nach der Montage vollständig entfernt werden! Bei Nichtbeachtung kann dies zu einer Funktionsbeeinträchtigung bis hin zum Ausfall führen.

- Montagehilfe (O-Ring/ Kabelbinder) entfernen und den Innenring inkl. Käfig vollständig absenken
- Überprüfen der Überholbewegung. Die Freilaufkupplung muss in Überholdrehrichtung leichtgängig zu verdrehen sein
- Transportsicherung montieren

6.2 Schmierung

Die Freilaufkupplungen FC5045 benötigen im Überholbetrieb oberhalb der Abhebedrehzahl keine Schmierung, da sie berührungslos arbeiten.

Ebenso wird im Sperrbetrieb keine Schmierung benötigt, da nur eine geringe Wälzbewegung der Klemmkörper stattfindet.

Eine zusätzliche Schmierung ist erforderlich, falls die Rücklaufsperre für einen häufigen oder langanhaltenden Betrieb unterhalb der Abhebedrehzahl eingesetzt wird. Dabei ist ein dünner Schmierfettfilm vorgeschrieben, der die Klemmkörper und die Laufbahn vom Außenring benetzt. Bei diesen Betriebsverhältnissen ist die Lebensdauer begrenzt!

6.2.1 Betrieb bei Ölschmierung

Erfolgt der Einbau direkt in ein Getriebe, reicht ein Ölnebel zur Schmierung aus.

Bei einem häufigen oder langanhaltenden Betrieb unterhalb der Abhebedrehzahl ist eine Tauchschmierung oder eine Ölzuführung zwischen Käfig und Außenringlaufbahn erforderlich. Bei diesen Betriebsverhältnissen ist die Lebensdauer begrenzt! Das notwendige Ölvolumen bei Tauchschmierung hängt von der Umgebungskonstruktion ab. Der Ölstand soll eine maximale Höhe von 10 Millimeter auf dem Innendurchmesser des Außenringes nicht überschreiten.

6.2.2 Betrieb bei Fettschmierung

	HINWEIS	Eine Überfettung kann zur Fehlfunktion der Freilaufkupplung führen! Fettmenge beachten!

	HINWEIS	Ungeeignete Schmiermittel können die Freilauffunktion negativ beeinflussen! Nur Fette verwenden, die durch Firma Stieber freigegeben sind!

Schmierfette entsprechend Produktkatalog / WN900 auswählen.

Arbeitsschritte zum Befetten der Freilaufkupplung:

- Freilaufkupplung mit FREE nach OBEN auf Montagetisch ablegen
- Transportsicherung entfernen
- Innenring (2) inklusive Käfig (8) aus dem Außenring (1) heben, dazu geeignete Hebemittel an Hebegewinde des Innenringes anbringen
- Außenringlaufbahn mit einer Schichtstärke von ca. 1 mm einfetten
    - Fette der NLGI Klasse 000 bis 2 mit einer max. Grundölviskosität von 42 mm^2/s verwenden

- die restliche Fettmenge (siehe Kap.2.5) gleichmäßig auf der Innenringlaufbahn und dem Käfig verteilen
- die Klemmkörper des Freilaufkäfigs mit einem O-Ring/ Kabelbinder als Montagehilfe in Abhebestellung fixieren (siehe Abbildung 5 und 6)
- Innenring (2) mit Käfig (8) in Außenring (1) einsetzen bis die Hälfte des Klemmkörpers verdeckt wird
- Montagehilfe (O-Ring/ Kabelbinder) entfernen und den Innenring inkl. Käfig vollständig absenken

	HINWEIS	Die Montagehilfe (O-Ring/ Kabelbinder) muss nach der Montage vollständig entfernt werden! Bei Nichtbeachtung kann dies zu einer Funktionsbeeinträchtigung bis hin zum Ausfall führen.

- Überprüfen der Überholbewegung. Die Freilaufkupplung muss in Überholdrehrichtung leichtgängig zu verdrehen sein.
- Transportsicherung montieren

6.2.3 Schutz vor Korrosionsschäden

Die Sperre muss vor Korrosionsschäden geschützt werden.

	HINWEIS	Blanke Flächen müssen mit geeignetem Korrosionsschutzmittel behandelt werden. Als Korrosionsschutzmittel sollen Fette der NLGI Klasse 000 bis 2 mit einer max. Grundölviskosität von 42 mm2/s verwendet werden!

6.3 Montage

	WARNUNG	**Verletzungsgefahr durch fehlerhafte Montage!** Fehlerhafte Montage und Wartung kann zu Sach- und schweren Personenschäden führen! Montage-, Wartungs- und Reparaturarbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden!

	WARNUNG	**Verletzungsgefahr durch bewegte Bauteile!** Angetriebene, rotierende Bauteile können schwerste Verletzungen verursachen! Deshalb während des Betriebes: ➢ Aufenthalt von Personen im Gefahrenbereich oder in seiner unmittelbaren Umgebung ist strengstens untersagt! ➢ Sicherheitsvorrichtungen und/oder –funktionen nicht außer Betrieb setzen, nicht unbrauchbar machen oder umgehen Vor Betreten des Gefahrenbereiches: ➢ Energieversorgung ausschalten und gegen Wiedereinschalten sichern ➢ Stillstand nachlaufender Bauteile abwarten

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!	**VORSICHT**	**Verletzungsgefahr durch herabfallende Bauteile!** Bei demontierter Transportsicherung kann der Außenring oder Innenring herabfallen. Außenring und Innenring axial fixieren.

Arbeitsschritte:

- Freilaufkupplung auf die geölte Maschinenwelle schieben, dazu ggf. geeignete Hebemittel an Hebegewinde des Innenringes anbringen
- Transportsicherung entfernen
- Freilaufkupplung auf der Maschinenwelle axial fixieren
- angetriebenes, bzw. drehmomentabstützendes Maschinenelement im Außenring zentrieren

i	**HINWEIS**	Die Schraubenqualität 12.9 darf nicht verwendet werden !

- angetriebenes, bzw. drehmomentabstützendes Maschinenelement mit entsprechenden Befestigungsschrauben (z. B. nach Norm DIN EN ISO 4762) und der Schraubenqualität 10.9 bzw. 8.8 fixieren, Anziehdrehmoment siehe Tab. Anzugsdrehmomente

Anziehdrehmoment [Nm]		
Größe	**8.8**	**10.9**
M16	206	290

Tab. Anzugsdrehmomente (nach VDI 2230 Blatt1, μ=0,12 metrisches Regelgewinde)

- Überprüfen der Überholbewegung

6.4 Einbaubeispiel

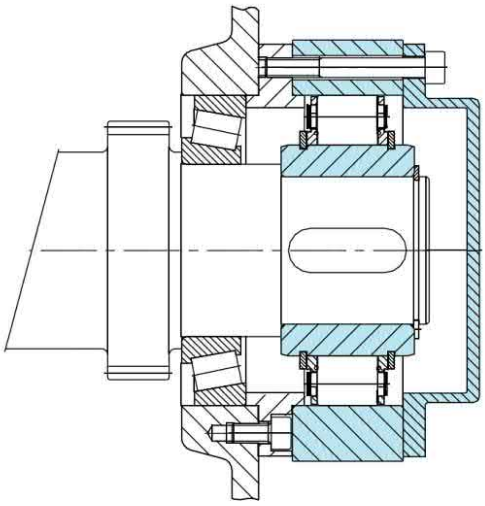


Abb. 7: Einbaubeispiel, Montage auf dem Wellenende

7 Wartung

⚠	**WARNUNG**	**Verletzungsgefahr durch fehlerhafte Montage!** Fehlerhafte Montage und Wartung kann zu Sach- und schweren Personenschäden führen! Montage-, Wartungs- und Reparaturarbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden!

⚠	**WARNUNG**	**Verletzungsgefahr durch bewegte Bauteile!** Angetriebene, rotierende Bauteile können schwerste Verletzungen verursachen! Deshalb während des Betriebes: ➢ Aufenthalt von Personen im Gefahrenbereich oder in seiner unmittelbaren Umgebung ist strengstens untersagt! ➢ Sicherheitsvorrichtungen und/oder –funktionen nicht außer Betrieb setzen, nicht unbrauchbar machen oder umgehen Vor Betreten des Gefahrenbereiches: ➢ Energieversorgung ausschalten und gegen Wiedereinschalten sichern ➢ Stillstand nachlaufender Bauteile abwarten

!	**VORSICHT**	**Verletzungsgefahr durch herabfallende Bauteile!** Bei demontierter Transportsicherung kann der Außenring oder Innenring herabfallen. Außenring und Innenring axial fixieren.

Die Freilaufkupplungen FC5045 müssen nach maximal **5 Jahren Betriebszeit** auf Beschädigungen überprüft und gewartet werden.

7.1 Demontage im Wartungsfall

Arbeitsschritte:

- Befestigungsschrauben vom Außenring (1) und angetriebenem, bzw. drehmomentabstützendem Maschinenelement lösen
- Axiale Fixierung des Innenringes entfernen
- Transportsicherung einfügen

!	**VORSICHT**	**Verletzungsgefahr durch herabfallende Bauteile!** Bei demontierter Transportsicherung kann der Außenring oder Innenring herabfallen. Deshalb: ➢ Transportsicherung einfügen!

- Freilaufkupplung von der Maschinenwelle abziehen, dazu ggf. geeignetes Hebewerkzeug verwenden
- Freilaufkupplung mit FREE nach oben auf Montagetisch ablegen
- Transportsicherung entfernen
- Innenring (2) inklusive Käfig (8) aus dem Außenring (1) heben, dazu geeignete Hebemittel an Hebegewinde des Innenringes anbringen
- Sicherungsring (4) vom Innerring entfernen und den Käfig (8) vom Innenring (2) abziehen

7.2 Prüfkriterien im Wartungsfall

Arbeitsschritte:

- Außenring (1), Innenring (2) und Käfig (8) mit einem Industriereiniger auf Petroleumbasis vorreinigen und mit einem Reiniger auf Acetonbasis entfetten
- Prüfen auf Schäden, Verschleiß und Risse (siehe Prüfkriterien
  - Außenringlaufbahn darf keine Beschädigungen / Ausbrüche aufweisen
  - verschleißbedingte Durchmesservergrößerung der Außenringlaufbahn max. 0,1 mm gegenüber den unverschlissenem Bereich
  - Deformationsspuren / Eindrücke auf den Laufbahndurchmessern des Innen- und Außenrings max. 0,1 mm tief

- Vollzähligkeit aller Federelemente (2 Stück pro Klemmkörper)
- Federelemente ohne Beschädigungen / Verformung
- Leichtgängige Drehbewegung der Klemmkörper von Anschlag zu Anschlag
- maximale Breite der Verschleißfacette auf den Klemmkörpern (siehe Abbildung 8)

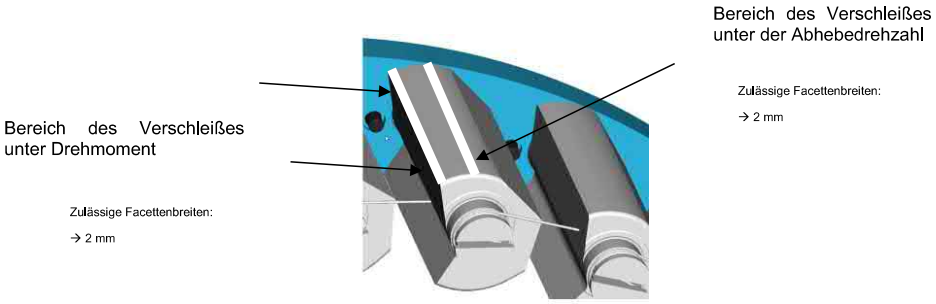


Abbildung 8: Verschleißzonen

- Nur wenn alle Prüfkriterien erfüllt sind, kann die Freilaufkupplung weiterverwendet werden

7.3 Montage im Wartungsfall bei Fettschmierung

Arbeitsschritte:

- Käfig (8) auf den Innenring (2) aufziehen und mit Sicherungsringen (4) axial fixieren
- die Außenringlaufbahn mit einer Schichtstärke von ca. 1 mm einfetten
  - Fette der NLGI Klasse 000 bis 2 mit einer max. Grundölviskosität von 42 mm^2/s verwenden
- die restliche Fettmenge (siehe Kap.2.5) gleichmäßig auf der Innenringlaufbahn und dem Käfig verteilen
- die Klemmkörper des Freilaufkäfigs mit einem O-Ring/ Kabelbinder als Montagehilfe in Abhebestellung fixieren (siehe Abbildung 5 und 6)
- Innenring (2) mit Käfig (8) in Außenring (1) einsetzen bis die Hälfte des Klemmkörpers verdeckt wird
- Montagehilfe (O-Ring/ Kabelbinder) entfernen und den Außenring über die Klemmkörper vollständig absenken

ℹ	**HINWEIS**	Die Montagehilfe (O-Ring/ Kabelbinder) muss nach der Montage vollständig entfernt werden! Bei Nichtbeachtung kann dies zu einer Funktionsbeeinträchtigung bis hin zum Ausfall führen.

- Transportsicherung montieren

- Freilaufkupplung auf die geölte Maschinenwelle schieben, dabei Überholdrehrichtung beachten
- Transportsicherung entfernen
- Freilaufkupplung auf der Maschinenwelle axial fixieren
- angetriebenes, bzw. drehmomentabstützendes Maschinenelement im Außenring zentrieren

	HINWEIS	Die Schraubenqualität 12.9 darf nicht verwendet werden !

- angetriebenes, bzw. drehmomentabstützendes Maschinenelement mit entsprechenden Befestigungsschrauben (z. B. nach Norm DIN EN ISO 4762) und der Schraubenqualität 10.9 bzw. 8.8 fixieren, Anziehdrehmoment siehe Tabelle Anzugsdrehmoment

Anziehdrehmoment [Nm]		
Größe	**8.8**	**10.9**
M16	206	290

Tab. Anzugsdrehmomente (nach VDI 2230 Blatt1, μ=0,12 metrisches Regelgewinde)

- Überprüfen der Überholbewegung

8 Demontage

	WARNUNG	**Verletzungsgefahr durch fehlerhafte Montage!** Fehlerhafte Montage und Wartung kann zu Sach- und schweren Personenschäden führen! Montage-, Wartungs- und Reparaturarbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden!

	WARNUNG	**Verletzungsgefahr durch bewegte Bauteile!** Angetriebene, rotierende Bauteile können schwerste Verletzungen verursachen! Deshalb während des Betriebes: ➢ Aufenthalt von Personen im Gefahrenbereich oder in seiner unmittelbaren Umgebung ist strengstens untersagt! ➢ Sicherheitsvorrichtungen und/oder –funktionen nicht außer Betrieb setzen, nicht unbrauchbar machen oder umgehen Vor Betreten des Gefahrenbereiches: ➢ Energieversorgung ausschalten und gegen Wiedereinschalten sichern ➢ Stillstand nachlaufender Bauteile abwarten

	VORSICHT	**Verletzungsgefahr durch herabfallende Bauteile!** Bei demontiertem Deckel und / oder Flansch kann der Außenring von den Lagern rutschen. Außenring und Innenring axial fixieren.

Arbeitsschritte

- Befestigungsschrauben vom Außenring (1) und angetriebenem, bzw. drehmomentabstützendem Maschinenelement lösen
- Axiale Fixierung des Innenringes entfernen
- Transportsicherung montieren
- Freilaufkupplung von der Maschinenwelle abziehen, dazu geeignetes Hebewerkzeug verwenden

9 Entsorgung

	HINWEIS	Zur Entsorgung der metallischen Bauteile und der vorhandenen Schmiermittel, sind die lokalen Entsorgungsbestimmungen zu beachten!

Die Freilaufkupplung besteht aus metallischen Werkstoffen, die mit einem Fett oder Öl benetzt sind. Metallische Werkstoffe sind vollständig wiederverwertbar. Schmiermittel und Korrosionsschutzmittel sind gesondert zu entsorgen. Hier sind die lokalen Entsorgungsbestimmungen zu beachten.

10 Störung

Bei Störung ist der Hersteller unverzüglich zu kontaktieren!

STIEBER GmbH, D-69126 Heidelberg, Hatschekstr. 36, Deutschland
Tel +49 (0) 6221 3047-0, Fax -31

11 Ersatzteile

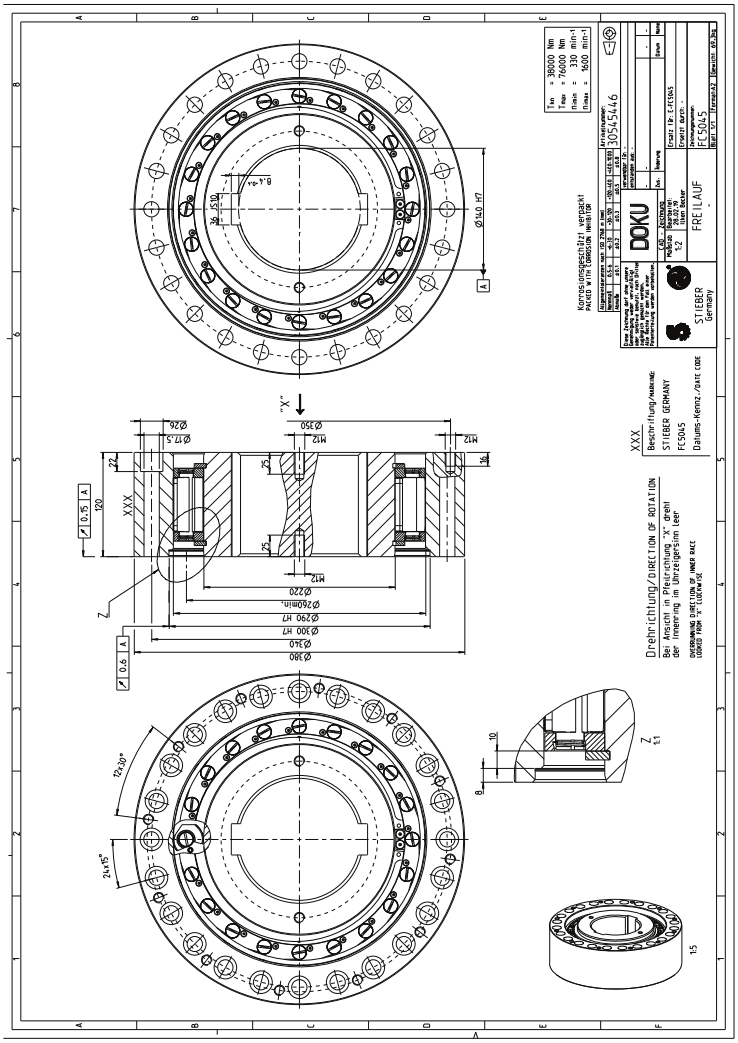
⚠	**WARNUNG**	**Verletzungsgefahr durch falsche Ersatzteile!** Falsche oder fehlerhafte Ersatzteile können zu Beschädigungen, Fehlfunktionen oder Totalausfall führen sowie die Sicherheit beeinträchtigen. Deshalb: ➢ Nur Originalersatzteile des Herstellers verwenden

Ersatzteile nur über Vertragshändler oder direkt beim Hersteller beschaffen.

12 Anhang

M1260D_0	Montage- und Wartungsanleitung	Stieber Altra Industrial Motion

12.1 Zeichnung FC5045



Stieber

Test documentation

[pekrun]

Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn
www.pekrun.de

PRÜFDOKUMENTATION

TESTDOCUMENTATION

ZUM AUFTRAG
TO THE ORDER

IHRE BESTELL NR. *YOUR ORDER NO.*	4500494756
KENNWORT *CODE WORD*	Projekt-Nr. 4000369 / 4000370
IHRE WERKS NR. *YOUR WORKS NO.*	Material-No.: 2000064792
PEKRUN SERIAL NR. *PEKRUN SERIAL NO*	10002292
GETRIEBE TYP *GEAR UNIT TYPE*	ASR 450-R-CCW
PEKRUN KOM. NR. *PEKRUN COM. NO.*	19396/20

PRÜFDOKUMENTATION
TESTDOCUMENTATION

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060562
Werks-Nr.: *Works no.:*	Material-No.: 2000064792	Kennwort: *Code word:*	S/No. 10002292

Inhalt nach ITP	***Contents acc. to ITP***
1. Zeugnisse Radwelle	*1. Certificates to the wheel shaft*
2. Zeugnisse Stirnrad	*2. Certificates to the bull gear*
3. Zeugnisse Baugruppe Radwelle mit Stirnrad	*3. Certificates to the assembly group, bull gear with wheel shaft*
4. Zeugnisse Ritzelwelle	*4. Certificates to the wheel shaft*
5. Zeugnisse Gehäuse	*5. Certificates to the housing*
8. Zeugnisse zur Getriebeprüfung	*8. Gear box test certificates*
9. Allg. Informationen	*9. General Information*

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

[pekrun]

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
1	**Gear shaft (LS Shaft)**										
1.1	Material verification	42CrMo4 EN 10083	Specification		Material labeling		R				
1.2	Chemical analysis	42CrMo4 EN 10083	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
1.3	Mechanical characteristics Ultrasonic test	42CrMo4 EN 10083 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
1.4	Dimensional check after mechanical processing	Drawing	All fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
1.5	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
2	**Bull gear**										
2.1	Gear shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R				
2.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
2.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
2.4	Dimensional check after mechanical processing	Drawing	Al fit measurements Accuracy of toothing	100%	Tolerance acc. to drawing	Measurement record	W	R			
2.5	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Measurement record	W	R			
3	**Assembly group, bull gear with gear shaft**										
3.1	Dimensional check of the toothing		Tooth trace, profile, pitch and runout	3 times circumference	Tolerance acc. to drawing	Test report	W	R			
3.2	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
3.3	Balance check		Acc. to drawing		Tolerance acc. to drawing	Test report	W	R			
4	**Pinion Shaft (HS Shaft)**										
4.1	Pinion shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R	R			
4.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
4.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
4.4	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Test report	R	R			
4.5	Dimensional check after mechanical processing	Drawing	Al fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
4.6	Balance check		Acc. to drawing		Tolerance acc. to drawing	Test report	W	R			
4.7	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
5	**Housing**										
5.1	Chemical analysis	P355NL1/2 EN 10028-3	Chemical composition in % by weight (% by mass) according to ladle analysis	100%	Material Standard	EN10204 3.1	R	R			
5.2	Mechanical characteristics	P355NL1/2 EN 10028-3	Tensile strength, Yield strength, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
5.3	Annealing		Stress free	100%	Material Standard	Diagram or record	R	R			
5.3	Casing leak test		Liquid penetrant inspection	all relevant welding seams	welding seams, no leakage allowed	Test report	W	R			
5.5	Dimensional check after mechanical processing	Drawing	All bearing seats and connecting dimensions	100%	Tolerance acc. to drawing	Measurement record	W	R			
8	**Gear unit**										
8.1	Backlash + contact check of the toothing	Manufacturer test instructions	Executed in job casing contact check, tape lift			Test report	W	W			
8.2	Control of assembly and conneting dimensions	Manufacturer test instructions	Al fit dimensions		Tolerance acc. to drawing	Test report	W	R			
8.3	Check at the Oil supply system bevor the test run.	Pekrun Testprocedure	Filter and cleanliness				W				
8.4	Test run main rotors	Pekrun Testprocedure	No load full speed			Test report	W	W			4 hour test run
8.5	Vibration and temperature reading during the test run	Pekrun Testprocedure	Measured with vibration probes and resistance thermometer			Test report	W	W			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

[pekrun]

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
9	**General Information**										
9.1	Machinery directive	2006/42/EG	Machinery Directive			Certificates	R	R			Part of the operating instructions.
9.2	Coating check		Surface cleanlines, Thickness of the coat, Adhesion acc. to ISO 2409		Grid cut test on test piece: ISO GT (1)	Certificates	R	R			
9.3	Documentation										

Remarks: Documentation (Quality certificates and reports) in german and english, **MRT**= Mechanical running test

R: Review. Verification of test results.

H: Hold Point. Inspection of a critical step in fabrication or testing. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer shall not continue fabrication if inspection parties are not present, except inspection has been waived by prior written notice.

W: Witness Point. Witnessing of a critical fabrication or testing step. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer may continue with work even if inspection parties are not present.

Seite / Page 1 / 2

BGH

Radwelle_wheel shaft_material certificates_PART-057585

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

BGH SL-Stahl GmbH
Chromstraße 3
30916 Isernhagen
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **412193**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **BSVF16004734TSE**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816364-010-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält / Round bars,forged,peeled
Werkstoff / Quality	1.7225 42CrMo4mod/4140mod/4145mod
Anforderungen / Requirements	SL-LV 4 Rev. 6 - 12/11 / AISI 4140 mod. + AISI 4145 mod. ,Kundenvereinbarung

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d'élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d' identification(analyse spectrale)
ohne Beanstandung / without objection	E- LF/VD	ohne Beanstandung / without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
10	2	280 mm rd. x 5715 + 5868 mm	5608 kg	733746

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Al
733746	0,430	0,29	0,98	0,006	0,0010	1,14	0,28	0,45	0,020

Wärmebehandlungszustand / Condition of heat treat: vergütet / quenched and tempered / gehärtet/quenched + 600°C 10h Luft/air

Probe-Nr. / Test-No.	Lage / Loc.	Temp. °C	Rp0,2 N/mm²		Rm N/mm²	A5 %	Z %	Kerbschlagarbeit / Impact value J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness / HB
Soll/Req.	L L	RT	>=760		>=965 <=1100	>=13	>=40	>=45 >=27			RT -30°C	>=285 <=326
503R2 503R2	L L	RT	818		965	14,3	58	103 56	110 45	100 45	RT -30°C	300-290

Stirnabschreckversuch / Jominy test - EN ISO 642:

mm	1,5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
HRC	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56

Umformgrad : 8.3 : 1
Reduction ratio:

Gefüge : Vergütungsgefüge
Microstructure: quench and temper structure

Korngröße nach ASTM E 112: 5
Grain size acc. ASTM E 112:

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	16.09.2021	**Langer**

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Radwelle_wheel shaft_material certificates_PART-057585

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

BGH SL-Stahl GmbH
Chromstraße 3
30916 Isernhagen
Deutschland

Zeugnis-Nr. **412193**
Certificate no.
No. de certificat

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
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La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes
Trade mark
Signe du fournisseur

Stempel des Werkssachverständigen
Inspector's stamp
Poincon de l'inspecteur

Kunden-Bestell-Nr. **BSVF16004734TSE**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816364-010-01**
BGH works no.
BGH référence

BGH Q 07

```
Reinheitsgrad nach ASTM E 45, Methode A  :
Degree of purity acc. ASTM E 45, method A:
Type          A     B     C     D
dünn/thin    0,0   0,8   0,5   1,0
dick/heavy   0,0   0,3   0,3   0,5

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done                 : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze
von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection
limit of 0.1 Bq/g.
```

Anlagen Encl. Annexe US-Zeugnis / UT cert.	Siegen,den Place and date Lieu et date 16.09.2021	Abnahmebeauftragter Inspector representative Inspecteur de réception **Langer**

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US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Radwelle_wheel shaft_material certificates_PART-057585

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. **BSVF16004734TSE**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816364-010-01**
BGH works no.
BGH référence

Zeugnis-Nr. **412193**
Certificate no.
No. de certificat

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.7225 42CrMo4mod/4140mod/4145mod
Abmessung/Dimension: 280 mm rd. x 5715 + 5868 mm
Anzahl/Quantity : 2 Gewicht /Weight : 5608 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
Tab.3 Typ 1a (100%) und Tab.5, QK 4 (Randzone) / QK 3 (Restbereich)
table 3 type 1a (100%) and table 5, quality class 4 (edge zone) / quality class 3 (residual area)

Prüfgerät : Deutsch Echograph 1090
Testing device

Prüfkopf : S 10 W 4 C
Search unit

Kopplungsmittel : Kleister / Wasser
Couplant glue / water

Prüfumfang : halber Umfang über gesamte Länge
Amount of inspection half circumference over total length

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0 mm
Recording threshold FBH 2.0 mm

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 16.09.21	Prüfer Testing operator Opérateur Kosch Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A BGH Q 30	Überwacher Supervisor Surveilleur

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057585
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451+-551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Radwelle / wheel shaft	PN-00077353.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagersitz	Ø 240 m6	+0,046 +0,017	240,04
Fügesitz	Ø 242,48 h6	0 -0,029	242,48
Lagersitz	Ø 240 m6	+0,046 +0,017	240,04
Durchmesser	Ø 240 m6	+0,046 +0,017	240,03-240,04
Durchmesser	Ø 240 m6	+0,046 +0,017	240,035-240,04

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	11.04.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057585
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451-551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Radwelle / wheel shaft	PN-00077353.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	42 CrMo4+QT	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Wellenübergang / shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	11.04.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
58640 ISERLOHN

TELEFON 02371/945-0
TELEFAX 02371/945-299
EMAIL: INFO@PEKRUN.DE

Stirnrad_spur gear_material certificates_PART-057696

Prüfbescheinigung / Type of document

Abnahmeprüfzeugnis 3.1 / Inspection Certificate 3.1 - DIN EN 10204

Schmiedewerke Gröditz GmbH Riesaer Straße 1 01609 Gröditz

Schmiedewerke Gröditz
GMH GRUPPE

Besteller / Customer: Delta Qualitätsstahl GmbH

Nr. / No.: S 3293
Seite/Page 1 von/of 2

Bestell-Nr. / P.O.No.: 169076 v./dd. 10.08.2020

Gegenstand / Object: geschmiedetes Rundmaterial / forged round material

Kommissions-Nr. / Commission No.:5200453346 / 4

Abmessung / Dimension [mm]:ø 700 x 6850 / Stückgewicht/Single weight: 21000 kg

Werkstoff / Material: 18CrNiMo7-6 / 1.6587 ID-Nr./ID-No.:

Lieferzustand / Condition of delivery: vorvergütet, vorbearbeitet/pre quenched and tempered, pre machined

Anforderungen / Demands: ISO-6336-5/08.16; DIN EN ISO-683-3/04.19; LVL02 18Cr Rev.18

Erschmelzungsart / Steelmaking process: EV/EAF

Chemische Analyse / Chemical analysis (% / H_2 ; O_2 ppm)

Stück Quantity	Chargennr. Heat no.	Probe Sample		C	Si	Mn	P	S	Cr	Ni	Mo	V	Cu	Al	Ti	Sn	Nb	As	Sb	Ca	N	H2	F01*	F02*
1	GP106102	Heat		,18	,23	,57	,006	,001	1,63	1,52	,26	,009	,15	,030	,0017	,007	,003	,0057	,0017	,0004	,0105	1,3	,2	2,9

F01*: Cu+(10*Sn); F02*: Al/N

Prüfergebnisse / Test results

Probe / Sample		Lage / Orientation	Zugversuch / Tensile test						Kerbschlagbiegeversuch / Impact test							Härte / Hardness
			Prüftemp. Test temp. [°C]	$R_{p0,2}$ [N/mm²]	R [N/mm²]	R_m [N/mm²]	A5 [%]	Z [%]	Prüftemp. Test temp. [°C]	KV2 [J]			$\overline{KV2}$ [J]		Zähbruch / Tough fracture	
Charge/Heat no.	Nr. /No.	L	RT	>=785	-	1120 - 1350	>=11	>=35	RT	-			40	-	-	
		L	-	-	-	-	-	-	-20	-			27	-	-	
		T	RT	>=785	-	1120 - 1350	>=8	>=25	RT	-			30	-	-	
GP106102	2058 B	T	23	982		1296	10,9	50	23	44	44	43	43			
GP106102	2059 B	L	23	958		1287	13,0	60	23	52	50	55	52			
GP106102	2059 B	L							-20	48	48	48	48			

Härte Soll / Hardness required [HBW]: min - max 235

Härte Ist am Teil / Hardness measured on part [HBW] : 198; 197; 201

Anmalung / paint-marking: 85648
O2 Gehalt/O2 content: 9 ppm
mechanische Werte an Blindhärteprobe/mechanical properties on blank hardened test ø 30 mm, Wärmebehandlung/heat treatment: 870°C/2h/Öl/oil, 180°C/2h/Luft/air
Verschmiedungsgrad / forging ratio: 3,6
auf Materialverwechslung geprüft - keine Beanstandung / material mix up tested - satisfactory
Radioaktivität innerhalb gesetzlicher Vorgaben wird gewährleistet/radioactivity within legal requirements guaranteed
Restmagnetismus max. 5 Gauss- wird gewährleistet/residual magnetism max. 5 Gauß - guaranteed

Stirnrad_spur gear_material certificates_PART-057696

Prüfbescheinigung / Type of document

Abnahmeprüfzeugnis 3.1 / Inspection Certificate 3.1 - DIN EN 10204

Schmiedewerke Gröditz GmbH Riesaer Straße 1 01609 Gröditz

Schmiedewerke Gröditz
GMH GRUPPE

Besteller / Customer: Delta Qualitätsstahl GmbH	Nr. / No.: S 3293 Seite/Page 2 von/of 2
Bestell-Nr. / P.O.No.: 169076 v./dd. 10.08.2020	Gegenstand / Object: geschmiedetes Rundmaterial / forged round material
Kommissions-Nr. / Commission No.:5200453346 / 4	Abmessung / Dimension [mm]:ø 700 x 6850 / Stückgewicht/Single weight: 21000 kg

Reinheitsgrad gemäß/micropurity acc. to DIN 50602: K4= 1
Reinheitsgrad nach/micropurity acc. to ISO 4967 Meth. A - A 0,2/0,2; B 0/0; C 0,3/0,2; D 0,5/0,5; DS 0,8
austenitische Körngröße gemäß DIN EN ISO 643 nach Wärmebehandlung 950°C 50 h: G = 5 und feiner, max. 2% gröber 5 erfüllt
austenitic grain size acc. to DIN EN ISO 643 after heat treatment 950°C 50 h: G = 5 and finer , max. 2% rougher 5 fulfilled

Anlagen / Annex: Ultraschallprüfbericht/ultrasonic test report, Jominy Prüfprotokoll/Jominy report

Die gestellten Anforderungen sind erfüllt. Besichtigung und Ausmessungen: o.B.
The a.m. results meet requirements. Visual and dimensional inspection: satisfactory

Herstellerzeichen, Manufacturer's brand mu	Stempel des Sachverständigen Inspector's stamp	Datum / Date: 04.11.2020 Abnahmebeauftragter Hersteller Manufacturers authorized representative

Stirnrad_spur gear_material certificates_PART-057696

Ultraschallprüfbericht Ultrasonic test report gemäß / acc. to DIN EN 10204 3.1	Nr./No.: 11/20/10-UT FA 520485648 Seite/page 1 von/of 1	Schmiedewerke Gröditz GMH GRUPPE

Besteller Customer Delta Qualitätsstahl GmbH Hamm	**Gegenstand** Item Rundmaterial round material
Bestell-Nr. Order-No 169076	**Werkstoff** Material 18 CrNiMo 7-6
Wärmebehandlung vergütet Heat treatment quenched and tempered	**Oberflächenzustand** mech. bearbeitet Surface condition mech. processed
Kennwort Code word -	**Lfd.-Nr.** Part-No -
Zeichnungs-Nr./Abmessung Drawing-No./Dimensions Liefermaß/delivery dimension: Dmr./dia. 700 x 6850	

Kommission Job No. 5200453346/4	**Chargen-Nr.** Charge No. GP106102	**Stückzahl** Pieces 1
Spezifikation Specification DELTA LV02 18Cr Rev. 17	**Prüfumfang** gemäß Vorschrift Scope of test acc. to specification	
Fertigungs- und Prüffolgeplan Fabrication and Inspection plan ☐ Nr/No:	**Prüf- und Abnahmeplan** Test and Inspection plan ☐ Nr/No:	**Prüfanweisung** test procedure ☒ Nr/No: QP-ZFP-A-01 Rev. B

Prüfdaten / Test data

Prüfgerät Test unit EPOCH 1000 - 160261308		**Koppelmittel** Couplant Tapetenleim / wallpaper paste
Prüfer Werner Tested by ISO9712 Stufe 2/level 2	**Prüfdatum** Date of testing 27.10.2020	**Prüfort** Place of testing Gröditz
Registriergrenze Registration level gemäß Vorschrift / acc. to specification		

Prüfkopf / Probe — **Justierung** / Calibration

Nr. No.	Typ Type	Fre-quenz Fre-quency	Winkel Angel	Justierbe-reich Calibration range	Methode Method	s_j	s_{max}	V_j	ΔV	ΔV_T ☐ ΔV_A ☐	ΔV_v	ΔV_K	V_R
		MHz	°	mm		mm	mm	dB	dB	dB	dB	dB	dB
1	PF2R-24	2	0	840	AVG/BI DGS/RI	700	700	23	51	-	-	-	74

s_{max} - Bewertungsschallweg/evaluated sound distance, s_j-Justierschallweg/Calibration distance, V_j-Justierverstärkung/ Calibration Gain, Δ V-Verstärkungszuschlag/Additional Gain, ΔV_T-Transferkorrektur/ Transfer correction, ΔV_A -Ankopplungskorrektur/ Coupling correction, ΔV_v -Schallschwächungskorrektur/Soundattenuation correction, ΔV_K - Kontrollkörperkorrektur für Winkelprüfköpfe bzw. Krümmungskorrektur für Senkrechtprüfköpfe/Adjusting block correction for angle beam probes or curvature correction for straight beam probes, V_R -Bewertungsverstärkung Evaluation Gain

Ergebnisse - Results:

Es wurden keine registrierpflichtigen Anzeigen festgestellt.
No recordable indications were found.

Beurteilung gemäß Spezifikation/ Evaluation acc. to specification :

ERFÜLLT ☒ PASSED	**NICHT ERFÜLLT** ☐ NOT PASSED	**ERGEBNIS S. ANLAGE** ☐ RESULT L. ANNEX
Datum / Date 03.11.2020	**Prüfaufsicht**/ Supervisor i.V. Hoffmann Knobloch ISO9712 Stufe 3/level 3	

Stirnrad_spur gear_material certificates_PART-057696

Schmiedewerke Gröditz
GMH GRUPPE

Jominy- Protokoll / Jominy - Report

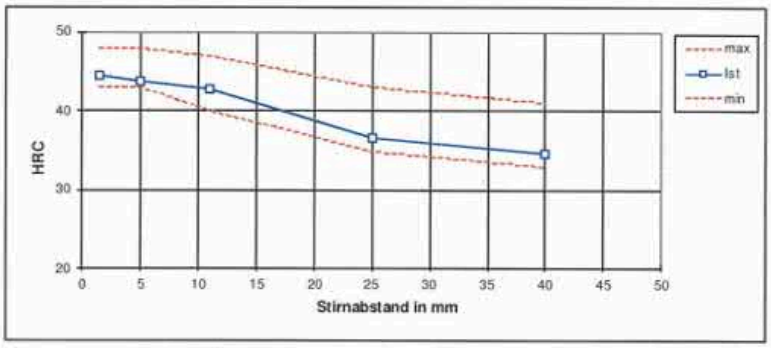
gem. ISO 642 / acc. to ISO 642
Berechnung nach/ calc. acc. to SEP 1664, Tafel 12 - 2. Ausgabe Juni 2004

Gegenstand/Item: Stabstahl / steel bar
Stahlmarke/Steel grade: 18 CrNiMo 7-6
Charge/Heat-No.: GP106102

Austenitbedingungen/
Austen. conditions: 860 °C/30min

mm	1,5	5	11	25	40
Ist	44,5	43,7	42,7	36,7	34,6
max	48	48	47	43	41
min	43	43	40	35	33

* Sollwerte nach / Limits acc. to DELTA LVL02 18Cr Rev. 18



Freigabe durch:
Released by: gez. Rink
TQW

13.10.2020

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057696
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451+551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Stirnrad / spur gear	PN-00077575.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Fügesitz	Ø 242 H7	+0,046 0	242,02-242,03
Verzahnung Vorfräsen			i.O.

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	11.03.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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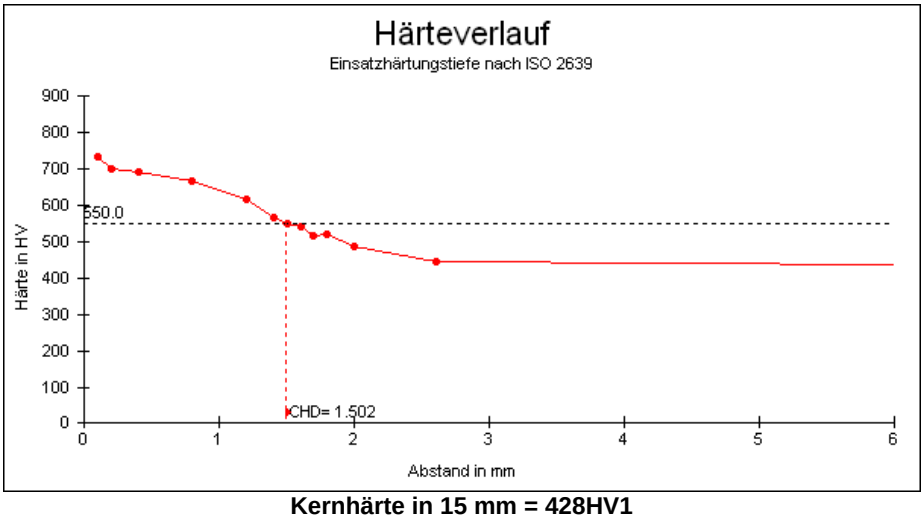
PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

DOK-QS-121	Härteverlauf Hardness profile	REINTJES POWERTRAIN SOLUTIONS

Abnahmeprüfzeugnis gemäß DIN/EN 10204 – 3.1
Inspection certificate according to DIN/EN 10204 - 3.1

Kunde: Customer:	**Pekrun**	**Benennung:** Object:	**Stirnrad 76**
FAUF: Production No.:		**Bestell Nr. /Pos:** Purchase Order No./Item:	**4500059044**
Zeichnungs Nr.: Drawing No.:	**PN-00077575**	**Auftrags Nr.:** Order No.:	**2053833**
Werkstoff: Material:	**18 CrNiMo 7-6**	**Proben Nr.:** Sample No.:	**09216**
Stückzahl: No. of pieces:	**2**	**Ofencharge:** Oven batch:	**C22-21936**

CHD 550H V1 = 1.50 mm



Kernhärte in 15 mm = 428HV1

Oberfl.-Härte IST: Surface hardness actual:	**62**	HRC	**EHT IST:** Penetration depth actual:	**1,50**	mm
Oberfl.-Härte SOLL: Surface hardness nominal:	**60 +- 2**	HRC	**EHT SOLL:** Penetration depth nominal:	**1,4 + 0,2**	mm
Martensit IST: Martensit actual:		%	**Restaustenit IST:** Resodual austenite:		%
Randoxidation IST: Surface oxidation actual:		µm	**Randentkohlung IST:** Surface dicarborising actual:	**---**	µm
Karbidanteil IST: Katbit actual:	**---**	%	**Rand C-Gehalt IST:** Surface-C actual:		%
Bemerkungen: Remark:					

Prüfer / Workinspector i.A. V.Gärtner Prüfdatum / Work date: 02.03.22

Dieses Zeugnis wurde maschinell erstellt und ist OHNE Unterschrift gültig.
This certificate was provided by machine and is valid also without signature.

Prozessverantwortlicher:	QS / Hr. Dr. Reso / 17.01.2018	Revisions-Nr.:	02

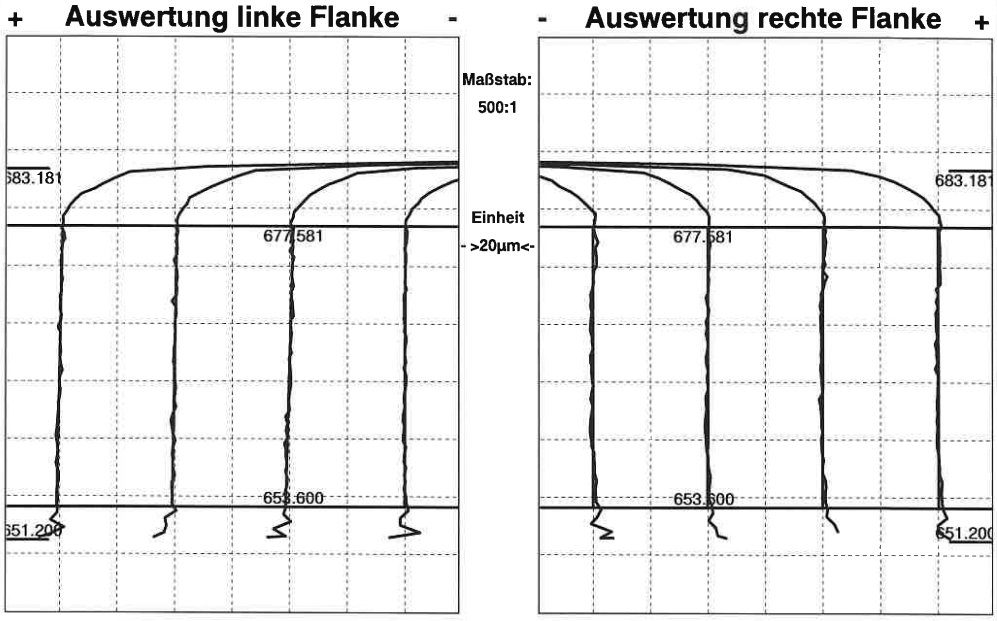
Seite 1 von 1

Profilmessung

Messung vom 04/25/2022 11:33:36 Dauer: 00:03:09 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
R.V.UNTEN
NR.1

Name der Verzahnung:	76Z 8M-P-057696-U	Profil	Evolventisch
Zähnezahl	76	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Rechtsschräg 25.000000 Grad	Meßbreite	55.000 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	683.181 mm	Fußformkreis (d)	651.200 mm



Q	M	S	58	39	20	1	Lücke Nr.	1	20	39	58	S	M	Q
1	2.5		3.0	2.4	3.1	1.6	F_α	3.4	2.5	2.8	2.8		2.9	2
3	- 1.6	0.0	- 2.0	- 1.6	- 2.6	- 0.3	fH_α	- 0.1	0.2	0.4	- 0.3	0.0	0.1	1
1	1.8		1.8	2.0	1.9	1.6	ff_α	3.4	2.6	2.9	2.6		2.9	2
	0.1	0.0	0.2	0.1	- 0.5	0.5	C_α	- 2.1	- 1.4	- 1.9	- 1.9	0.0	- 1.8	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

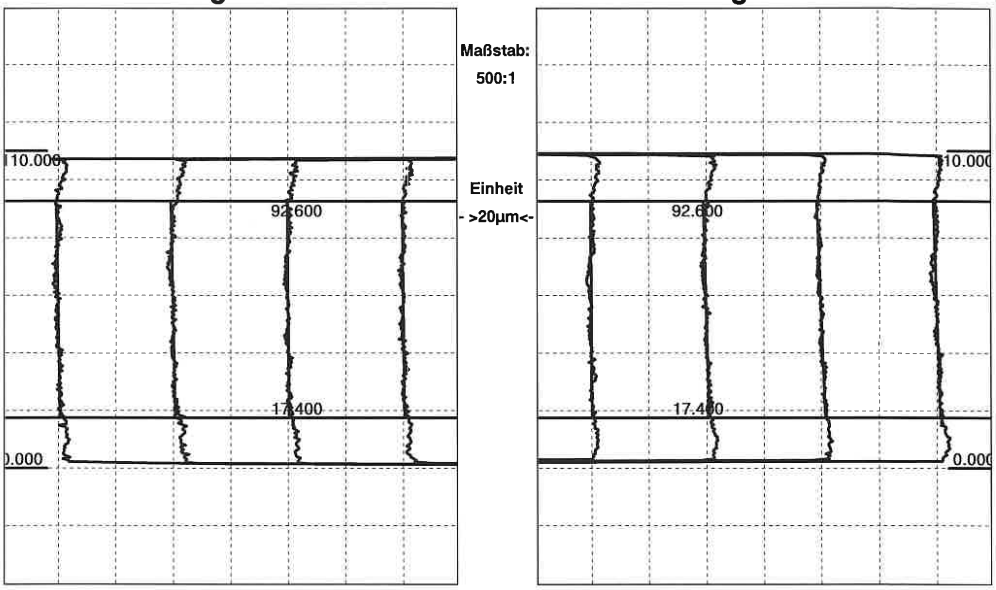
Flankenlinienmessung

Messung vom 04/25/2022 11:29:17 Dauer: 00:03:52 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
R.V.UNTEN
NR.1

Name der Verzahnung:	76Z 8M-P-057696-U	Profil	Evolventisch
Zähnezahl	76	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	206
Schrägungswinkel	Rechtsschräg 25.000000 Grad	Meßzylinder (d)	665.853 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	110.000 mm		

+ Auswertung linke Flanke - | - Auswertung rechte Flanke +



Q	M	S	58	39	20	1	Lücke Nr.	1	20	39	58	S	M	Q
2	4.3		4.0	6.2	3.2	3.9	Fβ	3.3	4.1	4.3	4.6		4.1	1
1	1.1	0.0	1.3	1.6	0.6	0.8	fHβ	- 0.3	- 1.9	- 2.8	- 2.3	0.0	- 1.8	2
2	3.7		3.5	5.0	2.9	3.3	ffβ	3.2	3.4	2.4	3.5		3.1	1
	1.2	0.0	1.3	1.4	1.2	1.1	Cβ	- 1.3	- 1.3	- 0.6	- 1.5	0.0	- 1.2	

Vert. Maßstab 1:2, d.h. 10 mm entspr. 20 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

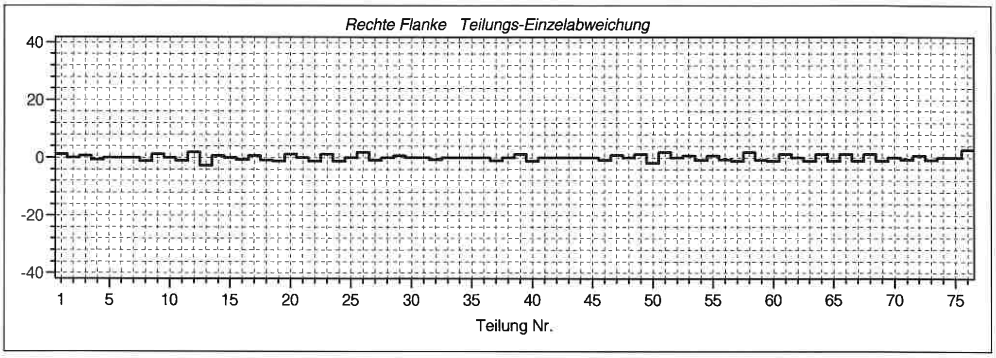
Alle Angaben in µm
Qualitäten nach DIN 3961

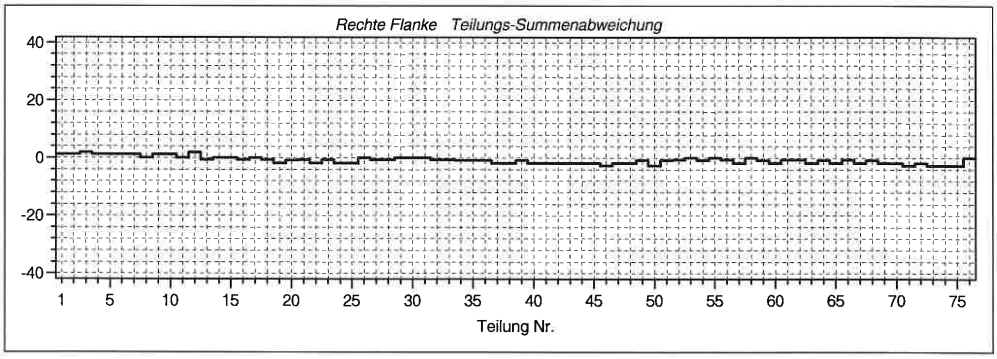
Teilungsmessung

Messung vom 04/25/2022 11:37:09 Dauer: 00:14:41 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
R.V.UNTEN
NR.1

Name der Verzahnung:	76Z 8M-P-057696-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.853 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 2.7	2	Teilungs-Schwankung (Rp)	5.3	
Teilungs-Gesamtabw. (Fp)	4.6	1	Max. Teilungssprung (fumax)	4.5	3
Teilungs-Spannenabw. (Fp(z/8))	3.8	1			

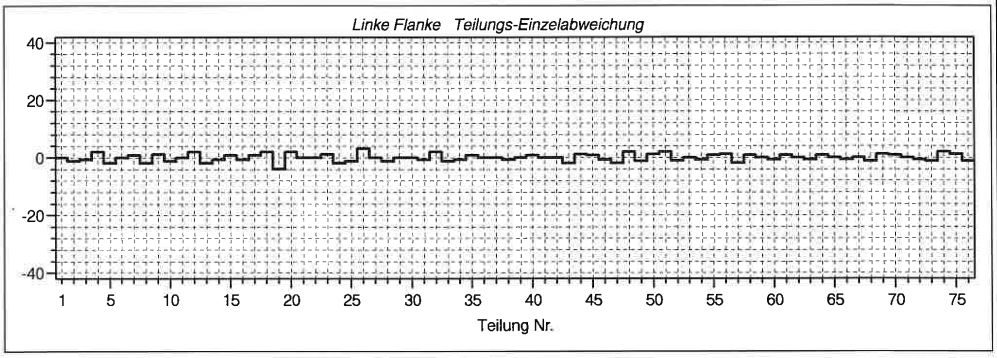
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

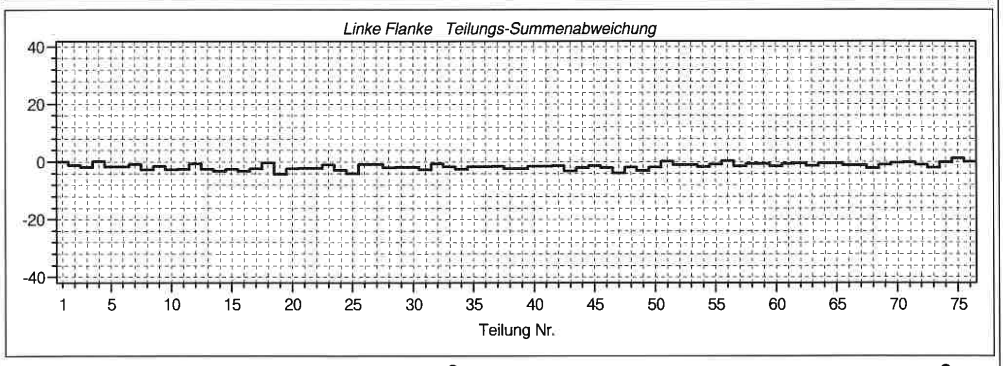
Teilungsmessung

Messung vom 04/25/2022 11:37:09 Dauer: 00:14:41 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
R.V.UNTEN
NR.1

Name der Verzahnung:	76Z 8M-P-057696-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.853 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 3.8	3	Teilungs-Schwankung (Rp)	7.0	
Teilungs-Gesamtabw. (Fp)	5.4	1	Max. Teilungssprung (fumax)	5.8	4
Teilungs-Spannenabw. (Fp(z/8))	4.2	1			

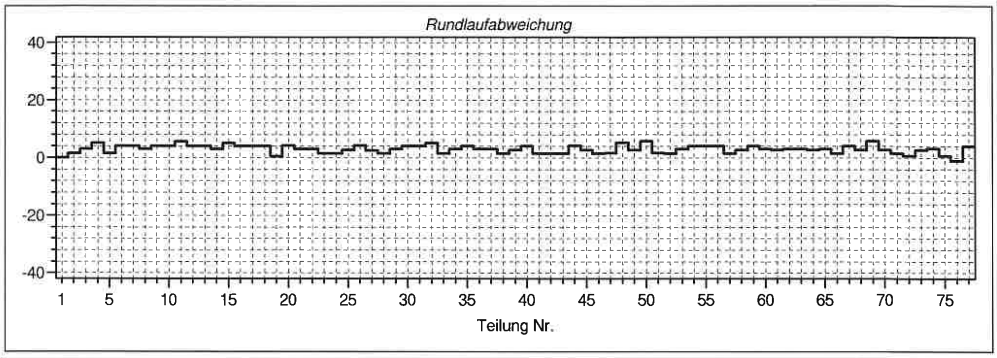
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

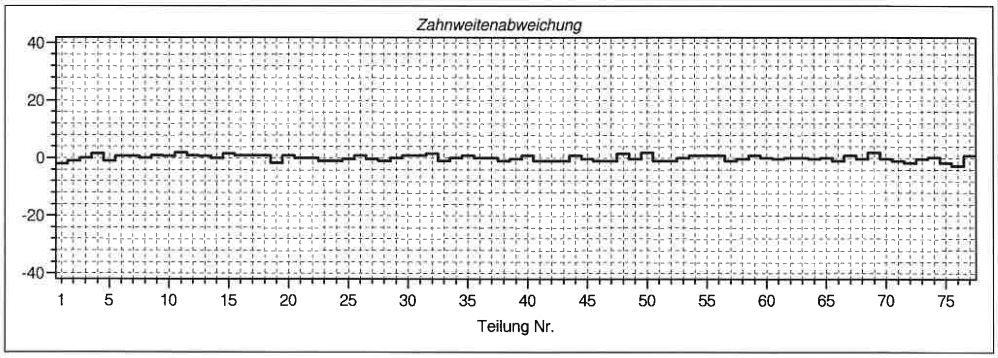
Teilungsmessung

Messung vom 04/25/2022 11:37:09 Dauer: 00:14:41 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
R.V.UNTEN
NR.1

Name der Verzahnung:	76Z 8M-P-057696-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.853 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





				Q
Min. Zahnweite (mm)	257.776	Mittl. Zahnweite (mm)	257.779	
Max. Zahnweite (mm)	257.781	Zahnweiten-Schwankung (µm)	4.6	
Anzahl Meßzähne	11			
		Rundlaufabweichung (Fr)	6.6	2
		Meßkugeldurchmesser (mm)	14.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

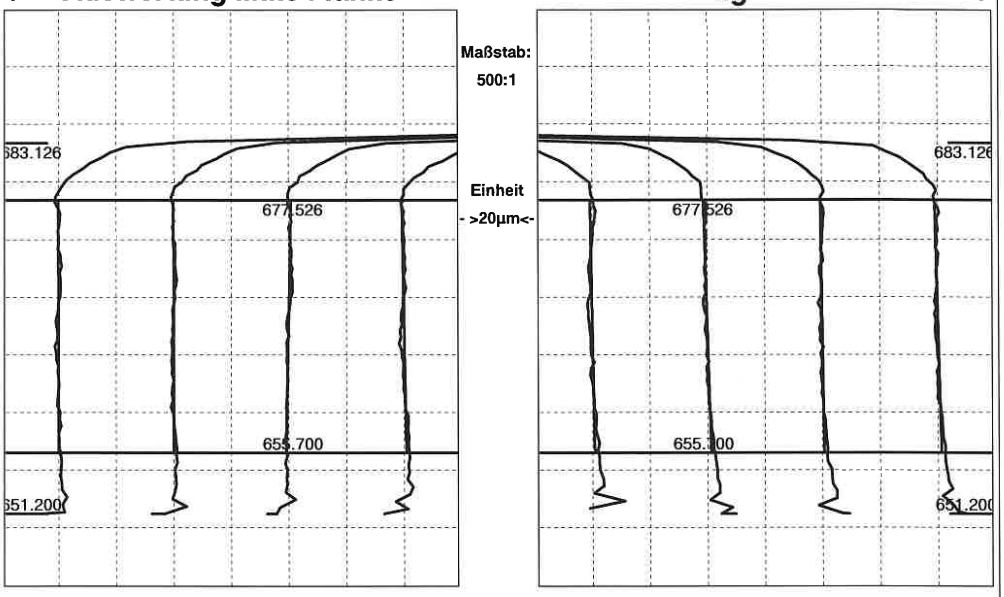
Profilmessung

Messung vom 04/22/2022 11:13:34 Dauer: 00:03:11 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
L.V.OBEN
NR.1

Name der Verzahnung:	76Z 8M-P-057696-O	Profil	Evolventisch
Zähnezahl	76	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Linksschräg 25.000000 Grad	Meßbreite	55.000 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	683.126 mm	Fußformkreis (d)	651.200 mm

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	58	39	20	1	Lücke Nr.	1	20	39	58	S	M	Q
2	2.6		2.4	2.1	2.5	3.4	F_α	3.9	4.0	3.2	3.8		3.7	2
2	- 0.0	0.0	0.2	0.1	- 1.8	1.5	fH_α	- 1.5	- 2.6	- 1.1	- 2.3	0.0	- 1.9	3
2	2.4		2.4	2.1	2.4	2.8	ff_α	3.4	2.2	2.5	2.6		2.7	2
	0.4	0.0	0.2	0.4	- 0.5	1.4	C_α	- 2.6	- 1.5	- 1.5	- 1.7	0.0	- 1.8	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

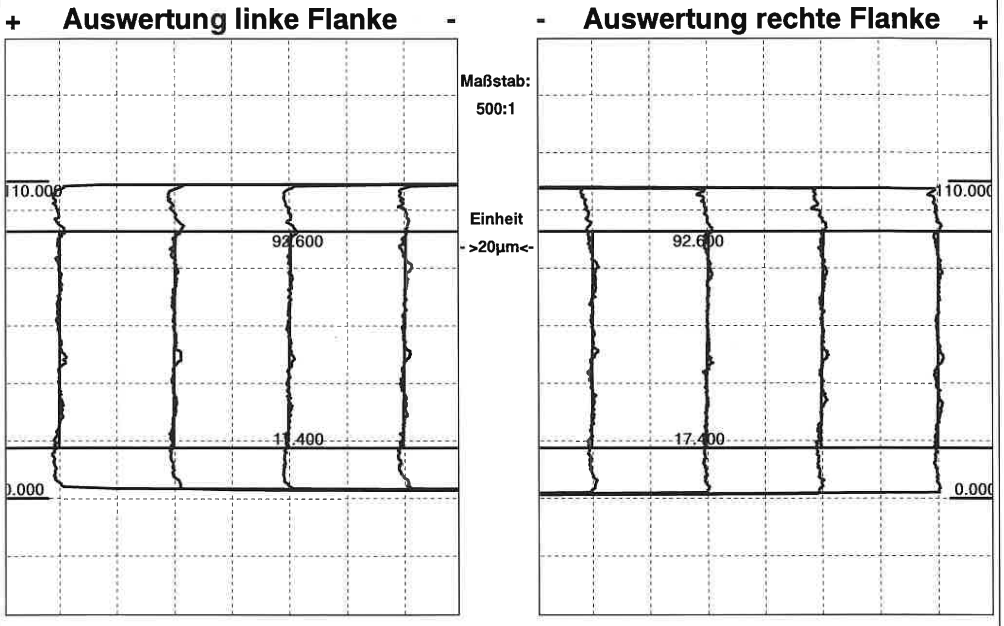
Alle Angaben in µm
Qualitäten nach DIN 3961

Flankenlinienmessung

Messung vom 04/22/2022 11:07:42 Dauer: 00:05:29 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
L.V.OBEN
NR.1

Name der Verzahnung:	76Z 8M-P-057696-O	Profil	Evolventisch
Zähnezahl	76	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	206
Schrägungswinkel	Linksschräg 25.000000 Grad	Meßzylinder (d)	665.829 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	110.000 mm		



Q	M	S	58	39	20	1	Lücke Nr.	1	20	39	58	S	M	Q
1	4.3		4.5	4.1	4.2	4.4	Fβ	3.8	3.5	4.4	3.5		3.8	1
1	- 0.8	0.0	- 0.2	- 0.7	- 1.1	- 1.0	fHβ	0.6	1.2	1.2	0.4	0.0	0.9	1
1	4.1		4.4	4.2	3.4	4.4	ffβ	3.9	3.5	3.9	3.5		3.7	1
	- 0.6	0.0	- 0.8	- 0.7	- 0.2	- 0.6	Cβ	1.0	0.9	1.2	0.7	0.0	1.0	

Vert. Maßstab 1:2, d.h. 10 mm entspr. 20 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

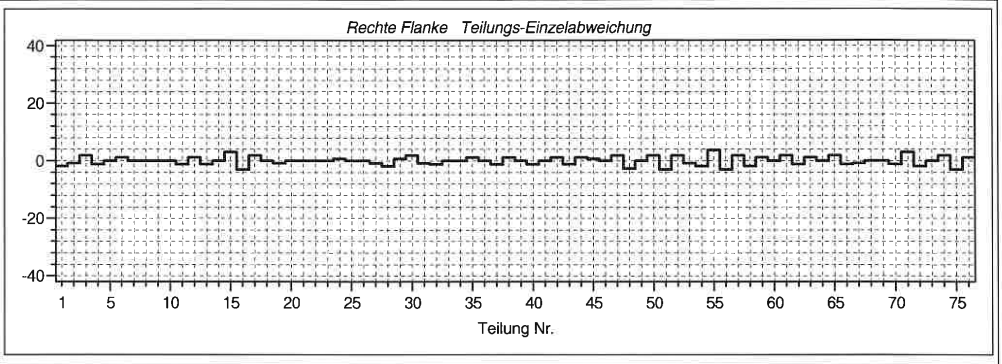
Alle Angaben in µm
Qualitäten nach DIN 3961

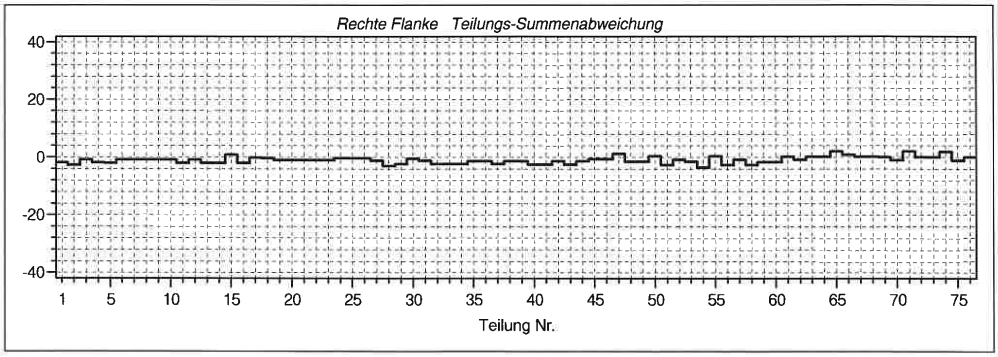
Teilungsmessung

Messung vom 04/22/2022 11:17:10 Dauer: 00:14:41 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
L.V.OBEN
NR.1

Name der Verzahnung:	76Z 8M-P-057696-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.829 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	3.8	3	Teilungs-Schwankung (Rp)	6.8	
Teilungs-Gesamtabw. (Fp)	5.5	1	Max. Teilungssprung (fumax)	6.8	4
Teilungs-Spannenabw. (Fp(z/8))	4.7	1			

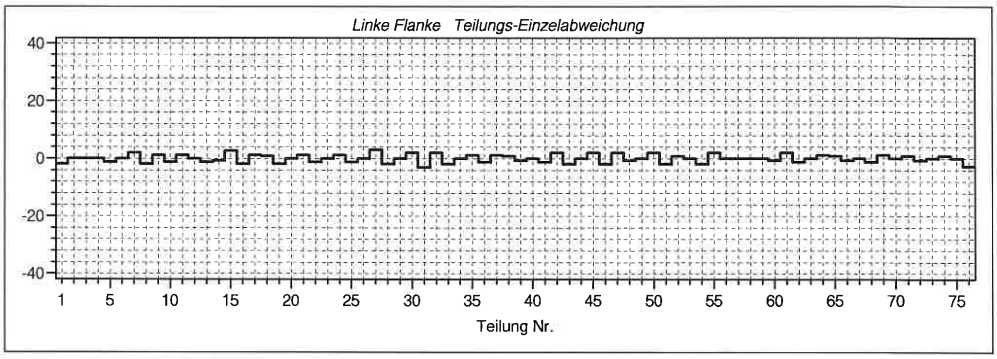
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

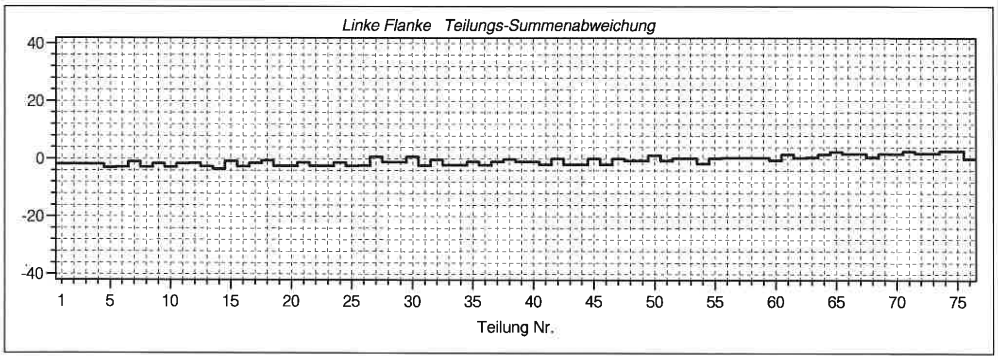
Teilungsmessung

Messung vom 04/22/2022 11:17:10 Dauer: 00:14:41 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
L.V.OBEN
NR.1

Name der Verzahnung:	76Z 8M-P-057696-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.829 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	3.1	2	Teilungs-Schwankung (Rp)	6.2	
Teilungs-Gesamtabw. (Fp)	6.2	1	Max. Teilungssprung (fumax)	5.1	3
Teilungs-Spannenabw. (Fp(z/8))	5.6	1			

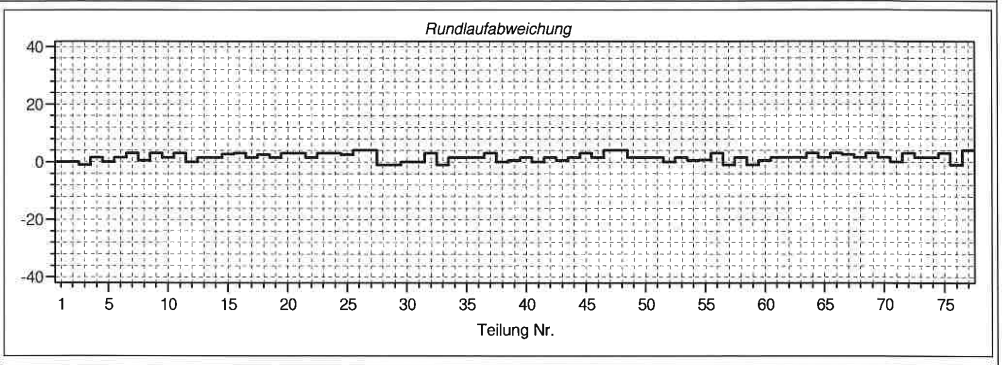
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

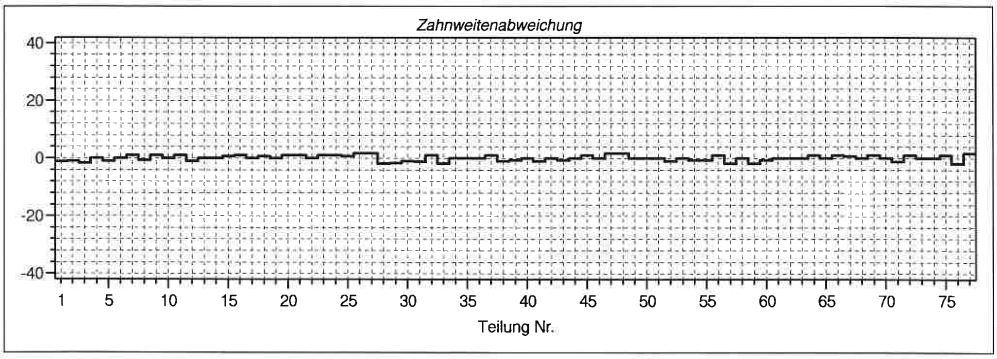
Teilungsmessung

Messung vom 04/22/2022 11:17:10 Dauer: 00:14:41 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
L.V.OBEN
NR.1

Name der Verzahnung:	76Z 8M-P-057696-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.829 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





				Q
Min. Zahnweite (mm)	257.781	Mittl. Zahnweite (mm)	257.783	
Max. Zahnweite (mm)	257.784	Zahnweiten-Schwankung (µm)	3.6	
Anzahl Meßzähne	11			
		Rundlaufabweichung (Fr)	5.1	1
		Meßkugeldurchmesser (mm)	14.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057696
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451-551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Stirnrad / spur gear	PN-00077575.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Verzahnung / toothing*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	05.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
58640 ISERLOHN

TELEFON 02371/945-0
TELEFAX 02371/945-299
EMAIL: INFO@PEKRUN.DE

BG Radwelle_assembly group wheel shaft_balancing report_PART-057697

```
*****************************************
Pekrun Getriebebau GmbH
Koebbingser Muehle 14
58640 Iserlohn/Germany
*****************************************
Operator : Ferdi Basar                          04.05.22 12:57
  Rotordaten              Fall   1              19396/20-057697
  a: 178.5 mm             b: 311.0 mm            c: 162.5 mm
  r1: 295.0 mm            Eb1/Eb2                r2: 295.0 mm
  m1: -polar                                     m2: -polar
  Tol1: 9999. gmm                                Tol2: 9999. gmm
                          N soll    :  400.  1/Min
  Ergebnisse              Rotor: Radwelle 1          04.05.22 12:57
  Lauf  3                 N ist     :   403.  1/Min
Eb 1:       1.47  g                     Eb 2:       13.4  g
            337. Grad                                 4. Grad
            in Tol                                  in Tol
Anteil in Tol.Einheiten  :
        433.6 gmm                               3952. gmm
```

Seite / Page 1 / 3

Ritzelwelle_pinion shaft_material certificates_PART-057699

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **414615**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-002-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält Round bars,forged,peeled
Werkstoff / Quality	1.6587 18CrNiMo7-6
Anforderungen / Requirements	LVL- 02 18Cr Rev.18 - 07/20 1.6587 18CrNiMo7-6 ,ISO 6336 -5 Third ed. 2016-08-15 1.6587 18CrNiMo7-6 ,DIN EN ISO 683 -3 April 2019 Lieferzustand: Vorvergütet Die Werkstoffqualität "MQ/ME" nach ISO 6336-5 wird bestätigt. Diese Bestätigung gilt nur für die Eigenschaften, die vom Stahlhersteller beeinflußt werden können. Für Eigenschaften, die von der konstruktiven Gestaltung, der Endwärmebehandlung und der Einsatzbedingungen abhängig sind, kann der Stahlhersteller keinerlei Garantie und Gewährleistung übernehmen. The material quality "MQ/ME" acc. ISO 6336-5 will be confirmed. This confirmation is only valid for the properties, which can be affected by the steel producer. The steel producer cannot provide any guarantee for properties, which are dependent on the constructional design, the final heat treatment and the application conditions.

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d´élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d´identification(analyse spectrale)
ohne Beanstandung without objection	E- LF/VD	ohne Beanstandung without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
2	10	260 mm rd. x 4492 - 5086 mm	20734 kg	735116

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb	V	Ti
735116	0,175	0,28	0,54	0,007	0,0010	1,71	0,32	1,52	0,102	0,003	0,009	0,001

Al	N	H(ppm)	O	Sn	Sb	Ca	Al/N	Cu+10xSn
0,023	0,0110	1,50	0,0014	0,004	0,003	0,0004	2,091	0,142

Wärmebehandlungszustand / Condition of heat treat: vergütet / quenched and tempered

Probe-Nr. / Test-No.	Lage / Loc.	Temp. / °C	Rp0,2 / N/mm²		Rm / N/mm²	A5 / %	Z / %	Kerbschlagarbeit / Impact value / J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness / HB
Soll/Req.	T	RT	>=785		>=1120 <=1450	>=8	>=25	>=30			RT	<=238
335W10	T	RT	923		1321	8,2	36	63	64	66	RT	190
335W10	T							49	50	50	-20°C	am Material

Die mechanischen Kennwerte wurden an einer Referenzprobe (30 mm rd.) ermittelt:
The mechanical properties were tested at a reference block (30 mm dia.) :
870°C 2h Oel/oil, 180°C 2h Luft/air

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	29.11.2021	**Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Page

Ritzelwelle_pinion shaft_material certificates_PART-057699

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. **414615**
Certificate no.
No. de certificat

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
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Zeichen des Lieferwerkes
Trade mark
Signe du fournisseur

Stempel des Werkssachverständigen
Inspector's stamp
Poincon de l'inspecteur

BGH
Q 07

Kunden-Bestell-Nr. **171472**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816888-002-01**
BGH works no.
BGH référence

```
Stirnabschreckversuch / Jominy test - EN ISO 642:
mm     1,5  5    11   25   40
HRC    45   44   43   38   36

Umformgrad      : 6.0 : 1
Reduction ratio:

Korngröße  nach ASTM E 112: 6
Grain size acc. ASTM E 112:

Korngröße  nach ISO 643 (950°C 50h Oel): 6
Grain size acc. ISO 643 (950°C 50h oil):

Reinheitsgrad nach DIN 50602   : K4 = 2 (Ox + S)
Degree of purity acc. DIN 50602:

Reinheitsgrad nach ISO 4967, Methode A  : DS = 1,5
Degree of purity acc. ISO 4967, method A:
Type           A      B      C      D
Dünn/fine     0,0    0,8    0,5    1,0
Dick/thick    0,0    0,5    0,3    0,5

Restmagnetismus   : < 8 A/cm
Residual magnetism:

Das Material wurde gemäß der Spezifikation hergestellt.
The Material was produced in compliance with the Specification.

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done                  : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze
von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection
limit of 0.1 Bq/g.
```

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	29.11.2021	**Langer**

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Ritzelwelle_pinion shaft_material certificates_PART-057699

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. **414615**
Certificate no.
No. de certificat

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Zeichen des Lieferwerkes
Trade mark
Signe du fournisseur

Stempel des Werkssachverständigen
Inspector's stamp
Poincon de l'inspecteur

Kunden-Bestell-Nr. **171472**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816888-002-01**
BGH works no.
BGH référence

BGH
Q 07

Bei Überschreitung der regelwerksseitigen Abmessungsgrenze sind im Zweifelsfall die Vorgaben
des Regelwerks vom Bauteilhersteller zu verifizieren. Seitens des Werkstoffherstellers werden
nur die, an der von ihm produzierten Geometrie, überprüften Eigenschaften bestätigt.
In case of doubt, the specifications of the regulations must be verified by the component manufacturer
if the dimensional limit of the regulations is exceeded. On the part of the material manufacturer,
only the properties verified on the geometry, produced by him, are confirmed.

Anlagen Encl. Annexe US-Zeugnis / UT cert.	Siegen,den Place and date Lieu et date 29.11.2021	Abnahmebeauftragter Inspector representative Inspecteur de réception **Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Ritzelwelle_pinion shaft_material certificates_PART-057699

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client: **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence: **816888-002-01**

Zeugnis-Nr. / Certificate no. / No. de certificat: **414615**

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.6587 18CrNiMo7-6
Abmessung/Dimension: 260 mm rd. x 4492 - 5086 mm
Anzahl/Quantity : 10 Gewicht /Weight : 20734 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
DIN EN 10228-3 Tab. 3 Typ 1a (100%)und
Tab. 5 Qualitätsklasse 4 für Randzone (1/3 D, min. 60mm)
Tab. 5 Qualitätsklasse 3 für Restbereich
DIN EN 10228-3 Tab.3 typ 1a (100%)and
Tab.5 quality class 4 for surface zone (1/3 D, min. 60 mm)
Tab.5 quality class 3 for remaining area

Prüfrichtlinie : DIN EN 10228-3 Tab. 3 & 4 (vollständig 360°)
Specification

Prüfgerät : K.Deutsch RPT.S 1156
Deutsch Echopraph 1090
Testing device

Prüfkopf : STS32.20P4L150C, STSE18/16P4
S 10 W 4 C
Search unit

Kopplungsmittel : Wasser / Kleister
Couplant water / glue

Prüfumfang : 360°
Amount of inspection

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0
Recording threshold FBH 2.0 mm

Schallschwächung : < 6 dB/m
Wave attenuation

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 29.11.21	Prüfer Testing operator Opérateur Konieczny Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A BGH Q 30	Überwacher Supervisor Surveilleur

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EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Abnahmeprüfzeugnis

gemäß DIN EN 10204-3.1

Belegnr	**PZ-2022-0097208**
Auftragsnr	**2022-0237912-3**
Kundennr	1011419
Ausgeber	Virzi, Laura
Telefon	0234/903660
Datum	22.03.2022
Seite	1/1

Teile/Verfahren	Stück	Gewicht
	2	---

Ihre Auftragsnr: 19396/Pos.20
Ihre Liefers.Nr: Anlieferung
Ihre Bestellnr: 4500059979 / 30 vom 09.03.2022
Uns. Auftragsnr: 2022-0237912-3 von 3 vom 09.03.2022
Bezeichnung: Ritzelwelle
Teilenummer: PART-057699
Zeichnungsnr: PN00077578
Fr. Feld: 2053531
WE-Nummer: WE-000096440
Werkstoff: 1.6587/18CrNiMo7-6/17CrNiMo6
Vorschrift: Isolieren, Einsatzhärten, Strahlen, Richten, Zeugnis

Soll-Vorgaben

Randhärte	58-62 HRC
Einsatzhärtetiefe	1,4-1,6 mm

Ergebnisse	Prüfer	Prüfdatum
RH:60-61 HRC EHT:1,59 mm	Rainer Theuer	21.03.2022

Die CHD haben wir an unserer Chargenbegleitprobe aus 18CrNiMo7-6 ermittelt.

Hiermit bestätigen wir, dass obige Teile gemäß den Vereinbarungen bei der Bestellannahme auf der Grundlage der Ihnen bekannten Allgemeinen Geschäftsbedingungen der Härterei Reese Bochum GmbH, Stand: Juli 2018 behandelt wurden.

Dieses Dokument wurde elektronisch erstellt und ist daher ohne Unterschrift gültig.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/9036-0
Fax +49 (0) 234/9036-96

Oberscheidstr. 25 · 44807 Bochum
bochum@haerterei.com
Handelsregister: HRB 1717
Ust-ID-Nr.: DE257486215
Steuer-Nr.: 306/5709/0368

National-Bank Essen BIC: NBAGDE3EXXX IBAN: DE89 3602 0030 0006 3781 29
VB Bochum Witten eG BIC: GENODEM1BOC IBAN: DE83 4306 0129 0123 2073 00
Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

www.haerterei.com

EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Inspection certificate

according to DIN EN 10204-3.1

Document #	**PZ-2022-0097208**
Job #	**2022-0237912-3**
Customer #	1011419
Issuer	Virzi, Laura
Telephone	0234/903660
Date	22.03.2022
Page	1/1

Parts/Process		Quantity	Weight
Your Job #:	19396/Pos.20	2	---
Your P/S. #:	Anlieferung		
Your P.O. #:	4500059979 / 30 from 09.03.2022		
Our Job #:	2022-0237912-3 of 3 from 09.03.2022		
Description:	pinion shaft		
Serial #:	PART-057699		
Drawing #:	PN00077578		
Free Field:	2053531		
RG-No.:	WE-000096440		
Material:	1.6587/18CrNiMo7-6/17CrNiMo6		
Process:	protection, case hardening, shot blasting, straightening, certificate		

Hardness requirements

Surface hardness	58-62 HRC
Case hardening depth	1,4-1,6 mm

Results	Auditor	Test date
EH:60-61 HRC CHD:1,59 mm	Rainer Theuer	21.03.2022

CHD was tested on our test-piece 18CrNiMo7-6 from the same batch.

We hereby confirm that the above parts will be treated and examined in accordance with the agreements applying on acceptance of order and based on the familiar General terms and conditions of business of Härterei Reese Bochum GmbH Edition: July 2018.

This document automatically generated valid without signature.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/9036-0
Fax +49 (0) 234/9036-96

Oberscheidstr. 25 · 44807 Bochum
bochum@haerterei.com
Handelsregister: HRB 1717
Ust-ID-Nr.: DE257486215
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National-Bank Essen BIC: NBAGDE3EXXX IBAN: DE89 3602 0030 0006 3781 29
VB Bochum Witten eG BIC: GENODEM1BOC IBAN: DE83 4306 0129 0123 2073 00
Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

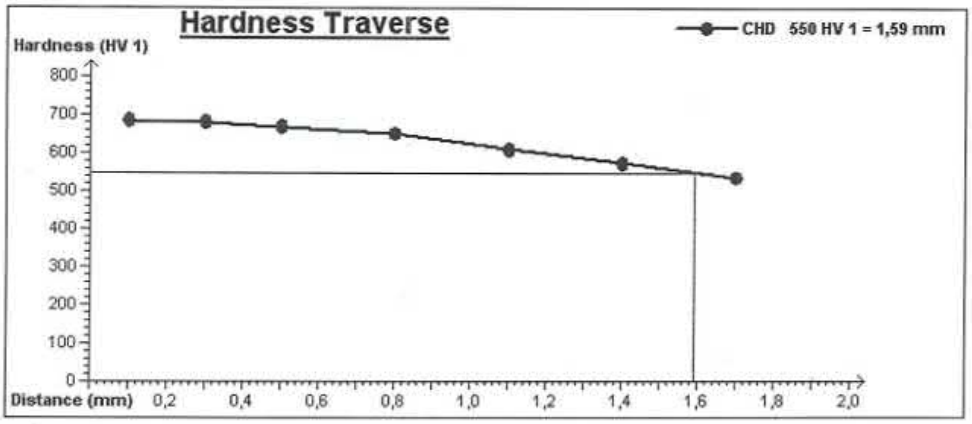
www.haerterei.com

REESE HÄRTEREI

Härterei Reese
Bochum GmbH
Oberscheidstrasse 25
44807 Bochum

Chargen-Nr.: .
Datum: 21.03.2022
Auftrags-Nr.: 2022-0237912-3
Prüfer: Labor

Kunde: Pekrun
Proben-Nr.: 18 CrNiMo7-6
H.R.Probe



Ergebnis

CHD 550 HV 1 = 1,59 mm

Reihe 1

Punkt	Abstand	Härte	Kommentar
1	0.100	686 HV 1	
2	0.300	681 HV 1	
3	0.500	669 HV 1	
4	0.800	652 HV 1	
5	1.100	611 HV 1	
6	1.400	575 HV 1	
7	1.700	536 HV 1	

QUALITÄTSWESEN HÄRTEREI REESE BOCHUM

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057699
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.451-551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Ritzelwelle / pinion shaft	PN-00077578.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Durchmesser	Ø 140 m6	+0,040 +0,015	140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03-140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03-140,04
Durchmesser	Ø 140 m6	+0,040 +0,015	140,03-140,04

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	16.05.2022	J. Nenast	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Ritzelwelle_pinion shaft_balancing report_PART-057699

```
*****************************************
Pekrun Getriebebau GmbH
Koebbingser Muehle 14
58640 Iserlohn/Germany
*****************************************
Operator : Ferdi Basar                          13.05.22 09:33
  Rotordaten              Fall   1              19396/20-057699
  a: 135.0 mm             b: 368.0 mm            c: 135.0 mm
  r1: 100.0 mm            Eb1/Eb2                r2: 100.0 mm
  m1: -polar                                     m2: -polar
  Tol1: 1889. gmm                                Tol2: 1889. gmm
                          N soll    : 1000.  1/Min
  Ergebnisse              Rotor: Ritzelwelle 1       13.05.22 09:33
  Lauf  3                 N ist     :  1001.  1/Min
Eb 1:       12.8  g                     Eb 2:       13.6  g
            222. Grad                               208. Grad
            in Tol                                  in Tol
Anteil in Tol.Einheiten  :
        1278. gmm                                1357. gmm
```

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenbaufabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057699
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451-551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Ritzelwelle / pinion shaft	PN-00077578.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m²

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Verzahnung und Wellenübergänge /* *Toothing and shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	16.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Gehäuse_housing_material certificates_PART-057669

Juan Lasa steel works

+34 943 88 28 61
info@juanlasa.com
www.juanlasa.com

Talleres Juan Lasa, S.A.
Barrio Alegi, Nº 14
20217 Gabiria (Gipuzkoa)
CIF: A-20082244

Cliente:
PEKRUN GETRIEBEBAU GMBH
Köbbingser Mühle 14
Phone: 02371/ 945-0 **Fax:**

Sent in:
Pekrun Getriebebau GmbH
Pekrun Getriebebau GmbH
58640 ISERLOHN

DELIVERY NOTE: **54.961**

Supplier Nº:	

Customer Order Ref.	Delivery Date	Order Date	TJL Order	TJL Proyect	Page
4500058885	04/03/2022	19/01/2022	54011	4614	1/1

OF	Description	Drawing Nº	Quantity
8618	GEHÄUSE	PN-00077481.000.01-0	2

Observations: 10018701 / PART-057699

TOTAL PIECES:	2

Gehäuse_housing_material certificates_PART-057669

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPQ8IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : Q8S1006030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Size	Product No.	Quantity	Weight (kg)	Heat No.	Position	Tensile Test YP (N/㎟)	Tensile Test TS (N/㎟)	Tensile Test EL (%)	Impact Test V Notch -20℃ Energy (Joule)	Division	Chemical Composition C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Cu (%)	Mo (%)	N (ppm)	Nb (%)	Ti (%)	V (%)	Sol-Al (%)
6x2500x12000	PK20727001	1	1,413	SK21827	T	502	549	31	1: 104 2: 108 3: 119 A: 110	L P	0.0762 0.0751	0.241 0.240	1.547 1.551	0.0104 0.0107	0.0020 0.0017	0.024 0.023	0.004 0.004	0.008 0.008	0.000 0.001	33 31	0.025 0.025	0.0133 0.0130	0.040 0.040	0.037 0.035
*** Sub Total (010) ***		47	66,411 (kg)																					
*** Heat Treatment ===> Normalizing rolling ***											CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5													
8x3000x12000	PK20684601-4603	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110	L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.046 0.066	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
----->8x3000x12000	PK20684701-4703	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110	L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.046 0.066	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
8x3000x12000	PK20684801-4803	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.008 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20684901-4903	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.008 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20685001-5003	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.008 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test. Direction : Transversal, Gauge Length : 5.65 √A_o (Rectangular), YP Method : Upper Point
* Impact Test. Direction : Surface Longitudinal, Sub-Size : 10mmX5.0mm
* Division - L : Ladle Analysis, P : Products Analysis
* Supply Condition : As-Rolled unless otherwise Heat Treated.

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN100025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

CE 0035 14 0035-CPR-A258 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia

Tadio Sukmadjaja / Team Leader NA SEON-HA

Copia de certificados de materiales empleados
Para el trabajo de OLAN S.A.
Realizado con la O.F. de OLAN Nº 170454
Su pedido N.º 66825
Ref.: OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPQ8IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : Q8S1006030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

Product No.	Division	Total-Al (%)	CEQ (%)	
PK20727001	L P	0.038 0.037	0.348	
*** Sub Total (010) ***			47	66,411 (kg)
PK20684601-4603	L P	0.033 0.035	0.361	
PK20684701-4703	L P	0.033 0.035	0.361	
PK20684801-4803	L P	0.035 0.034	0.348	
PK20684901-4903	L P	0.035 0.034	0.348	
PK20685001-5003	L P	0.035 0.034	0.348	

CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN100025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

CE 0035 14 0035-CPR-A258 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia < PAGE : 172 > Testing and Inspection Team Leader NA SEON-HA

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000008647

Date : 09.12.2020

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355 J2+N Plate Dimension -Thickness x Width x Length : 20.00MMX2950MMX11600MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
A02613	A0261302A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261302B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261302D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261303A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261303B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261303D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261304A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261304B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
Sub Total		8	42.984																													

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification.
The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions
UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PL/10025 13.08.2020
Despatch Advice No:
Vehicle No
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000008647

Date : 09.12.2020

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355 J2+N Plate Dimension -Thickness x Width x Length : 20.00MMX2950MMX11600MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
A02613	A0261311B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261311D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261312A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261312B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261312D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261313A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261313B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261313D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02614	A0261401A0	1	5.373	L	0.187	1.37	0.003	0.013	0.18	0.026	0.004	0.001	0.005	0.002	0.0040	0.006	0.0004	0.009	59	0.41	394	553	32		210	210	190	203.33	-20	Lo.
A02614	A0261401B0	1	5.373	L	0.187	1.37	0.003	0.013	0.18	0.026	0.004	0.001	0.005	0.002	0.0040	0.006	0.0004	0.009	59	0.41	394	553	32		210	210	190	203.33	-20	Lo.
Sub Total		38	204.174																												

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification.
The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/10025 13.08.2020
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000008647

Date : 09.12.2020

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PL.TA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition: NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355 J2+N Plate Dimension -Thickness x Width x Length : 20.00MMX3000MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Origin
					Chemical Analysis																Mechanical Properties									
B08643	B0864303B0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864303D0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864304A0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864304B0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864304D0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864305A0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864305B0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864305D0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
Sub Total		9	50.868																											
G Total		161	813.897																											

Remarks :
1. Test Certificate as per EN 10204, 2004 Type 3.1

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification.
The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions
UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/10025 13.08.2020
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000008647

Date : 09.12.2020

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PI.TA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-M04606C: Rev.01, Dt.:08.08.2020
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class B
5. Surface Inspection: As per EN10163:2005 class A Subclass 3
6. Flatness: As per EN10029:2011 table 4 class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW): C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
11. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification.
The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/10025 13.08.2020
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
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Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

JINDAL STEEL & POWER

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INSPECTION CERTIFICATE

Test Certificate No. 0000011094

Date : 16.10.2021

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** **Plate Dimension -**Thickness x Width x Length : **25.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)						
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orien
B17532	B1753211D0	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.018	56	0.42	419	552	27		322	334	309	321.67	-20	Lo.
B17532	B1753211D0	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.018	56	0.42	419	552	27		322	334	309	321.67	-20	Lo.
B17533	B1753301A0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753301B0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753301D0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753302A0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753302B0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753302D0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753303A0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753303B0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
Sub Total		17	99.246																													

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
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JINDAL STEEL & POWER

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INSPECTION CERTIFICATE

OLAN SA
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01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N Plate Dimension** -Thickness x Width x Length : **8.000MMX3000MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)						
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orien
B16737	B1673710E0	1	2.211	L	0.180	1.33	0.004	0.016	0.21	0.050	0.007	0.001	0.021	0.002	0.0010	0.009	0.0005	0.014	56	0.40	432	589	28		94	98	107	99.670	-20	Lo.
Sub Total		1	2.211																												
G Total		114	670.884																												

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-00733A; Rev.02, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B
5. Surface Inspection: As per EN10163 class A Subclass 3
6. Flatness: As per EN10029 Class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) :C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
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Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
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INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

Page 16 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

11. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

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INSPECTION CERTIFICATE

Test Certificate No. 0000011045

Date : 14.10.2021

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
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01250 Araia - Alava - Spain
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olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF = Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** **Plate Dimension -**Thickness x Width x Length : **50.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																Mechanical Properties									
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
			MT																											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
A13620	A1362001A0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0005	0.018	56	0.42	405	536	27		126	132	144	134.00	-20	Lo.
A13620	A1362001B0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0005	0.018	56	0.42	405	536	27		126	132	144	134.00	-20	Lo.
B17069	B1706906A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706906B0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706907A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706907B0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706908A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	390	538	26		144	134	133	137.00	-20	Lo.
Sub Total		7	82.075																											

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
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Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

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olan@olan.es

Test Certificate No. 0000011045

Date : 14.10.2021

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF = Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N Plate Dimension -**Thickness x Width x Length : **55.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)						
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orien
B16535	B1653506A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.001	0.0020	0.010	0.0003	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo.
B16535	B1653508A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.001	0.0020	0.010	0.0003	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo.
Sub Total		3	38.709																													
G Total		157	1150.149																													

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/- 00733A; Rev.2, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class B
5. Surface Inspection: As per EN10163:2005 class A Subclass 3
6. Flatness: As per EN10029:2011 table 4 class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) : C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

CE
0045
13
0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011045

Date : 14.10.2021

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF = Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
11. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH-63, AtPo : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab pordrangul jpl.com
Registered Office:Post box No. 6,O.P.Jindal Marg Hisar (Haryana)
Corporate Office:Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:(06764) 254101-05, Fax : (06764) -254141-44

INSPECTION CERTIFICATE

CE
0045
13
0045 - CPR - 1035
Date : 01.09.2019

Test Certificate No. 0276
To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition: Furnace Normalized
Deoxidation :Fully Killed

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Material Grade : EN10025-2:2005 S355J2+N Plate Dimension -Thickness x Width x Length : 55.00MMX2500MMX12000MM

Heat No	Plate No	No of Pcs	Wt MT	Chemical Analysis (Laddle)																Mechanical Properties									
																				<=25mm Flat & >25mm Round Sample				Impact (V Notch Charpy) Value at 0 Deg C (10*10*55 mm)					
				%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	%Copper	CE	YS(Mpa)	UTS(Mpa)	%El	Orien	I	II	III	Avg	Temp	Orien
883700	05A0, 09A0, 10A0, 11A0, 12A0, 13A0, 14A0	7	90.671	0.18	1.46	0.002	0.02	0.22	0.021	0.005	0.003	0.045	0.015	0	0.005	0.0015	0.023	.49	0.429	391	555	28	T	121	100	130	117.00	-20	L
																				386	549	30	T	129	137	111	125.67	-20	L
883702	01A0, 02A0, 03A0, 04A0, 05A0, 06A0, 07A0, 08A0, 09A0, 11A0, 12A0	11	142.483	0.173	1.45	0.002	0.015	0.2	0.024	0.007	0.002	0.046	0.018	0	0.006	0.0015	0.018	.51	0.42	389	576	27	T	115	122	110	115.67	-20	L
																				382	542	27	T	110	108	98	105.33	-20	L
883781	12A0	1	12.953	0.183	1.45	0.002	0.015	0.18	0.021	0.006	0.002	0.045	0.018	0.0000	0.006	0.0017	0.022	.55	0.430	366	492	32	T	78	72	68	72.67	-20	L

Sridhar Behera
AGM, QA & QC
Jindal Steel & Power Ltd.
Angul, Odisha, India

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, A/Pu.: Jindal Nagar, Dist.: Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6, O.P.Jindal Marg, Hisar (Haryana)
Corporate Office: Jindal Center,12 Bhikaji Cama Palace, New Delhi -11 006 INDIA
Phone No.:(06761) 254100-05, Fax :+06761 -254141-44

CE
0045
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0045 - CPR - 1835
Date : 01.09.2018

INSPECTION CERTIFICATE

Test Certificate No. 0276
To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF B83,SPAIN,PIN-00000

TEST RESULTS

Supply Condition: Furnace Normalized
Deoxidation :Fully Killed

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Remarks :
1. Test Certificate as per EN 10204, 2004 Type 3. 1
2. Material mentioned above also conforms to EN10025-2:2005, S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANG/IL/TDC/-M1216; Rev.00, Dt.: 22.01.2018
4. Supply Condition: Furnace Normalized at 900 ± 20°C, Cycle time: 1.4 minutes per mm thickness + 10 minutes Soaking
5. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class A
6. Surface Inspection: As per EN10163:2005 class A Subclass 3
7. Flatness: As per EN10029:2011 table 4 class N (L Type)
8. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
9. CE (IIW) : C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
10. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
11. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
12. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification
UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160:1999 S1E1 and found ok

Purchase Reference & Date: PRUV/EXP/PLT/8019/LOT 2/ 04.07.2018
* DOP can be viewed at www.jindalsteelpower.com", DOP No.: JSPL/CE/PL/S35512
* Gauge Length: 5.65(SO)1/2

Sridhar Behera
AGM, QA & QC
Jindal Steel & Power Ltd.
Angul , Odisha, India

Authorised Signatory
QA/QC Plate Mill

JSPL/ANG/PM-QA&QC/F-25J

Gehäuse_housing_material certificates_PART-057669

검 사 증 명 서
MILL TEST CERTIFICATE

HYUNDAI STEEL
0038/07
당진제철소 : 충남 당진시 송악읍 복운산업로 1480
1480 Bulbusanup-Ro, Songak-Eup, Dangjin-Si, Chungnam, Korea

주문번호 Order No. : F171200026
품 명 Commodity : Hot Rolled Steel Plate
제품규격 Specification : EN 10025-2 S355J2+N

고객사 Customer : OLAN
주문자 Contractor : HYUNDAI CORPORATION

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

증명서 번호 Certificate No. : 20180301-PS-010-003
발행일자 Date of Issue : 2018-03-01

제품치수 Dimension	수량 Quantity	중량 Weight (Kg)	제강번호 Heat No.	제품번호 Product No.	Position	인장시험 Tensile Test YP	TS	EL	YP-EL	RA	YR	YP Mtd	충격시험 Impact Test V Notch -20.0 ℃ Energy	SF	LE	Division	화학성분 Chemical Composition(%) C	Si	Mn	P	S	Cr	Ni	Cu	Mo	N	Nb	Ti	V	Sol-Al	CEQ
						(N/mm²)		(%)	(%)	(%)	(%)		(Joule)	(%)	(mm)		4	3	3	4	4	2	2	3	2	4	3	3	3	3	3
65 x 2500 x 12000	1	15,306	P59185	FA92167401	T	380.6	514.1	32				U	1: 263			L	1,152	210	1,454	147	40	2	10	82	0	41	31	16	1	30	374
													2: 312			P	1,201	207	1,453	160	37	2	10	78	0	37	29	16	2	27	379
													3: 255																		
													A: 277																		
65 x 2500 x 12000	1	15,306	P59185	FA92167501	T	380.6	514.1	32				U	1: 263			L	1,152	210	1,454	147	40	2	10	82	0	41	31	16	1	30	374
													2: 312			P	1,201	207	1,453	160	37	2	10	78	0	37	29	16	2	27	379
													3: 255																		
													A: 277																		
65 x 2500 x 12000	1	15,306	P59753	FA92223601	T	384.1	500.0	32				U	1: 313			L	1,142	198	1,455	145	38	2	9	81	1	43	29	15	2	32	374
													2: 272			P	1,147	191	1,452	118	25	2	9	82	1	35	29	16	1	34	374
													3: 320																		
													A: 302																		
65 x 2500 x 12000	1	15,306	P59750	FA92223701	T	389.8	501.2	32				U	1: 288			L	1,170	186	1,454	156	35	2	8	81	0	41	29	16	2	36	374
													2: 313			P	1,247	194	1,428	134	37	2	9	79	1	36	31	16	1	31	380
													3: 255																		
													A: 285																		

단위 Unit 2 : x 100 3 : x 1,000 4 : x 10,000 5 : x 100,000

NOTE
- Position – T:Top, M:Middle, B:Bottom
- Tensile test – Direction:Transverse, Gauge length:5.65√A₀ (Round), YP Mtd : 2 (0.2% off-set),5 (0.5% underload), U (Upper yield point), L (Lower yield point)
- Impact test – Direction:Longitudinal, Size:10mmX10mm, SF:Shear fracture, LE:Lateral Expansion
- Division – P:Product analysis, L:Ladle analysis

- THIS CERTIFICATE IS ISSUED ACCORDING TO EN 10204 3.1 AD2000W0(W1)
This Mill Test Certificate is issued in accordance with EN 10204 Type 3.1

상기의 제품은 검사의 결과 주문요구사항과 지정된 규격에 합격한 것을 증명합니다.
WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ORDER AND SPECIFICATION

Signature S. B. Park
Chief Of Quality Assurance Team

- 본 검사증명서는 원본인 전자문서(전자서명 정보 포함)로부터 출력된 사본입니다. 전자문서의 내용은 현대제철 고객포털에서 확인하실 수 있습니다.(http://sm.hyundai-steel.com/cs/cm/login.jsp)
- This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signing).
You are able to check an original electronic document at hyundaisteel's customer portal.(http://sm.hyundai-steel.com/cs/cm/login.jsp) ★ QRcode scanner App : 'QReal'
- [사용상 주의사항] 본 검사증명서에 명기된 규격 외 사용시 제품손상 및 안전상 문제가 발생할 수 있습니다.
- [Caution for Use] Damage on products and safety problems may arise if used other than to the spec stated in this Mill Test Certification.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

CE 0045

13

0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011096

Date : 16.10.2021

Page 1 of 2

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:FURNACE NORMALIZED

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** **Plate Dimension -**Thickness x Width x Length : **130.0MMX2200MMX8550MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																		Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)					
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orien
A13625	A1362506A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362507A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362508A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
--> A13625	A1362509A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
B16531	B1653102A0	1	19.196	L	0.182	1.47	0.002	0.016	0.20	0.037	0.006	0.045	0.046	0.011	0.0010	0.011	0.0005	0.015	57	0.44	330	524	26		188	159	166	171.00	-20	Lo.
Sub Total		5	95.980																											
G Total		5	95.980																											

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3. 1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-00733A; Rev.02, Dt.:09.03.2021
4. Supply Condition: Furnace Normalized at 900 ± 20°C, cycle time minimum: 1.4 minutes per mm thickness + 10 minutes.
5. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:48:30
Printing Date 18.10.2021 & Time 11:22:14

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

CE
0045
13
0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011096

Date : 16.10.2021

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:FURNACE NORMALIZED

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

6. Surface Inspection: As per EN10163 class A Subclass 3
7. Flatness: As per EN10029 Class N (L Type)
8. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
9. CE (IIW) :C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
10. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
11. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
12. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:48:30
Printing Date 18.10.2021 & Time 11:22:14

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

OLAN, S.A.
PRODUCTOS METALICOS - CORTE A MEDIDA
OXICORTE - TRATAMIENTOS ANTICORROSIVOS

INFORME DE INSPECCIÓN POR ULTRASONIDOS
ULTRASONIC INSPECTION REPORT

Nº Informe (Report): **O.F. 170.454**

Cliente: Customer:	JUAN LASA	**Nº Pedido:** Order:	66.835	**Referencia:** Reference:	OF.8618
Descripción: Description:	Chapa	**Norma:** Standard:	UNE-EN 10160:2000	**Clase:** Grade:	S2 + E2
Tipo de material: Type of material:	Chapas de acero			**Acabado superficial:** Surface finish:	Laminación
Equipo: Equipment:	KRAUTKRAMER USM 32			**Acoplamiento:** Couplant:	AGUA

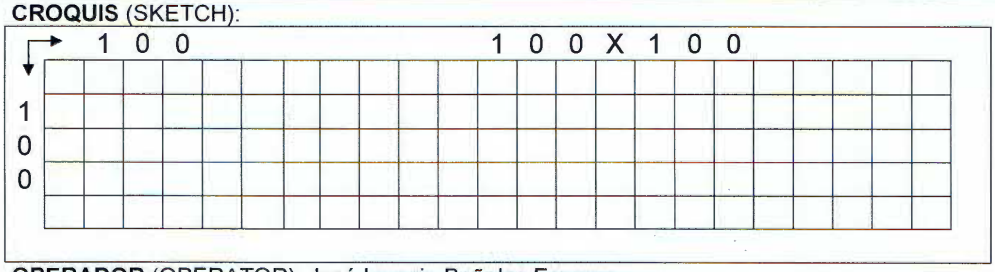
PALPADOR - PROBE				CALIBRACIÓN - CALIBRATION				
TIPO TYPE	FREC. FREQ (MHz.)	TAMAÑO SIZE (mm.)	Espesor Thickness (mm.)	PARA CAMPO FOR RANGE	CAMPO RANGE (mm.)	TALADRO REGISTRO REC. HOLD	PARA LA GANANCIA FOR GAIN	GANANCIA GAIN
SEB-4T	4	Ø 24 mm	8 / 65	Chapa	16 / 130	Ø 5 mm.	80 % ECO	42 / 56 dB
B2S-E	2	Ø 24 mm	130	Chapa	260	Ø 8 mm.	80 % ECO	46 dB

RESULTADOS (RESULTS):
Se ha efectuado la inspección por ultrasonidos según la norma UNE-EN10160:2000 según clases S2 + E2 al siguiente material / The inspection by ultrasonic test has been made in accordance with UNE-EN10160:2000 standard and S2 + E2 grade the following material:

1 chapa/*plate* 8 x 3000 x 12000 (S-355-J2+N):	PK20684701
1 chapa/*plate* 20 x 2500 x 12100 (S-355-J2+N):	A0261304A0 / A0261311D0
1 chapa/*plate* 25 x 2500 x 12000 (S-355-J2+N):	B1753303A0
1 chapa/*plate* 50 x 2500 x 12000 (S-355-J2+N):	B1706906A0
1 chapa/*plate* 55 x 2500 x 12000 (S-355-J2+N):	B8370204A0
1 chapa/*plate* 65 x 2500 x 12000 (S-355-J2+N):	FA92167401
1 chapa/*plate* 130 x 2200 x 8550 (S-355-J2+N):	A1362509A0

En dicha inspección se han detectado indicaciones que NO superan el nivel de referencia, por lo que se clasifica la chapa como ACEPTABLE / In this inspection weren't found indications exceeding the reference level, so the material is classified as **ACCEPTABLE.**

CROQUIS (SKETCH):



OPERADOR (OPERATOR): José Ignacio Bañales Esparza
Nº CERTIFICADO (CERTIFICATE NR.): E-A-004397-UT-2-M-2
FECHA (DATE): 14/02/2022

OLAN, S.A.
Pol. Ind. Asparrena - C/ Amezaga, 9
01250 ARAIA (ALAVA)
Tl.: 945 31 46 61 Fax 945 31 45 89

Gehäuse_housing_material certificates_PART-057669

INTEC Inspección Técnica email: intec.era@gmail.com Tel: 696 320 618 / Lasao, Gipuzkoa	INSPECCIÓN VISUAL *(Visual Testing)*	INFORME Nº *(ReportNr.)* 220302

CLIENTE *(Customer)*	ORDEN DE FABRICACIÓN *(Purchaseorder)*	PLANO CLIENTE *(CustomerDrwg).*
TALLERES JUAN LASA, S.A.	65.516/ OF 8618	PART-057669
DESIGNACIÓN *(Item)*	**MATERIAL** *(Material)*	**SOLDADURA** *(Welding)*
GEHÄUSE (2 piezas)	S355J2+N	FW / BW

CONDICIONES DE EXAMEN(Examination Conditions)

ILUMINACIÓN *(Ilumination)*		SOLDADURA *(Welding)*		ESTADO DE LA SUPERFICIE *(Surface status)*
				SOLDADURA EN BRUTO
Natural *(Natural)*	Artificial *(Artificial)*	Procedimiento *(Proced.)*	Tipo Junta *(Jointtype)*	PROCEDIMIENTO DE INSPECCIÓN *(Inspectionprocedure)*
	X	MAG	FW/BW	UNE EN ISO 17637

ESPECIFICACIÓN *(Specification)*	OBSERVACIONES (Observations)
S/EN5817	
GRADO *(Grade)*	**RESULTADO DEL EXAMEN** *(ExaminationResults)*
C	ACEPTABLE

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.

(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-002024-VT-2-S-3 *(Level 2 Inspector)*	FECHA *(Date)*
INTEC Inspección Técnica email: intec.era@gmail.com Tel: 696 320 618 / Lasao, Gipuzkoa	01/03/2022

Gehäuse_housing_material certificates_PART-057669

INTEC Inspección Técnica	EXAMEN POR LÍQUIDOS PENETRANTES *(Examfor penetran liquids)*	INFORME Nº *(ReportNr.)* 220219

CLIENTE *(Customer)*	PEDIDO CLIENTE *(Purchaseord.)*	PLANO CLIENTE *(PurchaseDrwg.)*
TALLERES JUAN LASA, S.A.	65.516/ OF 8618	PART-057669

MATERIAL *(Material)*	COLADA *(Heat)*
S355J2+N	--

DESIGNACIÓN *(Item)*
GEHÄUSE

LIMPIEZA *(Cleaning)*	TIPO DE PENETRANTE *(Type of penetrating)*	ELIMINADOR *(Eliminator)*	REVELADOR *(Revealer)*
ARDROX 9PR5	ARDROX 996 PB	ARDROX 9PR5	ARDROX LD7

MÉTODO *(Method)*
LIQUIDOS PENETRANTES COLOREADOS LAVABLES CON DISOLVENTE

ESTADO DE LA SUPERFICIE *(State of thesurface)*
SOLDADURAS EN BRUTO

OBSERVACIONES *(Observations)*

ACEPTADOS *(Accepted)*	RECHAZADOS *(Rejected)*
2 PIEZAS	--

PROCEDIMIENTO *(Specification)*	GRADO DE EXIGENCIA *(Demand grade)*
EN ISO 23277	3X

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.
(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-002024-PT-2-S-3	FECHA
INTEC Inspección Técnica email: intec.ena@gmail.com Tel: 696 320 618 / Lazkao Gipuzkoa	01/03/2022

05 – PT – IT – M

Gehäuse_housing_material certificates_PART-057669

Juan Lasa Steel-Work	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order* 4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL* 6618-1

Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		568		22				
2	485+D		499		23				
3	185		183		24				
4	330		330		25				
5	65		65		26				
6	Ø360-D		Ø337		27				
7	Ø330-D		Ø307		28				
8	310		310		29				
9.	Ø300-D		Ø277		30				
10	Ø300-D		Ø277		31				
11	520		522		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

Responsable control final/ *Final Control responsable*

2-3-22

www.juanlasa.com www.jlsteelwork.com

Gehäuse_housing_material certificates_PART-057669

Juan Lasa steel-works	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order*	4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL*	0618-2

Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		570		22				
2	485+D		500		23				
3	185		183		24				
4	330		330		25				
5	65		65		26				
6	Ø350-D		Ø357		27				
7	Ø330-D		Ø308		28				
8	310		310		29				
9.	Ø300-D		Ø277		30				
10	Ø300-D		Ø278		31				
11	520		523		32				
12	770+D		783		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

Responsable control final/ *Final Control responsable*

2-3-22

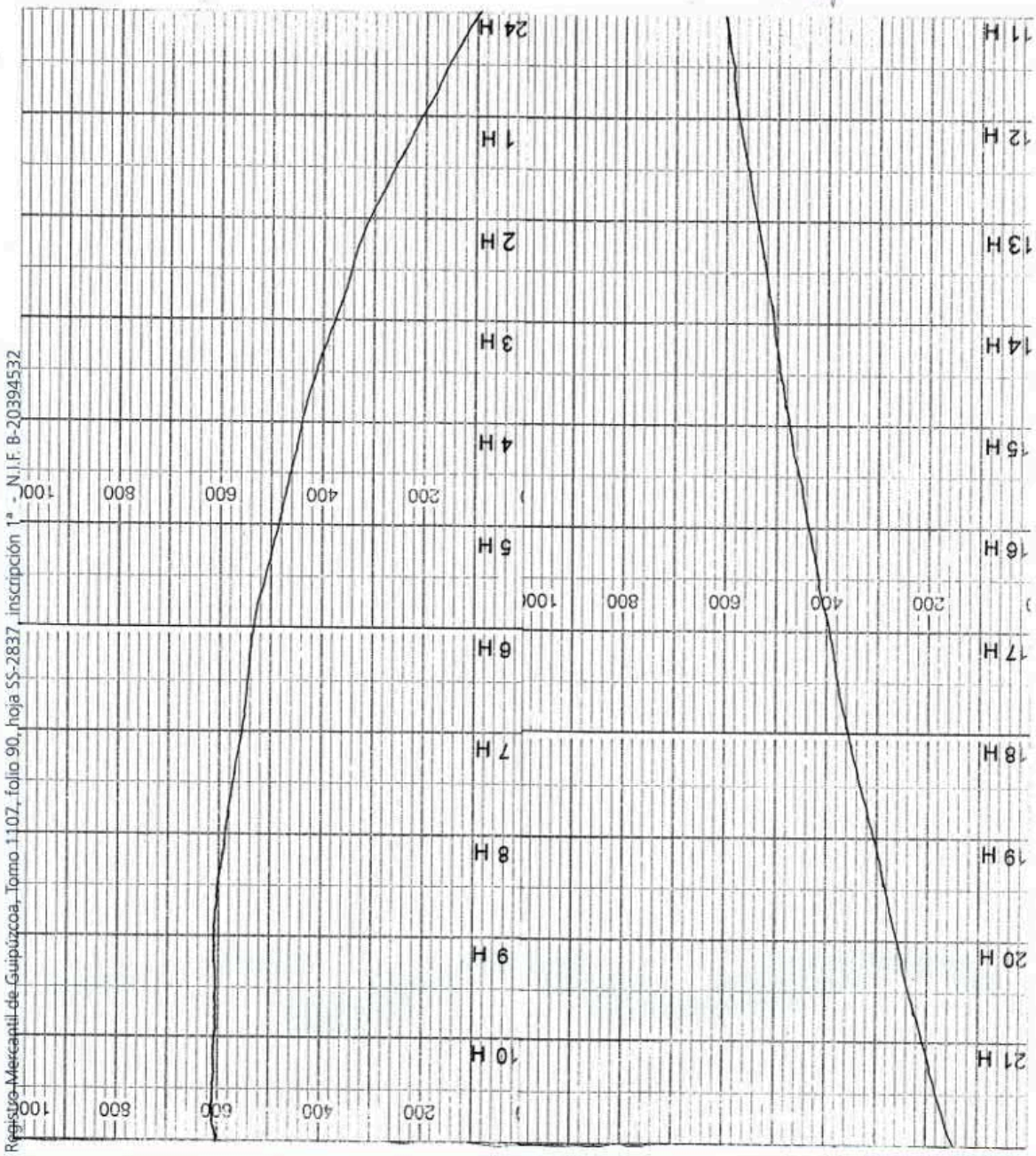
www.juanlasa.com

Gehäuse_housing_material certificates_PART-057669

muñagorri S.L.
recubrimientos

Talleres Juan Lasa, S.A.
Nº Reg. 03-03-2022
Pdo. 65.525, OF 8618
2 GEHÄUSE s/p PN-00077481.000.01-0
Estabilizado 600ºC

RECUBRIMIENTOS MUÑAGORRI, S.L.
Polígono Industrial Beotibar
20491 BELAUNTZA



Registro Mercantil de Guipúzcoa, Tomo 1107, folio 90, hoja SS-2837, inscripción 1ª - N.I.F. B-20394532

Polígono Industrial Beotibar, s/n Tel. 943 67 30 28 Fax 943 67 01 35 20491 BELAUNTZA (Gipuzkoa)

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451+551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Gehäuse / housing	PN-00077481.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagerbohrung	Ø 360 H7	+0,057 0	360,045-360,05
Lagerbohrung	Ø 360 H7	+0,057 0	360,045-360,05
Lagerbohrung	Ø 300 H7	+0,052 0	300,03-300,04
Lagerbohrung	Ø 300 H7	+0,052 0	300,03-300,04
Achshöhe	550	0 -0,2	i.O.
Ankerlöcher	Ø 42		i.O.
Lochabstand	400		i.O.
	700		i.O.
	380		i.O.
	380		

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	23.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 2

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060562
Werks-Nr.: *Works no.:*	Material-No.: 2000064792	Kennwort: *Code word:*	Projekt-Nr. 4000369 S/No. 10002292

Menge *Quantity*	Benennung *Designation*	Getriebetyp *Gearbox type*	Zeichnungs-Nr. *Drawing no.*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW	PN-00096635.001.01

Technische Daten Getriebe / *Technical data gear unit*			
Leistung/*power*	3600 kW	Übersetzung/*ratio*	i = 2,9231:1
Ölmenge/*oil quantity*	270 l / 56 l/min	Drehzahl/*number of revolution*	n_1 =1493 min^{-1}
Ölviscosität/*oil viscosity*	ISO VG 320	Drehzahl/*number of revolution*	n_2 = 510,8 min^{-1}
Anordnung Antrieb *drive arrangement*	Horizontal	Anordnung Abtrieb *output arrangement*	Horizontal
Drehrichtung Abtrieb *sense of rotation (output)*	CCW	Schmierung *lubrication*	recirculation lubrication

Messprotokoll für Getriebe / *measuring data report for gear unit*

Tragbilder und Zahnspiele
meshing patterns and gear clearance of the toothing

Prüfergebnis:

Die Tragbilder und Zahnspiele der Verzahnungen wurden während der Getriebemontage nach den Zeichnungen geprüft und entsprechen den, der Konstruktion vorgegebenen, Qualitätsanforderungen.

Test result:

The meshing patterns and gear clearances of the gear toothing were checked during gear assembly according to the drawings and correspond to the quality instructions specified by the construction.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	18.05.2022	M. Hammann	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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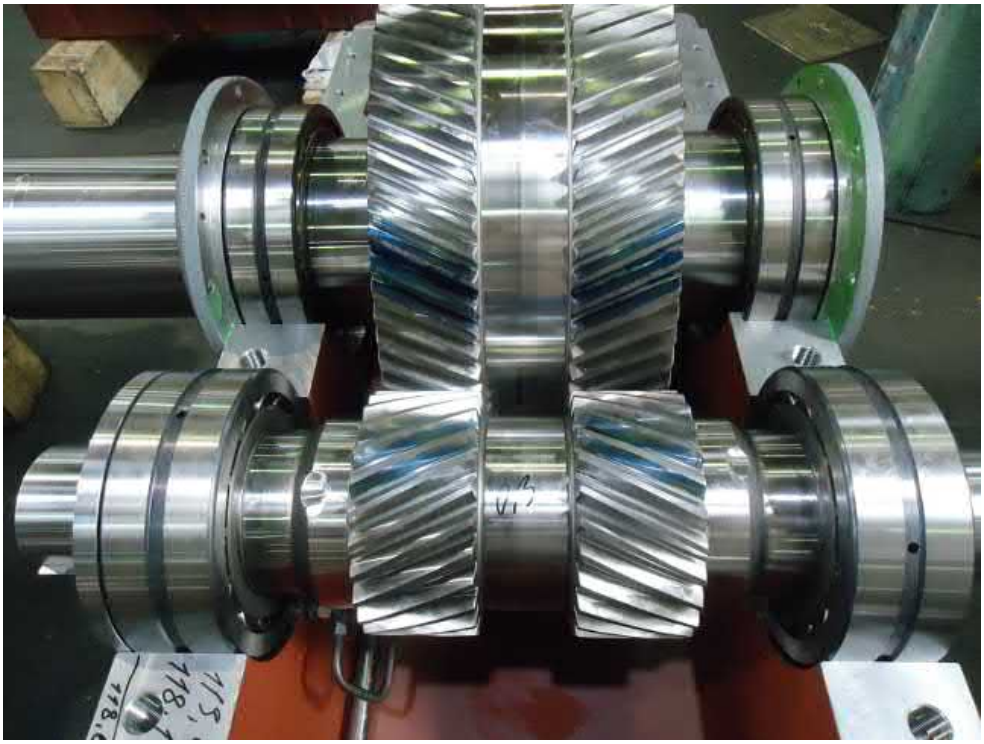
Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]



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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060562
Werks-Nr.: *Works no.:*	Material-No.: 2000064792	Kennwort: *Code word:*	Projekt-Nr. 4000369 S/No. 10002292

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Stirnradgetriebe /*spur gear gearbox*	PN-00096635.001.01

Maßprotokoll der Anschlussmaße
measurement report of the connection dimensions

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Antriebswelle / *Input shaft*	Ø 140 m6	+0,040 +0,015	140,04
Höhe / *height*	550	0 -0,2	i.O.
Länge / length	180	+0,5 -0,5	i.O.
Abtriebswelle / Output shaft	Ø 240 m6	+0,046 +0,017	240,03
Höhe / *height*	550	0 -0,2	i.O.
Länge / *length*	292	+0,5 -0,5	i.O.
Fußlochabstand / *distance of the Housing holes*	400/220/480	+0,8 -0,8	i.O.
Fußlochabstand / *distance of the Housing holes*	380/380	+0,8 -0,8	i.O.
Fußlöcher / *housing holes*	Ø 42	+0,3 -0,3	i.O.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	31.05.2022	J. Nenast	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 1 von 3

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20-1
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060562
Serial-Nr.: *Serial- No.:*	10002292	Probelaufdatum: *Test run date::*	28.05.2022

Menge/*Quantity*	Benennung/*Designation*	Getriebe-Typ/*Gearbox type*
1	Getriebe	ASR 450-R-CCW

Technische Daten Getriebe / *Technical data gear unit*					
Leistung/ *power*	P [kW]	3600	Drehmoment/ *torque*	T [Nm]	-
Übersetzung/ *ratio*	i	2,9231:1	Drehzahl/ *number of revolution*	n1 [1/min]	1493
Drehrichtung/ *sense of rotation*		CCW	Drehzahl/ *number of revolution*	n2 [1/min]	510,8
Ölviscosität/ *oil viscosity*	[cST 40°C]	320	Schmierung/ *lubrication*		Circulating oil lub.
Ölmenge / *oil quantity*	[l/min]	56	Ölfüllmenge/ *oil filling quantity*	[l]	270

Probelaufprotokoll / test run report

Antriebsdrehzahl beim Probelauf *drive number of revolution during test run*	n1 [1/min]	Ist / *actual value* 1493
Abtriebsdrehzahl beim Probelauf *output number of revolution during test run*	n2 [1/min]	Ist / *actual value* 511

Temperaturen nach Laufzeit *Temperature after running time*			Lager antriebsseitig *bearing on drive side*	Lager abtriebsseitig *bearing on output side*
Antrieb/*drive*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	42	51
Abtrieb/*output*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	35	45
Öltemperatur /*oil temperature*		[°C]	43	

Separate Temperaturaufzeichnung mit Datenlogger, mit „JA“ oder „NEIN“ bestätigen *Separate temperature recording with data logger, confirm with "YES" or "NO*		Ja
Laufzeit Probelauf /*running time test run*	[h]	4
Ölfüllmenge/ *oil filling quantity*	[l]	270
Ölmenge/ *oil flow rate*	[l/min]	56
Probelauföl/ *test run oil*	[cST 40°C]	ISO VG 320

Erfassen des Öldruckes/ *recording the oil pressure*		
Öldruck bei Probelaufstart/ *oil pressure at test run start* (mit Angabe der Öltemperatur / with indication of the oil temperature)	3,0 bar @ 24C°	
Öldruck bei Beharrungstemperatur (alternativ nach Laufzeit h) *Oil pressure at steady-state temperature (alternatively after running time h)*	Soll / *nominal value* bar @ C°	Ist / *actual value* 1,8 bar @ 43C°

Öldichtigkeit des Getriebes, mit „i.O.“ oder „n.i.o.“ bestätigen *oil tightness of the gearbox, confirm with "i.O." or "n.i.o.*	i.O

Schwingungsmessung/ *vibration measurement*	
Schwingungsmessung gemäß Beschreibung, mit „JA“ oder „NEIN“ bestätigen *vibration measurement acc. to description, confirm with "YES" or "NO*	Ja
Messpositionen nach Vorgaben in der Maßzeichnung, mit Angabe (x) bestätigen *measuring positions acc. to specifications in the dimensional drawing, confirm with indication (x)*	x

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 2 von 3

Funktionsprüfung von Zubehörteilen/ *functional test of accessory parts*	
Zubehör auf Funktion geprüft (Durchflusswächter, Druckwächter, etc.), mit Angabe (x) bestätigen *Accessories checked for function (flow monitor, pressure monitor, etc.), confirm with indication (x)*	-

Erfassen der Serialnummern/ *recording the serial numbers*	
Erfassen aller Serialnummern des verbauten Zubehörs am Getriebe, mit Angabe (x) bestätigen *recording of all serial numbers of the installed accessories on the gearbox,/ confirm with indication (x)*	x

Prüfungen Mühlengetriebe/ *tests mill gear unit*		
Maß X/ *dimension X*	[mm]	
Anschlussflanch/ *connecting flange*		
Radialschlag/ *radial run-out*	[mm]	
Axialschlag/ *axial run-out*	[mm]	

Weitere Prüfungen/ *further tests*			
Schallpegel in 1m Entfernung *sound level at 1m distance*	[dB(A)]	Soll / *nominal value*	Ist / *Actual value*
		-	76 dB
Innenkonservierung, mit Angabe Konservierungsmittel *interior conservation,* with indication of preservative			VCI
Ölfilter gereinigt, mit Angabe (x) bestätigen *oil filter cleaned, confirm with indication (x)*			-

Bilder Probelaufaufbau / *pictures test run bench*

Bilder Öldruck bei Start /
pictures oil pressure at start

Bilder Öldruck bei Beharrungstemperatur /
Pictures oil pressure at steady-state temperature

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 3 von 3

Bilder Durchflusswächter bei Start /
Pictures flow monitor at start

Bilder Durchflusswächter bei Beharrungstemperatur /
Pictures Flow monitor at steady-state temperature

Bilder Funktionsprüfung Instrumentierung und Zubehör /
Pictures Functional test instrumentation and accessories

Bemerkung: Probelauf ohne Last. Während des Probelaufs wurden keine Undichtigkeiten am Getriebe festgestellt.

Remark : Test run without load. During the test run, no leaks were detected at the gearbox.

Prüfer / Inspector:	J. Nenast
Datum / Date:	28.05.2022

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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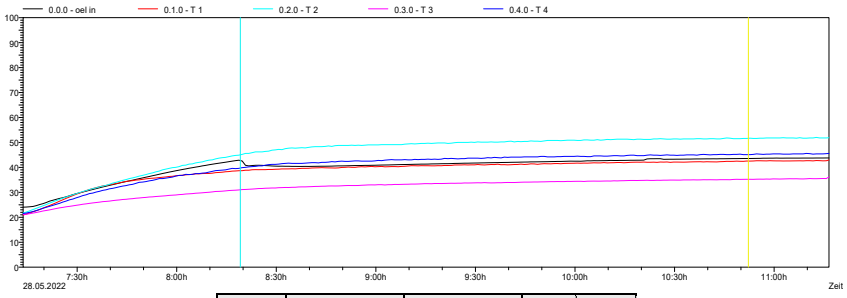
Probelaufdiagramm
test run diagram

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	Werks-Nr.: *Works no.:*	Material No. 2000064792	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-20-1
Bestell-Nr.: *Order no.:*	4500494756	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292	Artikel-Nr.: *Article no.:*	PART-060562

Temperaturverlauf / *temperature profile*



Messstelle	Linker Cursor		Rechter Cursor		Differenz		Mittelwert	
Zeit	28.05.2022, 08:19:09		28.05.2022, 10:52:14		02:33:04			
0.0.0 - oel in	42,87	°C	43,56	°C	0,69	°C	41,915	°C
0.1.0 - T 1	38,65	°C	42,52	°C	3,87	°C	40,982	°C
0.2.0 - T 2	44,9	°C	51,7	°C	6,8	°C	49,85	°C
0.3.0 - T 3	30,96	°C	35,22	°C	4,26	°C	33,692	°C
0.4.0 - T 4	39,6	°C	45,1	°C	5,5	°C	43,54	°C

	58640 Iserlohn	28.05.2022	J. Nenast
	ORT / *INSPECTION LOCATION*	DATUM / *DATE*	PRÜFER / *INSPECTOR*

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

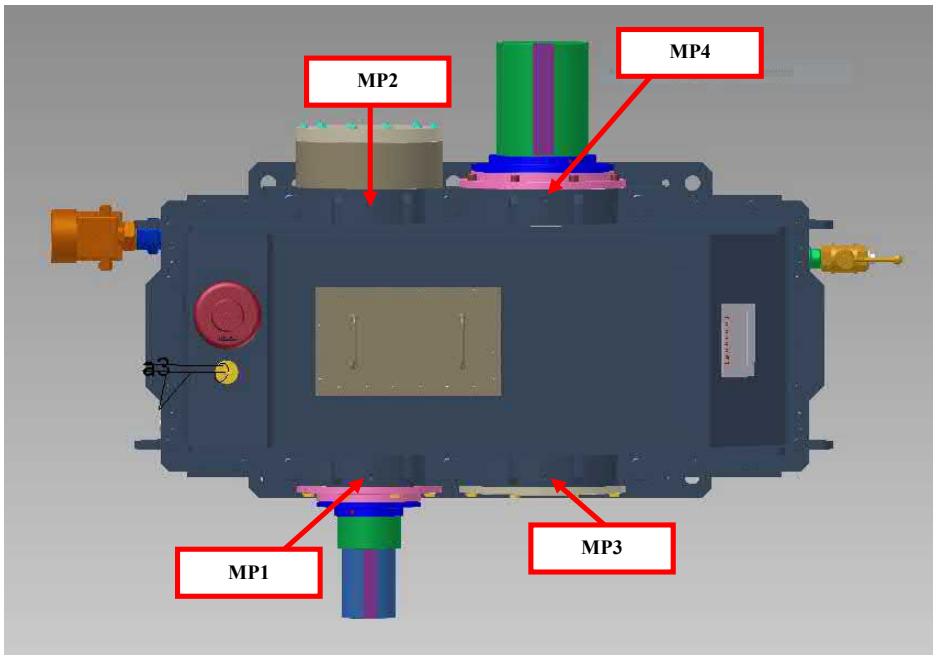
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Auftraggeber: customer:	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: PEKRUN com.-no.:	19396/20-1
Bestell-Nr.: order no.:	4500494756	Zeichnungs-Nr.: drawing no.:	PART-060562
Auftrags-Nr.: works no.:	Material-No.: 2000064792	Kennwort: code word:	Projekt-Nr. 4000369 S/No. 10002292

Menge/quantity	Benennung/designation	Getriebe-Typ/gear unit type
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW

Gearbox overview



Remarks:
Measuring points acc. to dimensional drawing.

Test result:
The results of the test run comply with the Pekrun quality specifications. The test results are listed on the second page.

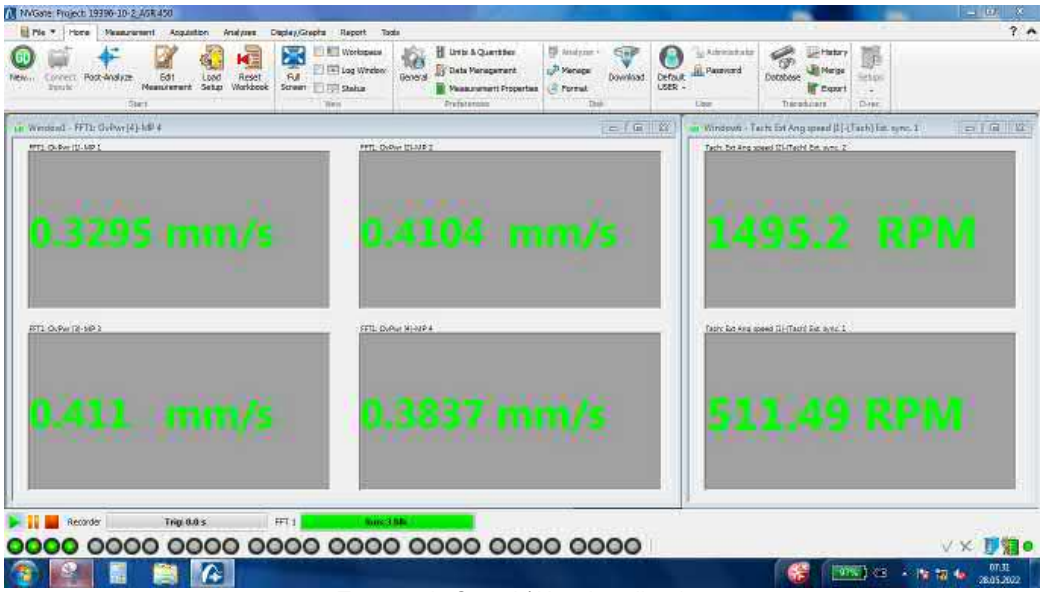
J. Nenast

Datum: 28.05.2022

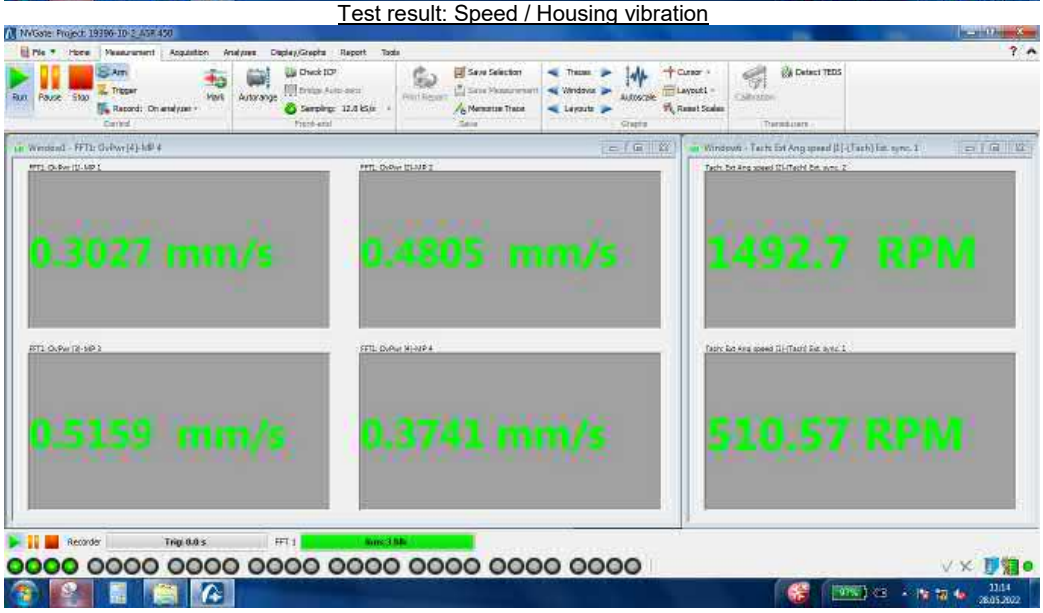
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Test result: Speed / Housing vibration



Test result: Speed / Housing vibration



Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

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Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060562
Werks-Nr.: *Works no.:*	Material-No.: 2000064792	Kennwort: *Code word:*	S/No. 10002292

Menge *Quantity*	Benennung *Designation*	Getriebe-Typ *Gearbox type:*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW

Anstrichprüfung / *coat of paint report*

Anforderungen / ***requirements:***			
Spezifikation (PEKRUN oder Kunden-Nr.): *Specification (PEKRUN or customer no.):*	QH00510B_01		
Vorbehandlung nach ISO 12944-4 *Surface preparation treatment acc to EN ISO 12944-4*	Shot blasting ☐SA 2 / ☒SA 2½ / ☐SA 3		
Oberflächenreinheit *Surface cleanliness*	Acc. to ISO 8501 (free of rust, oil, tinder and other impurities)		
Oberflächenrauheit *Surface roughness*	acc. to SA 2½		
	Grundanstrich *1st. Coat (Primary coat)*	Zwischenanstrich *2nd. Coat (Intermediate coat)*	Deckanstrich *3rd. Coat (Top coat)*
Produktname Name of Product	Vestozink 2K EP Zink	VESTOPOX 2K-EP-1.Deck EG RAPID	VESTOPUR 2K-DT-Deck – ATEX
Chargen Nr.: *Charge No.*	2200964	2200193	2200781
Farbe (RAL Nr.) *Color (RAL no.)*	graumatt	RAL 7703	RAL 5001
Trockenschichtdicke *DFT (dry film thickness)*	60 µm – 90 µm	140 µm -171 µm	230 µm – 290 µm
Lufttemperatur °C *Air temperature °C*	20 °C	22 °C	22 °C
Oberflächentemperatur °C *Surface temperature °C*	22 °C	22 °C	22 °C
Relative Luftfeuchte % *Relative air humidity %*	47 %	48 %	49 %
Datum Date	14.05.2022	30.05.2022	03.06.2022
Haftfähigkeit der Farbe nach ISO 2409 Gitterschnittkennwert: *Adhesion test acc. to ISO 2409 Parameter of grid cut test:*	ISO GT (1)		

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Bemerkungen	Schichtdickenangaben nach DIN EN ISO 12944-5

Die Sollschichtdicke gilt auch als erreicht, wenn Einzelmesswerte den Sollwert um höchstens 20% unterschreiten und der Mittelwert aller Einzelmessungen gleich oder größer der Sollschichtdicke ist.

Remarks: Layer thickness information according to DIN EN ISO 12944-5

The nominal layer thickness is also complied, to be achieved if individual measured values fall below the setpoint value by at most 20% and the mean value of all individual measurements is equal to or greater than the nominal layer thickness.

Prüfergebnis:	Die Anforderungen sind erfüllt.
Test result:	*The requirements are complied*

58640 Iserlohn	27.06.2022	Z. Acikgöz	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

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[pekrun]
Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn
www.pekrun.de

PRÜFDOKUMENTATION

TESTDOCUMENTATION

ZUM AUFTRAG
TO THE ORDER

IHRE BESTELL NR. *YOUR ORDER NO.*	4500494756
KENNWORT *CODE WORD*	Projekt-Nr. 4000369 / 4000370
IHRE WERKS NR. *YOUR WORKS NO.*	Material-No.: 2000064792
PEKRUN SERIAL NR. *PEKRUN SERIAL NO*	10002293
GETRIEBE TYP *GEAR UNIT TYPE*	ASR 450-R-CCW
PEKRUN KOM. NR. *PEKRUN COM. NO.*	19396/20

PRÜFDOKUMENTATION
TESTDOCUMENTATION

[pekrun]

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Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060562
Werks-Nr.: *Works no.:*	Material-No.: 2000064792	Kennwort: *Code word:*	S/No. 10002293

Inhalt nach ITP	***Contents acc. to ITP***
1. Zeugnisse Radwelle	*1. Certificates to the wheel shaft*
2. Zeugnisse Stirnrad	*2. Certificates to the bull gear*
3. Zeugnisse Baugruppe Radwelle mit Stirnrad	*3. Certificates to the assembly group, bull gear with wheel shaft*
4. Zeugnisse Ritzelwelle	*4. Certificates to the wheel shaft*
5. Zeugnisse Gehäuse	*5. Certificates to the housing*
8. Zeugnisse zur Getriebeprüfung	*8. Gear box test certificates*
9. Allg. Informationen	*9. General Information*

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
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PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

[pekrun]

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
1	**Gear shaft (LS Shaft)**										
1.1	Material verification	42CrMo4 EN 10083	Specification		Material labeling		R				
1.2	Chemical analysis	42CrMo4 EN 10083	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
1.3	Mechanical characteristics Ultrasonic test	42CrMo4 EN 10083 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
1.4	Dimensional check after mechanical processing	Drawing	All fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
1.5	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
2	**Bull gear**										
2.1	Gear shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R				
2.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
2.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
2.4	Dimensional check after mechanical processing	Drawing	Al fit measurements Accuracy of toothing	100%	Tolerance acc. to drawing	Measurement record	W	R			
2.5	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Measurement record	W	R			
3	**Assembly group, bull gear with gear shaft**										
3.1	Dimensional check of the toothing		Tooth trace, profile, pitch and runout	3 times circumference	Tolerance acc. to drawing	Test report	W	R			
3.2	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
3.3	Balance check		Acc. to drawing		Tolerance acc. to drawing	Test report	W	R			
4	**Pinion Shaft (HS Shaft)**										
4.1	Pinion shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R	R			
4.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
4.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
4.4	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Test report	R	R			
4.5	Dimensional check after mechanical processing	Drawing	Al fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
4.6	Balance check		Acc. to drawing		Tolerance acc. to drawing	Test report	W	R			
4.7	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
5	**Housing**										
5.1	Chemical analysis	P355NL1/2 EN 10028-3	Chemical composition in % by weight (% by mass) according to ladle analysis	100%	Material Standard	EN10204 3.1	R	R			
5.2	Mechanical characteristics	P355NL1/2 EN 10028-3	Tensile strength, Yield strength, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
5.3	Annealing		Stress free	100%	Material Standard	Diagram or record	R	R			
5.3	Casing leak test		Liquid penetrant inspection	all relevant welding seams	welding seams, no leakage allowed	Test report	W	R			
5.5	Dimensional check after mechanical processing	Drawing	All bearing seats and connecting dimensions	100%	Tolerance acc. to drawing	Measurement record	W	R			
8	**Gear unit**										
8.1	Backlash + contact check of the toothing	Manufacturer test instructions	Executed in job casing contact check, tape lift			Test report	W	W			
8.2	Control of assembly and conneting dimensions	Manufacturer test instructions	Al fit dimensions		Tolerance acc. to drawing	Test report	W	R			
8.3	Check at the Oil supply system bevor the test run.	Pekrun Testprocedure	Filter and cleanliness				W				
8.4	Test run main rotors	Pekrun Testprocedure	No load full speed			Test report	W	W			4 hour test run
8.5	Vibration and temperature reading during the test run	Pekrun Testprocedure	Measured with vibration probes and resistance thermometer			Test report	W	W			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 01
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370
Pekrun Reference: 19396

[pekrun]

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
9	**General Information**										
9.1	Machinery directive	2006/42/EG	Machinery Directive			Certificates	R	R			Part of the operating instructions.
9.2	Coating check		Surface cleanlines, Thickness of the coat, Adhesion acc. to ISO 2409		Grid cut test on test piece: ISO GT (1)	Certificates	R	R			
9.3	Documentation										

Remarks: Documentation (Quality certificates and reports) in german and english, **MRT**= Mechanical running test

R: Review. Verification of test results.

H: Hold Point. Inspection of a critical step in fabrication or testing. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer shall not continue fabrication if inspection parties are not present, except inspection has been waived by prior written notice.

W: Witness Point. Witnessing of a critical fabrication or testing step. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer may continue with work even if inspection parties are not present.

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Radwelle_wheel shaft_material certificates_PART-057585

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

BGH SL-Stahl GmbH
Chromstraße 3
30916 Isernhagen
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **412193**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **BSVF16004734TSE**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816364-010-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält / Round bars,forged,peeled
Werkstoff / Quality	1.7225 42CrMo4mod/4140mod/4145mod
Anforderungen / Requirements	SL-LV 4 Rev. 6 - 12/11 / AISI 4140 mod. + AISI 4145 mod. ,Kundenvereinbarung

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d'élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d' identification(analyse spectrale)
ohne Beanstandung / without objection	E- LF/VD	ohne Beanstandung / without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
10	2	280 mm rd. x 5715 + 5868 mm	5608 kg	733746

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Al
733746	0,430	0,29	0,98	0,006	0,0010	1,14	0,28	0,45	0,020

Wärmebehandlungszustand / Condition of heat treat	vergütet / quenched and tempered / gehärtet/quenched + 600°C 10h Luft/air

Probe-Nr. / Test-No.	Lage / Loc.	Temp. °C	Rp0,2 N/mm²		Rm N/mm²	A5 %	Z %	Kerbschlagarbeit / Impact value J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness / HB
Soll/Req.	L L	RT	>=760		>=965 <=1100	>=13	>=40	>=45 >=27			RT -30°C	>=285 <=326
503R2 503R2	L L	RT	818		965	14,3	58	103 56	110 45	100 45	RT -30°C	300-290

Stirnabschreckversuch / Jominy test - EN ISO 642:

mm	1,5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
HRC	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56

Umformgrad : 8.3 : 1
Reduction ratio:

Gefüge : Vergütungsgefüge
Microstructure: quench and temper structure

Korngröße nach ASTM E 112: 5
Grain size acc. ASTM E 112:

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	16.09.2021	**Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Radwelle_wheel shaft_material certificates_PART-057585

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

BGH SL-Stahl GmbH
Chromstraße 3
30916 Isernhagen
Deutschland

Zeugnis-Nr. **412193**
Certificate no.
No. de certificat

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes
Trade mark
Signe du fournisseur

Stempel des Werkssachverständigen
Inspector's stamp
Poincon de l'inspecteur

Kunden-Bestell-Nr. **BSVF16004734TSE**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816364-010-01**
BGH works no.
BGH référence

BGH Q 07

```
Reinheitsgrad nach ASTM E 45, Methode A  :
Degree of purity acc. ASTM E 45, method A:
Type          A     B     C     D
dünn/thin    0,0   0,8   0,5   1,0
dick/heavy   0,0   0,3   0,3   0,5

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done                 : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze
von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection
limit of 0.1 Bq/g.
```

Anlagen Encl. Annexe US-Zeugnis / UT cert.	Siegen,den Place and date Lieu et date 16.09.2021	Abnahmebeauftragter Inspector representative Inspecteur de réception **Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Radwelle_wheel shaft_material certificates_PART-057585

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client: **BSVF16004734TSE**

BGH-Auftrags-Nr. / BGH works no. / BGH référence: **816364-010-01**

Zeugnis-Nr. / Certificate no. / No. de certificat: **412193**

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.7225 42CrMo4mod/4140mod/4145mod
Abmessung/Dimension: 280 mm rd. x 5715 + 5868 mm
Anzahl/Quantity : 2 Gewicht /Weight : 5608 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
Tab.3 Typ 1a (100%) und Tab.5, QK 4 (Randzone) / QK 3 (Restbereich)
table 3 type 1a (100%) and table 5, quality class 4 (edge zone) / quality class 3 (residual area)

Prüfgerät : Deutsch Echograph 1090
Testing device

Prüfkopf : S 10 W 4 C
Search unit

Kopplungsmittel : Kleister / Wasser
Couplant : glue / water

Prüfumfang : halber Umfang über gesamte Länge
Amount of inspection : half circumference over total length

Prüfrichtung : radial
Scanning direction : radial

Registriergrenze : FBB 2,0 mm
Recording threshold : FBH 2.0 mm

Befund : Keine registrierpflichtigen Anzeigen.
Result : No reportable indications.

Siegen,den Place and date Lieu et date 16.09.21	Prüfer Testing operator Opérateur Kosch Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A BGH Q 30	Überwacher Supervisor Surveilleur

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

This certificate was generated by data system and it is valid without signature as well.
Ce certificat a été établi sur système informatique et est valable sans signature aussi.

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

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Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057585
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451+-551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Radwelle / wheel shaft	PN-00077353.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagersitz	Ø 240 m6	+0,046 +0,017	240,04
Fügesitz	Ø 242,48 h6	0 -0,029	242,48
Lagersitz	Ø 240 m6	+0,046 +0,017	240,04
Durchmesser	Ø 240 m6	+0,046 +0,017	240,03-240,04
Durchmesser	Ø 240 m6	+0,046 +0,017	240,035-240,04

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	11.04.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057585
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451-551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Radwelle / wheel shaft	PN-00077353.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	42 CrMo4+QT	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Wellenübergang / shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	11.04.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
58640 ISERLOHN

TELEFON 02371/945-0
TELEFAX 02371/945-299
EMAIL: INFO@PEKRUN.DE

Stirnrad_spur gear_material certificates_PART-057696

Prüfbescheinigung / Type of document

Abnahmeprüfzeugnis 3.1 / Inspection Certificate 3.1 - DIN EN 10204

Schmiedewerke Gröditz GmbH Riesaer Straße 1 01609 Gröditz

Schmiedewerke Gröditz
GMH GRUPPE

Besteller / Customer: Delta Qualitätsstahl GmbH

Nr. / No.: S 3293
Seite/Page 1 von/of 2

Bestell-Nr. / P.O.No.: 169076 v./dd. 10.08.2020

Gegenstand / Object: geschmiedetes Rundmaterial / forged round material

Kommissions-Nr. / Commission No.:5200453346 / 4

Abmessung / Dimension [mm]:ø 700 x 6850 / Stückgewicht/Single weight: 21000 kg

Werkstoff / Material: 18CrNiMo7-6 / 1.6587 ID-Nr./ID-No.:

Lieferzustand / Condition of delivery: vorvergütet, vorbearbeitet/pre quenched and tempered, pre machined

Anforderungen / Demands: ISO-6336-5/08.16; DIN EN ISO-683-3/04.19; LVL02 18Cr Rev.18

Erschmelzungsart / Steelmaking process: EV/EAF

Chemische Analyse / Chemical analysis (% / H_2 ; O_2 ppm)

Stück Quantity	Chargennr. Heat no.	Probe Sample		C	Si	Mn	P	S	Cr	Ni	Mo	V	Cu	Al	Ti	Sn	Nb	As	Sb	Ca	N	H2	F01*	F02*
1	GP106102	Heat		,18	,23	,57	,006	,001	1,63	1,52	,26	,009	,15	,030	,0017	,007	,003	,0057	,0017	,0004	,0105	1,3	,2	2,9

F01*: Cu+(10*Sn); F02*: Al/N

Prüfergebnisse / Test results

Probe / Sample		Lage / Orientation	Zugversuch / Tensile test						Kerbschlagbiegeversuch / Impact test							Härte / Hardness
			Prüftemp. Test temp. [°C]	$R_{p0,2}$ [N/mm²]	R [N/mm²]	R_m [N/mm²]	A5 [%]	Z [%]	Prüftemp. Test temp. [°C]	KV2 [J]			$\overline{KV2}$ [J]		Zähbruch / Tough fracture	
Charge/Heat no.	Nr. /No.	L	RT	>=785	-	1120 - 1350	>=11	>=35	RT	-			40	-	-	
		L	-	-	-	-	-	-	-20	-			27	-	-	
		T	RT	>=785	-	1120 - 1350	>=8	>=25	RT	-			30	-	-	
GP106102	2058 B	T	23	982		1296	10,9	50	23	44	44	43	43			
GP106102	2059 B	L	23	958		1287	13,0	60	23	52	50	55	52			
GP106102	2059 B	L							-20	48	48	48	48			

Härte Soll / Hardness required [HBW]: min - max 235

Härte Ist am Teil / Hardness measured on part [HBW] : 198; 197; 201

Anmalung / paint-marking: 85648
O2 Gehalt/O2 content: 9 ppm
mechanische Werte an Blindhärteprobe/mechanical properties on blank hardened test ø 30 mm, Wärmebehandlung/heat treatment: 870°C/2h/Öl/oil, 180°C/2h/Luft/air
Verschmiedungsgrad / forging ratio: 3,6
auf Materialverwechslung geprüft - keine Beanstandung / material mix up tested - satisfactory
Radioaktivität innerhalb gesetzlicher Vorgaben wird gewährleistet/radioactivity within legal requirements guaranteed
Restmagnetismus max. 5 Gauss- wird gewährleistet/residual magnetism max. 5 Gauß - guaranteed

Stirnrad_spur gear_material certificates_PART-057696

Prüfbescheinigung / Type of document

Abnahmeprüfzeugnis 3.1 / Inspection Certificate 3.1 - DIN EN 10204

Schmiedewerke Gröditz GmbH Riesaer Straße 1 01609 Gröditz

Schmiedewerke Gröditz
GMH GRUPPE

Besteller / Customer: Delta Qualitätsstahl GmbH	Nr. / No.: S 3293 Seite/Page 2 von/of 2
Bestell-Nr. / P.O.No.: 169076 v./dd. 10.08.2020	Gegenstand / Object: geschmiedetes Rundmaterial / forged round material
Kommissions-Nr. / Commission No.:5200453346 / 4	Abmessung / Dimension [mm]:ø 700 x 6850 / Stückgewicht/Single weight: 21000 kg

Reinheitsgrad gemäß/micropurity acc. to DIN 50602: K4= 1
Reinheitsgrad nach/micropurity acc. to ISO 4967 Meth. A - A 0,2/0,2; B 0/0; C 0,3/0,2; D 0,5/0,5; DS 0,8
austenitische Körngröße gemäß DIN EN ISO 643 nach Wärmebehandlung 950°C 50 h: G = 5 und feiner, max. 2% gröber 5 erfüllt
austenitic grain size acc. to DIN EN ISO 643 after heat treatment 950°C 50 h: G = 5 and finer , max. 2% rougher 5 fulfilled

Anlagen / Annex: Ultraschallprüfbericht/ultrasonic test report, Jominy Prüfprotokoll/Jominy report

Die gestellten Anforderungen sind erfüllt. Besichtigung und Ausmessungen: o.B.
The a.m. results meet requirements. Visual and dimensional inspection: satisfactory

Herstellerzeichen, Manufacturer's brand mu	Stempel des Sachverständigen Inspector's stamp	Datum / Date: 04.11.2020 Abnahmebeauftragter Hersteller Manufacturers authorized representative

Stirnrad_spur gear_material certificates_PART-057696

Ultraschallprüfbericht Ultrasonic test report gemäß / acc. to DIN EN 10204 3.1	Nr./No.: 11/20/10-UT FA 520485648 Seite/page 1 von/of 1	Schmiedewerke Gröditz GMH GRUPPE

Besteller Customer Delta Qualitätsstahl GmbH Hamm	**Gegenstand** Item Rundmaterial round material
Bestell-Nr. Order-No 169076	**Werkstoff** Material 18 CrNiMo 7-6
Wärmebehandlung vergütet Heat treatment quenched and tempered	**Oberflächenzustand** mech. bearbeitet Surface condition mech. processed
Kennwort Code word -	**Lfd.-Nr.** Part-No -
Zeichnungs-Nr./Abmessung Drawing-No./Dimensions Liefermaß/delivery dimension: Dmr./dia. 700 x 6850	

Kommission Job No. 5200453346/4	**Chargen-Nr.** Charge No. GP106102	**Stückzahl** Pieces 1

Spezifikation Specification DELTA LV02 18Cr Rev. 17	**Prüfumfang** gemäß Vorschrift Scope of test acc. to specification

Fertigungs- und Prüffolgeplan Fabrication and Inspection plan ☐ Nr/No:	**Prüf- und Abnahmeplan** Test and Inspection plan ☐ Nr/No:	**Prüfanweisung** test procedure ☒ Nr/No: QP-ZFP-A-01 Rev. B

Prüfdaten / Test data

Prüfgerät Test unit EPOCH 1000 - 160261308	**Koppelmittel** Couplant Tapetenleim / wallpaper paste

Prüfer Werner Tested by ISO9712 Stufe 2/level 2	**Prüfdatum** Date of testing 27.10.2020	**Prüfort** Place of testing Gröditz

Registriergrenze
Registration level gemäß Vorschrift / acc. to specification

Prüfkopf / Probe — **Justierung** / Calibration

Nr. No.	Typ Type	Fre-quenz Fre-quency	Winkel Angel	Justierbe-reich Calibration range	Methode Method	s_j	s_{max}	V_j	ΔV	ΔV_T ☐ ΔV_A ☐	ΔV_v	ΔV_K	V_R
		MHz	°	mm		mm	mm	dB	dB	dB	dB	dB	dB
1	PF2R-24	2	0	840	AVG/BI DGS/RI	700	700	23	51	-	-	-	74

s_{max} - Bewertungsschallweg/evaluated sound distance, s_j-Justierschallweg/Calibration distance, V_j-Justierverstärkung/ Calibration Gain, Δ V-Verstärkungszuschlag/Additional Gain, ΔV_T-Transferkorrektur/ Transfer correction, ΔV_A -Ankopplungskorrektur/ Coupling correction, ΔV_v -Schallschwächungskorrektur/Soundattenuation correction, ΔV_K - Kontrollkörperkorrektur für Winkelprüfköpfe bzw. Krümmungskorrektur für Senkrechtprüfköpfe/Adjusting block correction for angle beam probes or curvature correction for straight beam probes, V_R -Bewertungsverstärkung Evaluation Gain

Ergebnisse - Results:

Es wurden keine registrierpflichtigen Anzeigen festgestellt.
No recordable indications were found.

Beurteilung gemäß Spezifikation/ Evaluation acc. to specification :

ERFÜLLT ☒ PASSED	**NICHT ERFÜLLT** ☐ NOT PASSED	**ERGEBNIS S. ANLAGE** ☐ RESULT L. ANNEX
Datum / Date 03.11.2020	**Prüfaufsicht**/ Supervisor i.V. Hoffmann Knobloch ISO9712 Stufe 3/level 3	

Stirnrad_spur gear_material certificates_PART-057696

Schmiedewerke Gröditz
GMH GRUPPE

Jominy- Protokoll / Jominy - Report

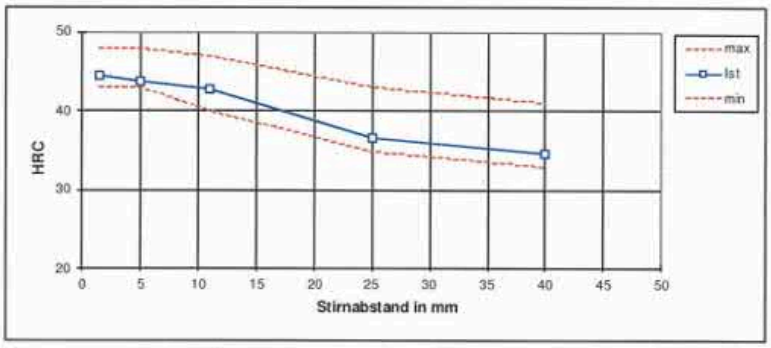
gem. ISO 642 / acc. to ISO 642
Berechnung nach/ calc. acc. to SEP 1664, Tafel 12 - 2. Ausgabe Juni 2004

Gegenstand/Item: Stabstahl / steel bar
Stahlmarke/Steel grade: 18 CrNiMo 7-6
Charge/Heat-No.: GP106102

Austenitbedingungen/
Austen. conditions: 860 °C/30min

mm	1,5	5	11	25	40
Ist	44,5	43,7	42,7	36,7	34,6
max	48	48	47	43	41
min	43	43	40	35	33

* Sollwerte nach / Limits acc. to DELTA LVL02 18Cr Rev. 18



Freigabe durch:
Released by: gez. Rink
TQW

13.10.2020

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057696
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451+551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Stirnrad / spur gear	PN-00077575.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Fügesitz	Ø 242 H7	+0,046 0	242,02-242,03
Verzahnung Vorfräsen			i.O.

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	11.03.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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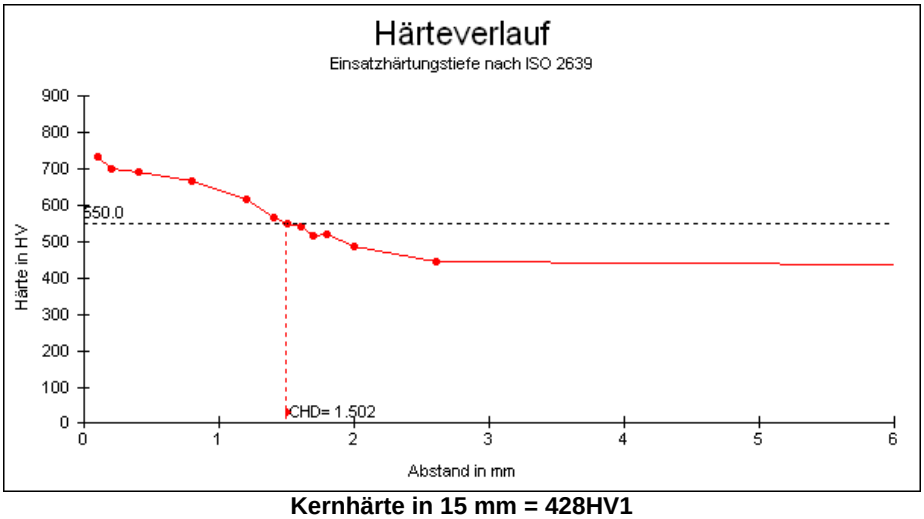
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

DOK-QS-121	Härteverlauf Hardness profile	REINTJES POWERTRAIN SOLUTIONS

Abnahmeprüfzeugnis gemäß DIN/EN 10204 – 3.1
Inspection certificate according to DIN/EN 10204 - 3.1

Kunde: Customer:	**Pekrun**	**Benennung:** Object:	**Stirnrad 76**
FAUF: Production No.:		**Bestell Nr. /Pos:** Purchase Order No./Item:	**4500059044**
Zeichnungs Nr.: Drawing No.:	**PN-00077575**	**Auftrags Nr.:** Order No.:	**2053833**
Werkstoff: Material:	**18 CrNiMo 7-6**	**Proben Nr.:** Sample No.:	**09216**
Stückzahl: No. of pieces:	**2**	**Ofencharge:** Oven batch:	**C22-21936**

CHD 550H V1 = 1.50 mm



Kernhärte in 15 mm = 428HV1

Oberfl.-Härte IST: Surface hardness actual:	**62**	HRC	**EHT IST:** Penetration depth actual:	**1,50**	mm
Oberfl.-Härte SOLL: Surface hardness nominal:	**60 +- 2**	HRC	**EHT SOLL:** Penetration depth nominal:	**1,4 + 0,2**	mm
Martensit IST: Martensit actual:		%	**Restaustenit IST:** Resodual austenite:		%
Randoxidation IST: Surface oxidation actual:		µm	**Randentkohlung IST:** Surface dicarborising actual:	**---**	µm
Karbidanteil IST: Katbit actual:	**---**	%	**Rand C-Gehalt IST:** Surface-C actual:		%
Bemerkungen: Remark:					

Prüfer / Workinspector i.A. V.Gärtner Prüfdatum / Work date: 02.03.22

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Prozessverantwortlicher:	QS / Hr. Dr. Reso / 17.01.2018	Revisions-Nr.:	02

Seite 1 von 1

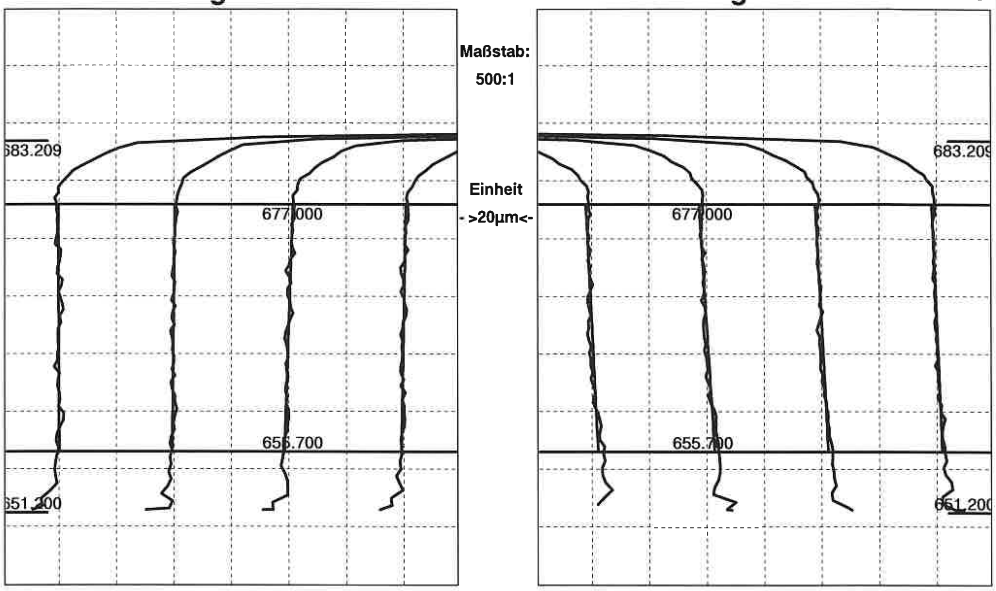
Profilmessung

Messung vom 04/26/2022 9:33:27 Dauer: 00:03:10 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
L.V.OBEN
NR.2

Name der Verzahnung:	76Z 8M-P-057696-O	Profil	Evolventisch
Zähnezahl	76	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Linksschräg 25.000000 Grad	Meßbreite	55.000 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	683.209 mm	Fußformkreis (d)	651.200 mm

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	58	39	20	1	Lücke Nr.	1	20	39	58	S	M	Q
2	3.2		3.4	2.7	4.1	2.7	F_α	5.9	6.4	5.6	4.4		5.6	4
3	- 1.3	0.0	0.4	- 1.0	- 3.0	- 1.6	fH_α	- 4.2	- 5.3	- 4.3	- 3.6	0.0	- 4.4	5
2	2.8		3.4	2.4	3.0	2.4	ff_α	4.0	2.8	3.2	2.6		3.2	3
	0.3	0.0	- 0.7	0.5	0.6	0.9	C_α	- 2.4	- 2.2	- 1.8	- 1.3	0.0	- 1.9	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

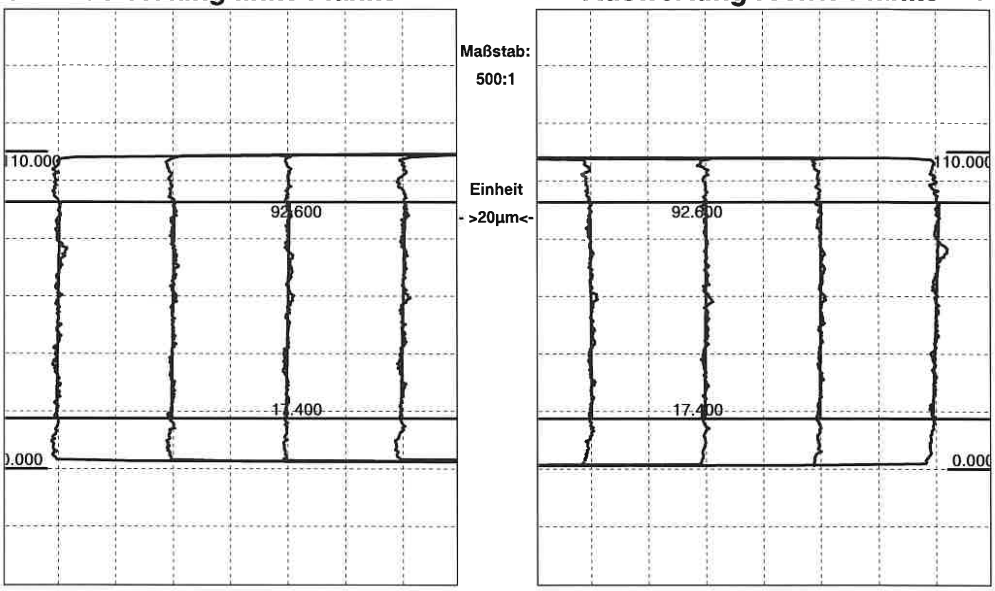
Flankenlinienmessung

Messung vom 04/26/2022 9:29:10 Dauer: 00:03:52 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
L.V.OBEN
NR.2

Name der Verzahnung:	76Z 8M-P-057696-O	Profil	Evolventisch
Zähnezahl	76	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	206
Schrägungswinkel	Linksschräg 25.000000 Grad	Meßzylinder (d)	665.865 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	110.000 mm		

+ Auswertung linke Flanke - | - Auswertung rechte Flanke +



Q	M	S	58	39	20	1	Lücke Nr.	1	20	39	58	S	M	Q
1	4.2		5.0	3.8	3.6	4.6	Fβ	4.1	4.3	3.3	6.3		4.5	2
1	- 1.2	0.0	- 1.1	- 1.0	- 1.2	- 1.5	fHβ	- 0.5	0.6	0.6	2.4	0.0	0.8	1
1	3.7		4.4	3.1	3.3	4.1	ffβ	4.0	4.6	3.6	5.0		4.3	2
	- 0.4	0.0	- 0.0	- 0.5	- 0.7	- 0.2	Cβ	1.0	1.2	1.4	0.5	0.0	1.0	

Vert. Maßstab 1:2, d.h. 10 mm entspr. 20 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

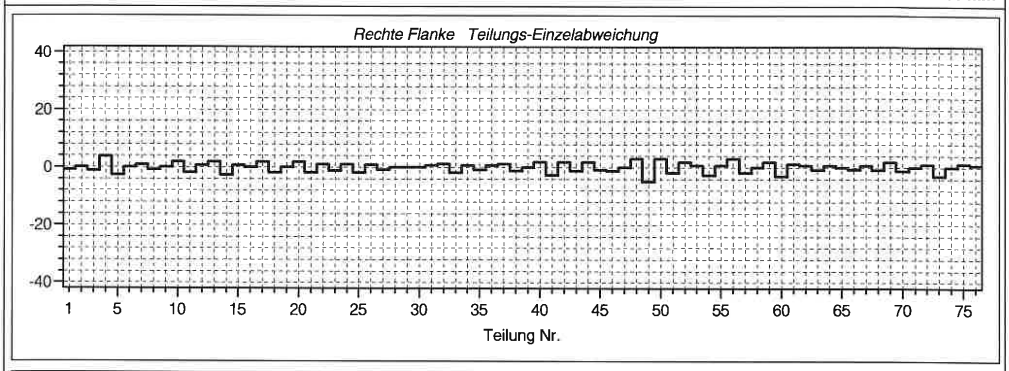
Alle Angaben in µm
Qualitäten nach DIN 3961

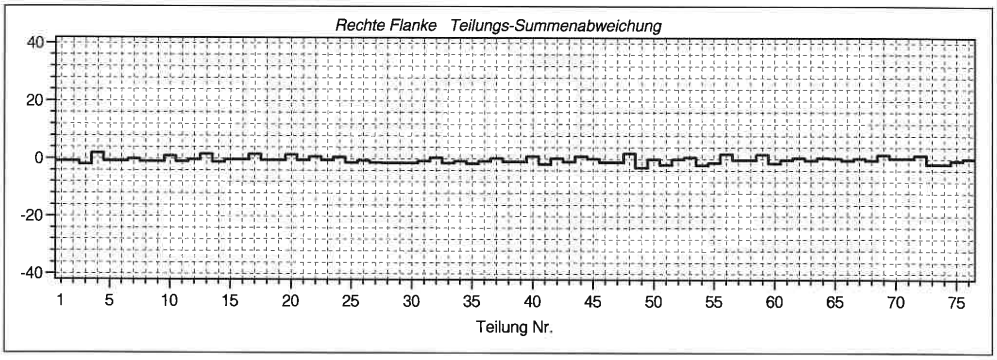
Teilungsmessung

Messung vom 04/26/2022 9:37:02 Dauer: 00:14:43 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
L.V.OBEN
NR.2

Name der Verzahnung:	76Z 8M-P-057696-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.865 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 5.0	4	Teilungs-Schwankung (Rp)	8.7	
Teilungs-Gesamtabw. (Fp)	5.0	1	Max. Teilungssprung (fumax)	8.0	4
Teilungs-Spannenabw. (Fp(z/8))	4.0	1			

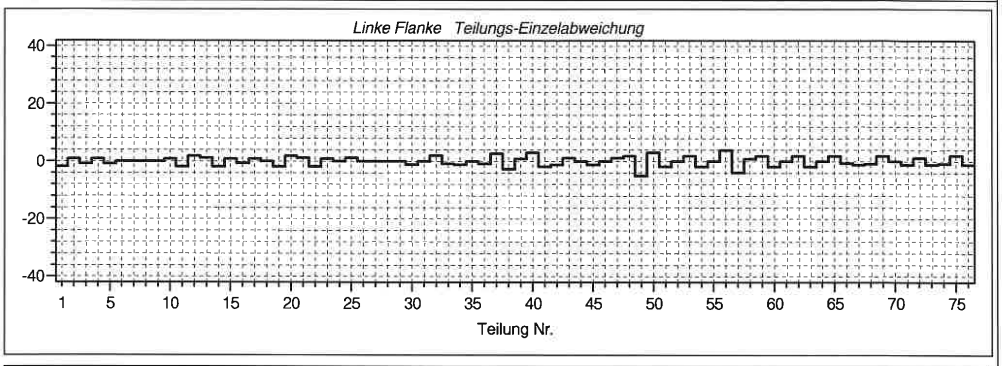
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

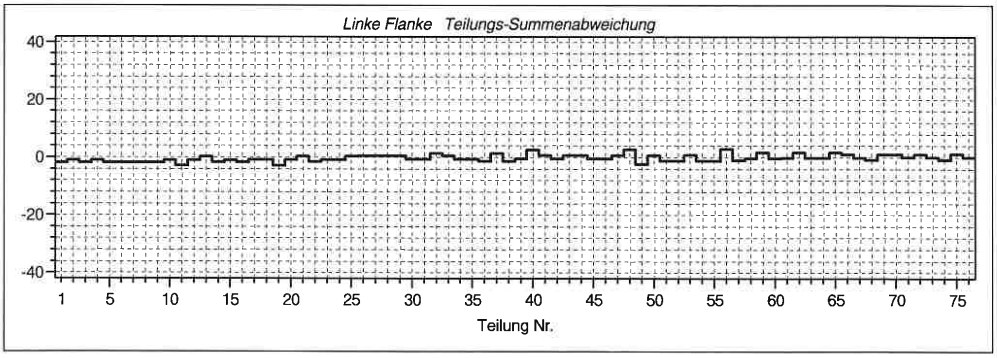
Teilungsmessung

Messung vom 04/26/2022 9:37:02 Dauer: 00:14:43 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
L.V.OBEN
NR.2

Name der Verzahnung:	76Z 8M-P-057696-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.865 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 5.0	4	Teilungs-Schwankung (Rp)	9.0	
Teilungs-Gesamtabw. (Fp)	5.7	1	Max. Teilungssprung (fumax)	8.1	5
Teilungs-Spannenabw. (Fp(z/8))	4.9	1			

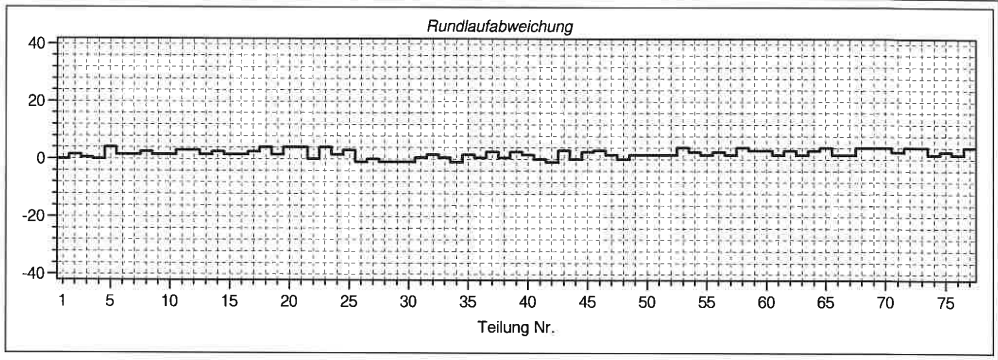
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

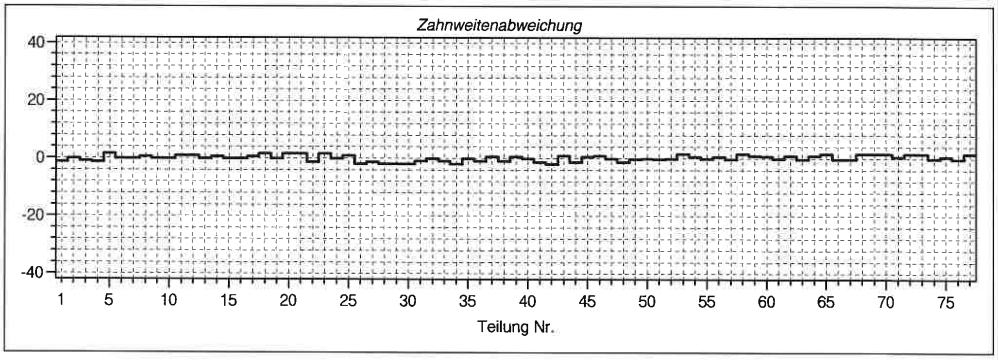
Teilungsmessung

Messung vom 04/26/2022 9:37:02 Dauer: 00:14:43 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
L.V.OBEN
NR.2

Name der Verzahnung:	76Z 8M-P-057696-O	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.865 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





				Q
Min. Zahnweite (mm)	257.769	Mittl. Zahnweite (mm)	257.771	
Max. Zahnweite (mm)	257.773	Zahnweiten-Schwankung (µm)	3.6	
Anzahl Meßzähne	11			
		Rundlaufabweichung (Fr)	5.1	1
		Meßkugeldurchmesser (mm)	14.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

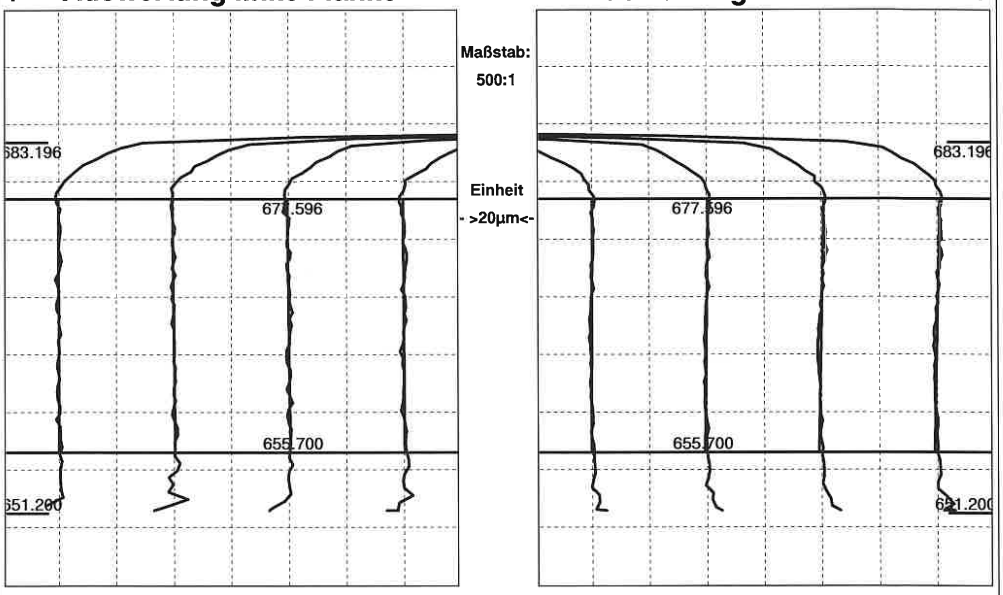
Profilmessung

Messung vom 04/25/2022 22:36:03 Dauer: 00:03:10 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
R.V.UNTEN
NR.2

Name der Verzahnung:	76Z 8M-P-057696-U	Profil	Evolventisch
Zähnezahl	76	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Rechtsschräg 25.000000 Grad	Meßbreite	55.000 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	683.196 mm	Fußformkreis (d)	651.200 mm

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	58	39	20	1	Lücke Nr.	1	20	39	58	S	M	Q
1	2.6		2.4	2.2	3.1	2.6	F_α	1.9	2.2	3.2	3.2		2.6	2
1	0.7	0.0	0.3	0.9	1.0	0.5	fH_α	0.5	1.2	1.9	2.0	0.0	1.4	2
2	2.3		2.3	1.7	2.7	2.6	ff_α	1.8	1.8	2.5	2.4		2.1	1
	- 0.1	0.0	0.4	0.1	- 0.6	- 0.1	C_α	- 1.1	- 1.1	- 1.4	- 1.4	0.0	- 1.2	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

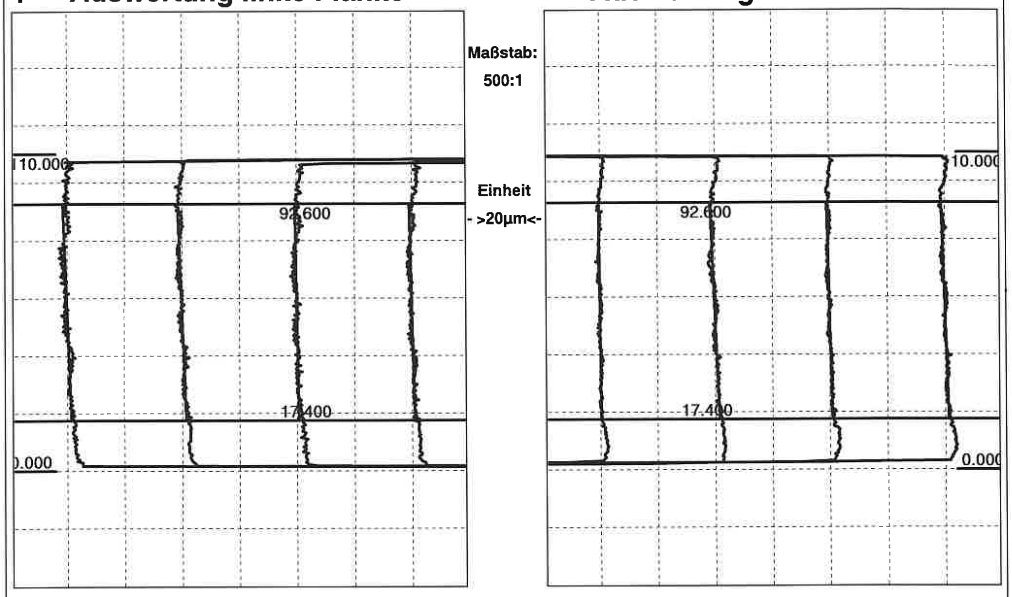
Flankenlinienmessung

Messung vom 04/25/2022 22:30:10 Dauer: 00:05:29 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
R.V.UNTEN
NR.2

Name der Verzahnung:	76Z 8M-P-057696-U	Profil	Evolventisch
Zähnezahl	76	Taststiftdurchmesser	2.000 mm
Normalmodul	8.000 mm	Anzahl gemessener Punkte	206
Schrägungswinkel	Rechtsschräg 25.000000 Grad	Meßzylinder (d)	665.859 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	110.000 mm		

+ Auswertung linke Flanke - | - Auswertung rechte Flanke +



Q	M	S	58	39	20	1	Lücke Nr.	1	20	39	58	S	M	Q
2	5.0		5.5	5.1	4.9	4.3	Fβ	2.4	4.8	3.3	4.1		3.6	1
2	2.2	0.0	2.9	2.9	1.3	1.7	fHβ	- 0.8	- 3.2	- 1.8	- 2.5	0.0	- 2.0	3
2	4.0		4.2	3.6	4.8	3.4	ffβ	2.2	2.8	2.2	2.6		2.4	1
	1.4	0.0	1.5	1.0	1.7	1.3	Cβ	- 0.0	- 0.5	- 0.9	- 0.1	0.0	- 0.4	

Vert. Maßstab 1:2, d.h. 10 mm entspr. 20 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

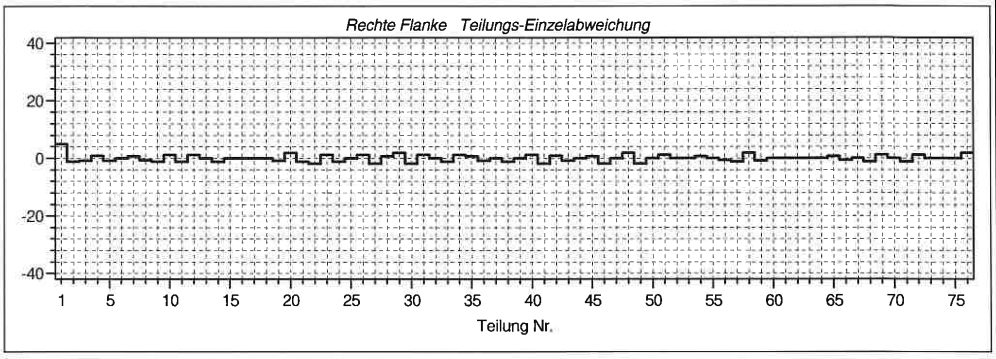
Alle Angaben in µm
Qualitäten nach DIN 3961

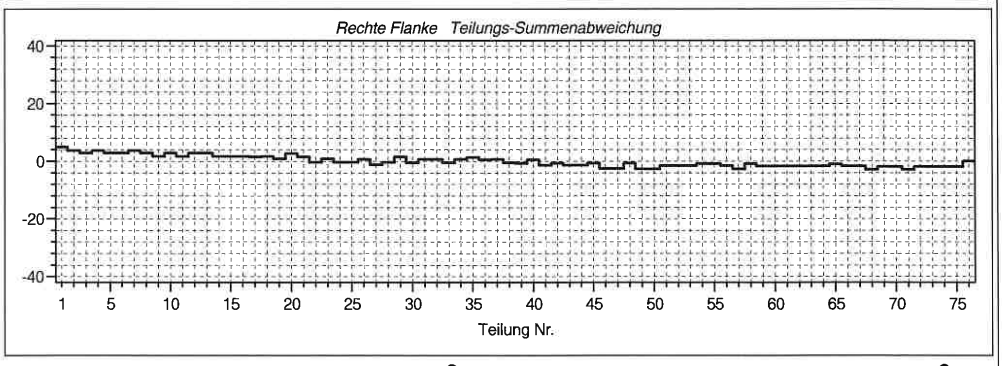
Teilungsmessung

Messung vom 04/25/2022 22:39:37 Dauer: 00:14:41 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
R.V.UNTEN
NR.2

Name der Verzahnung:	76Z 8M-P-057696-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.859 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	4.9	4	Teilungs-Schwankung (Rp)	6.8	
Teilungs-Gesamtabw. (Fp)	7.8	1	Max. Teilungssprung (fumax)	6.1	4
Teilungs-Spannenabw. (Fp(z/8))	7.8	3			

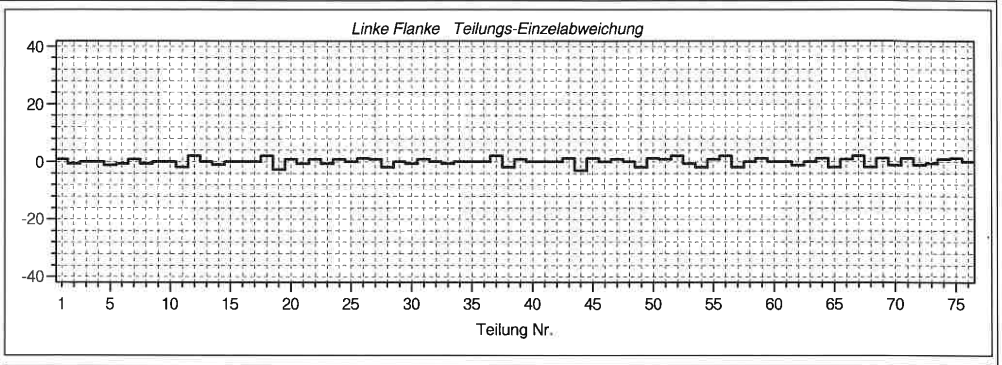
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

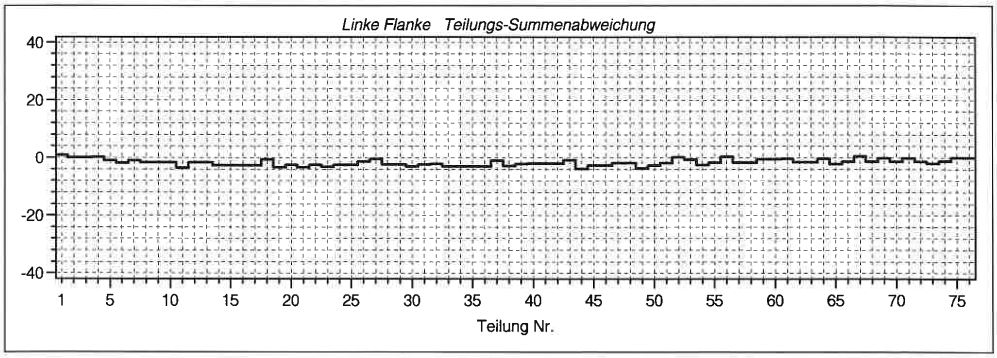
Teilungsmessung

Messung vom 04/25/2022 22:39:37 Dauer: 00:14:41 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
R.V.UNTEN
NR.2

Name der Verzahnung:	76Z 8M-P-057696-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.859 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 3.1	2	Teilungs-Schwankung (Rp)	5.1	
Teilungs-Gesamtabw. (Fp)	4.7	1	Max. Teilungssprung (fumax)	4.7	3
Teilungs-Spannenabw. (Fp(z/8))	3.6	1			

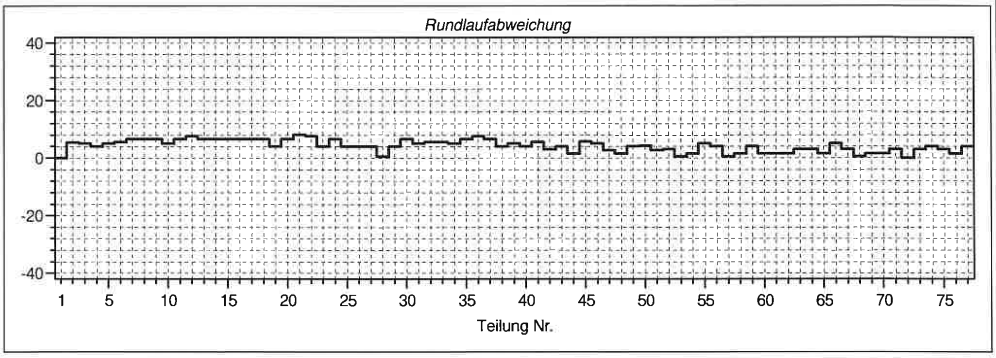
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

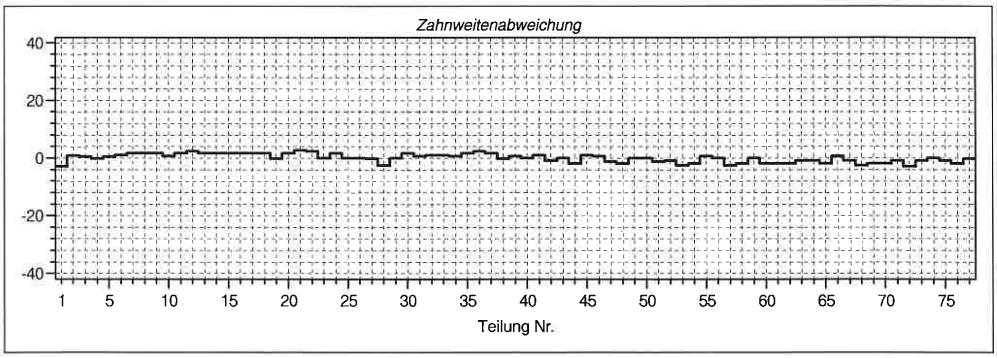
Teilungsmessung

Messung vom 04/25/2022 22:39:37 Dauer: 00:14:41 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/20-P-057696 ZW: 257.859-257.784
R.V.UNTEN
NR.2

Name der Verzahnung:	76Z 8M-P-057696-U	Profil	Evolventisch
Normalmodul	8.000 mm	Zähnezahl	76
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 25.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	665.859 mm
Meßbreite	55.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.265		
Zahnweite (Nennmaß)	257.790 mm	Anzahl Meßzähne	11
Diametrales Zweikugelmaß (Nennmaß)	686.993 mm	Meßkugeldurchmesser	14.000 mm
Diametrales Zweirollenmaß (Nennmaß)	686.993 mm	Meßrollendurchmesser	14.000 mm





				Q
Min. Zahnweite (mm)	257.777	Mittl. Zahnweite (mm)	257.780	
Max. Zahnweite (mm)	257.783	Zahnweiten-Schwankung (µm)	5.7	
Anzahl Meßzähne	11			
		Rundlaufabweichung (Fr)	8.1	2
		Meßkugeldurchmesser (mm)	14.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057696
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451-551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Stirnrad / spur gear	PN-00077575.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Verzahnung / toothing*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	05.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
58640 ISERLOHN

TELEFON 02371/945-0
TELEFAX 02371/945-299
EMAIL: INFO@PEKRUN.DE

BG Radwelle_assembly group wheel shaft_balancing report_PART-057697

```
*****************************************
Pekrun Getriebebau GmbH
Koebbingser Muehle 14
58640 Iserlohn/Germany
*****************************************
Operator : Ferdi Basar                          04.05.22 06:27
  Rotordaten              Fall   1              19396/20-057697
  a: 178.5 mm             b: 311.0 mm            c: 162.5 mm
  r1: 295.0 mm            Eb1/Eb2                r2: 295.0 mm
  m1: -polar                                     m2: -polar
  Tol1: 9999. gmm                                Tol2: 9999. gmm
                          N soll    :  400.  1/Min
  Ergebnisse              Rotor: Radwelle 2          04.05.22 06:27
  Lauf  3                 N ist     :   401.  1/Min
Eb 1:       17.5  g                     Eb 2:       20.4  g
            188. Grad                               311. Grad
            in Tol                                  in Tol
Anteil in Tol.Einheiten  :
        5156. gmm                                 6031. gmm
```

BG Radwelle_assembly group wheel shaft_balancing report_PART-057697

```
*****************************************
Pekrun Getriebebau GmbH
Koebbingser Muehle 14
58640 Iserlohn/Germany
*****************************************
Operator : Ferdi Basar                          04.05.22 10:12
  Rotordaten              Fall   1              19396/20-057697
  a: 178.5 mm             b: 311.0 mm            c: 162.5 mm
  r1: 295.0 mm            Eb1/Eb2                r2: 295.0 mm
  m1: -polar                                     m2: -polar
  Tol1: 9999. gmm                                Tol2: 9999. gmm
                          N soll    :  400.  1/Min
  Ergebnisse              Rotor: Radwelle 1          04.05.22 10:12
  Lauf  2                 N ist     :  400.  1/Min
Eb 1:       35.6  g                   Eb 2:       14.4  g
            128. Grad                               4. Grad
            1.1  * Tol                             in Tol
Anteil in Tol.Einheiten  :
        ***** gmm                               4238. gmm
```

BG Radwelle_assembly group wheel shaft_balancing report_PART-057697

```
*****************************************
Pekrun Getriebebau GmbH
Koebbingser Muehle 14
58640 Iserlohn/Germany
*****************************************

Operator : Ferdi Basar                          04.05.22 12:57

  Rotordaten              Fall   1              19396/20-057697

  a: 178.5 mm             b: 311.0 mm            c: 162.5 mm

  r1: 295.0 mm            Eb1/Eb2                r2: 295.0 mm

  m1: -polar                                     m2: -polar

  Tol1: 9999. gmm                                Tol2: 9999. gmm

                          N soll    :  400.  1/Min

  Ergebnisse              Rotor: Radwelle 1          04.05.22 12:57

  Lauf  3                 N ist     :   403.  1/Min

Eb 1:        1.47  g                    Eb 2:       13.4  g

             337. Grad                                 4. Grad

             in Tol                                   in Tol

Anteil in Tol.Einheiten  :
        433.6 gmm                                 3952. gmm
```

Seite / Page 1 / 3

Ritzelwelle_pinion shaft_material certificates_PART-057699

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **414615**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-002-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält Round bars,forged,peeled
Werkstoff / Quality	1.6587 18CrNiMo7-6
Anforderungen / Requirements	LVL- 02 18Cr Rev.18 - 07/20 1.6587 18CrNiMo7-6 ,ISO 6336 -5 Third ed. 2016-08-15 1.6587 18CrNiMo7-6 ,DIN EN ISO 683 -3 April 2019 Lieferzustand: Vorvergütet Die Werkstoffqualität "MQ/ME" nach ISO 6336-5 wird bestätigt. Diese Bestätigung gilt nur für die Eigenschaften, die vom Stahlhersteller beeinflußt werden können. Für Eigenschaften, die von der konstruktiven Gestaltung, der Endwärmebehandlung und der Einsatzbedingungen abhängig sind, kann der Stahlhersteller keinerlei Garantie und Gewährleistung übernehmen. The material quality "MQ/ME" acc. ISO 6336-5 will be confirmed. This confirmation is only valid for the properties, which can be affected by the steel producer. The steel producer cannot provide any guarantee for properties, which are dependent on the constructional design, the final heat treatment and the application conditions.

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d´élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d´identification(analyse spectrale)
ohne Beanstandung without objection	E- LF/VD	ohne Beanstandung without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
2	10	260 mm rd. x 4492 - 5086 mm	20734 kg	735116

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb	V	Ti
735116	0,175	0,28	0,54	0,007	0,0010	1,71	0,32	1,52	0,102	0,003	0,009	0,001

Al	N	H(ppm)	O	Sn	Sb	Ca	Al/N	Cu+10xSn
0,023	0,0110	1,50	0,0014	0,004	0,003	0,0004	2,091	0,142

Wärmebehandlungszustand / Condition of heat treat: vergütet / quenched and tempered

Probe-Nr. / Test-No.	Lage / Loc.	Temp. / °C	Rp0,2 / N/mm²		Rm / N/mm²	A5 / %	Z / %	Kerbschlagarbeit / Impact value / J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness / HB
Soll/Req.	T	RT	>=785		>=1120 <=1450	>=8	>=25	>=30			RT	<=238
335W10	T	RT	923		1321	8,2	36	63	64	66	RT	190
335W10	T							49	50	50	-20°C	am Material

Die mechanischen Kennwerte wurden an einer Referenzprobe (30 mm rd.) ermittelt:
The mechanical properties were tested at a reference block (30 mm dia.) :
870°C 2h Oel/oil, 180°C 2h Luft/air

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	29.11.2021	**Langer**

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Page

Ritzelwelle_pinion shaft_material certificates_PART-057699

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. **414615**
Certificate no.
No. de certificat

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes
Trade mark
Signe du fournisseur

Stempel des Werkssachverständigen
Inspector's stamp
Poincon de l'inspecteur

BGH
Q 07

Kunden-Bestell-Nr. **171472**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816888-002-01**
BGH works no.
BGH référence

```
Stirnabschreckversuch / Jominy test - EN ISO 642:
mm     1,5  5    11   25   40
HRC    45   44   43   38   36

Umformgrad      : 6.0 : 1
Reduction ratio:

Korngröße  nach ASTM E 112: 6
Grain size acc. ASTM E 112:

Korngröße  nach ISO 643 (950°C 50h Oel): 6
Grain size acc. ISO 643 (950°C 50h oil):

Reinheitsgrad nach DIN 50602   : K4 = 2 (Ox + S)
Degree of purity acc. DIN 50602:

Reinheitsgrad nach ISO 4967, Methode A  : DS = 1,5
Degree of purity acc. ISO 4967, method A:
Type           A      B      C      D
Dünn/fine     0,0    0,8    0,5    1,0
Dick/thick    0,0    0,5    0,3    0,5

Restmagnetismus   : < 8 A/cm
Residual magnetism:

Das Material wurde gemäß der Spezifikation hergestellt.
The Material was produced in compliance with the Specification.

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done                  : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze
von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection
limit of 0.1 Bq/g.
```

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	29.11.2021	**Langer**

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Seite / Page 3 / 3

Ritzelwelle_pinion shaft_material certificates_PART-057699

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Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **414615**

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Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-002-01**

Bei Überschreitung der regelwerksseitigen Abmessungsgrenze sind im Zweifelsfall die Vorgaben
des Regelwerks vom Bauteilhersteller zu verifizieren. Seitens des Werkstoffherstellers werden
nur die, an der von ihm produzierten Geometrie, überprüften Eigenschaften bestätigt.
In case of doubt, the specifications of the regulations must be verified by the component manufacturer
if the dimensional limit of the regulations is exceeded. On the part of the material manufacturer,
only the properties verified on the geometry, produced by him, are confirmed.

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	29.11.2021	**Langer**

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US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Ritzelwelle_pinion shaft_material certificates_PART-057699

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. **171472**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816888-002-01**
BGH works no.
BGH référence

Zeugnis-Nr. **414615**
Certificate no.
No. de certificat

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.6587 18CrNiMo7-6
Abmessung/Dimension: 260 mm rd. x 4492 - 5086 mm
Anzahl/Quantity : 10 Gewicht /Weight : 20734 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
DIN EN 10228-3 Tab. 3 Typ 1a (100%)und
Tab. 5 Qualitätsklasse 4 für Randzone (1/3 D, min. 60mm)
Tab. 5 Qualitätsklasse 3 für Restbereich
DIN EN 10228-3 Tab.3 typ 1a (100%)and
Tab.5 quality class 4 for surface zone (1/3 D, min. 60 mm)
Tab.5 quality class 3 for remaining area

Prüfrichtlinie : DIN EN 10228-3 Tab. 3 & 4 (vollständig 360°)
Specification

Prüfgerät : K.Deutsch RPT.S 1156
Deutsch Echopraph 1090
Testing device

Prüfkopf : STS32.20P4L150C, STSE18/16P4
S 10 W 4 C
Search unit

Kopplungsmittel : Wasser / Kleister
Couplant water / glue

Prüfumfang : 360°
Amount of inspection

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0
Recording threshold FBH 2.0 mm

Schallschwächung : < 6 dB/m
Wave attenuation

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 29.11.21	Prüfer Testing operator Opérateur Konieczny Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A BGH Q 30	Überwacher Supervisor Surveilleur

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EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Abnahmeprüfzeugnis

gemäß DIN EN 10204-3.1

Belegnr	**PZ-2022-0097208**
Auftragsnr	**2022-0237912-3**
Kundennr	1011419
Ausgeber	Virzi, Laura
Telefon	0234/903660
Datum	22.03.2022
Seite	1/1

Teile/Verfahren	Stück	Gewicht
	2	---

Ihre Auftragsnr: 19396/Pos.20
Ihre Liefers.Nr: Anlieferung
Ihre Bestellnr: 4500059979 / 30 vom 09.03.2022
Uns. Auftragsnr: 2022-0237912-3 von 3 vom 09.03.2022
Bezeichnung: Ritzelwelle
Teilenummer: PART-057699
Zeichnungsnr: PN00077578
Fr. Feld: 2053531
WE-Nummer: WE-000096440
Werkstoff: 1.6587/18CrNiMo7-6/17CrNiMo6
Vorschrift: Isolieren, Einsatzhärten, Strahlen, Richten, Zeugnis

Soll-Vorgaben

Randhärte	58-62 HRC
Einsatzhärtetiefe	1,4-1,6 mm

Ergebnisse	Prüfer	Prüfdatum
RH:60-61 HRC EHT:1,59 mm	Rainer Theuer	21.03.2022

Die CHD haben wir an unserer Chargenbegleitprobe aus 18CrNiMo7-6 ermittelt.

Hiermit bestätigen wir, dass obige Teile gemäß den Vereinbarungen bei der Bestellannahme auf der Grundlage der Ihnen bekannten Allgemeinen Geschäftsbedingungen der Härterei Reese Bochum GmbH, Stand: Juli 2018 behandelt wurden.

Dieses Dokument wurde elektronisch erstellt und ist daher ohne Unterschrift gültig.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/9036-0
Fax +49 (0) 234/9036-96

Oberscheidstr. 25 · 44807 Bochum
bochum@haerterei.com
Handelsregister: HRB 1717
Ust-ID-Nr.: DE257486215
Steuer-Nr.: 306/5709/0368

National-Bank Essen BIC: NBAGDE3EXXX IBAN: DE89 3602 0030 0006 3781 29
VB Bochum Witten eG BIC: GENODEM1BOC IBAN: DE83 4306 0129 0123 2073 00
Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

www.haerterei.com

EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Inspection certificate

according to DIN EN 10204-3.1

Document #	**PZ-2022-0097208**
Job #	**2022-0237912-3**
Customer #	1011419
Issuer	Virzi, Laura
Telephone	0234/903660
Date	22.03.2022
Page	1/1

Parts/Process		Quantity	Weight
Your Job #:	19396/Pos.20	2	---
Your P/S. #:	Anlieferung		
Your P.O. #:	4500059979 / 30 from 09.03.2022		
Our Job #:	2022-0237912-3 of 3 from 09.03.2022		
Description:	pinion shaft		
Serial #:	PART-057699		
Drawing #:	PN00077578		
Free Field:	2053531		
RG-No.:	WE-000096440		
Material:	1.6587/18CrNiMo7-6/17CrNiMo6		
Process:	protection, case hardening, shot blasting, straightening, certificate		

Hardness requirements

Surface hardness	58-62 HRC
Case hardening depth	1,4-1,6 mm

Results	Auditor	Test date
EH:60-61 HRC CHD:1,59 mm	Rainer Theuer	21.03.2022

CHD was tested on our test-piece 18CrNiMo7-6 from the same batch.

We hereby confirm that the above parts will be treated and examined in accordance with the agreements applying on acceptance of order and based on the familiar General terms and conditions of business of Härterei Reese Bochum GmbH Edition: July 2018.

This document automatically generated valid without signature.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/9036-0
Fax +49 (0) 234/9036-96

Oberscheidstr. 25 · 44807 Bochum
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Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

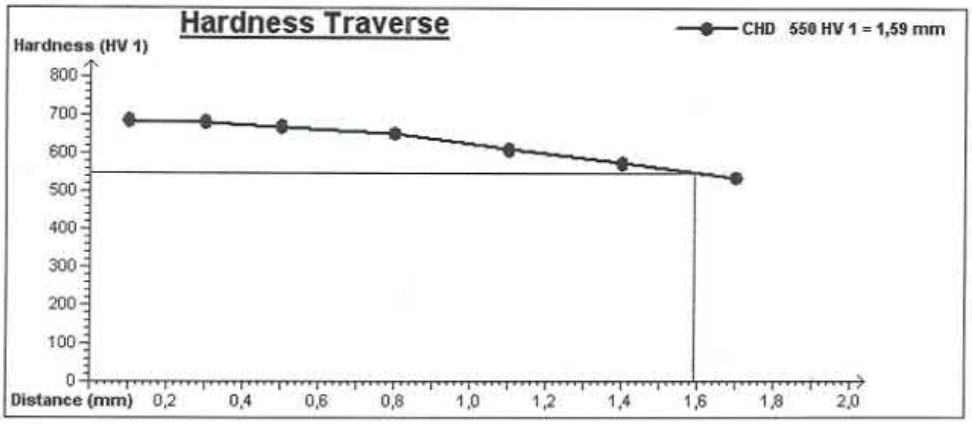
www.haerterei.com

REESE HÄRTEREI

Härterei Reese
Bochum GmbH
Oberscheidstrasse 25
44807 Bochum

Chargen-Nr.: .
Datum: 21.03.2022
Auftrags-Nr.: 2022-0237912-3
Prüfer: Labor

Kunde: Pekrun
Proben-Nr.: 18 CrNiMo7-6
H.R.Probe



Ergebnis

CHD 550 HV 1 = 1,59 mm

Reihe 1

Punkt	Abstand	Härte	Kommentar
1	0.100	686 HV 1	
2	0.300	681 HV 1	
3	0.500	669 HV 1	
4	0.800	652 HV 1	
5	1.100	611 HV 1	
6	1.400	575 HV 1	
7	1.700	536 HV 1	

QUALITÄTSWESEN HÄRTEREI REESE BOCHUM

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057699
Werks-Nr.: *Works no.:*	Material No. 2000064788 TAG-No. 2.7.1.451-551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Ritzelwelle / pinion shaft	PN-00077578.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Durchmesser	Ø 140 m6	+0,040 +0,015	140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03-140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,03-140,04
Durchmesser	Ø 140 m6	+0,040 +0,015	140,03-140,04

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	16.05.2022	J. Nenast	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Ritzelwelle_pinion shaft_balancing report_PART-057699

```
*****************************************
Pekrun Getriebebau GmbH
Koebbingser Muehle 14
58640 Iserlohn/Germany
*****************************************

Operator : Ferdi Basar                          13.05.22 10:46

  Rotordaten              Fall   1              19396/20-057699

  a: 135.0 mm             b: 368.0 mm            c: 135.0 mm

  r1: 100.0 mm            Eb1/Eb2                r2: 100.0 mm

  m1: -polar                                     m2: -polar

  Tol1: 1889. gmm                                Tol2: 1889. gmm

                          N soll    : 1000.  1/Min

  Ergebnisse              Rotor: Ritzelwelle 2       13.05.22 10:46

  Lauf  4                 N ist     :   999.  1/Min

Eb 1:       7.36  g                    Eb 2:       5.00  g

             53. Grad                               110. Grad

            in Tol                                  in Tol

Anteil in Tol.Einheiten  :
        735.9 gmm                                 500.1 gmm
```

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenbaufabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057699
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451-551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Ritzelwelle / pinion shaft	PN-00077578.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m²

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Verzahnung und Wellenübergänge /* *Toothing and shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	16.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Gehäuse_housing_material certificates_PART-057669

Juan Lasa steel works

+34 943 88 28 61
info@juanlasa.com
www.juanlasa.com

Talleres Juan Lasa, S.A.
Barrio Alegi, Nº 14
20217 Gabiria (Gipuzkoa)
CIF: A-20082244

Cliente:
PEKRUN GETRIEBEBAU GMBH
Köbbingser Mühle 14
Phone: 02371/ 945-0 **Fax:**

Sent in:
Pekrun Getriebebau GmbH
Pekrun Getriebebau GmbH
58640 ISERLOHN

DELIVERY NOTE: **54.961**

Supplier Nº:	

Customer Order Ref.	Delivery Date	Order Date	TJL Order	TJL Proyect	Page
4500058885	04/03/2022	19/01/2022	54011	4614	1/1

OF	Description	Drawing Nº	Quantity
8618	GEHÄUSE	PN-00077481.000.01-0	2

Observations: 10018701 / PART-057699

TOTAL PIECES:	2

Gehäuse_housing_material certificates_PART-057669

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPQ8IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : Q8S1006030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Size	Product No.	Quantity	Weight (kg)	Heat No.	Position	Tensile Test YP (N/㎟)	Tensile Test TS (N/㎟)	Tensile Test EL (%)	Impact Test V Notch -20℃ Energy (Joule)	Division	Chemical Composition C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Cu (%)	Mo (%)	N (ppm)	Nb (%)	Ti (%)	V (%)	Sol-Al (%)
6x2500x12000	PK20727001	1	1,413	SK21827	T	502	549	31	1: 104 2: 108 3: 119 A: 110	L P	0.0762 0.0751	0.241 0.240	1.547 1.551	0.0104 0.0107	0.0020 0.0017	0.024 0.023	0.004 0.004	0.008 0.008	0.000 0.001	33 31	0.025 0.025	0.0133 0.0130	0.040 0.040	0.037 0.035
*** Sub Total (010) ***		47	66,411 (kg)																					
*** Heat Treatment ===> Normalizing rolling ***											CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5													
8x3000x12000	PK20684601-4603	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110	L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.046 0.066	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
----->8x3000x12000	PK20684701-4703	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110	L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.046 0.066	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
8x3000x12000	PK20684801-4803	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.008 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20684901-4903	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.008 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20685001-5003	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.008 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test. Direction : Transversal, Gauge Length : 5.65 √A₀ (Rectangular), YP Method : Upper Point
* Impact Test. Direction : Surface Longitudinal, Sub-Size : 10mmX5.0mm
* Division - L : Ladle Analysis, P : Products Analysis
* Supply Condition : As-Rolled unless otherwise Heat Treated.

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN100025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

CE 0035 14 0035-CPR-A258 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia

Tadio Sukmadjaja / Team Leader NA SEON-HA

Copia de certificados de materiales empleados
Para el trabajo de OLAN S.A.
Realizado con la O.F. de OLAN Nº 170454
Su pedido N.º 66825
Ref.: OLAN, S.A.

Gehäuse_housing_material certificates_PART-057669

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPQ8IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : Q8S1006030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

Product No.	Division	Total-Al (%)	CEQ (%)	
PK20727001	L P	0.038 0.037	0.348	
*** Sub Total (010) ***			47	66,411 (kg)
PK20684601-4603	L P	0.033 0.035	0.361	
PK20684701-4703	L P	0.033 0.035	0.361	
PK20684801-4803	L P	0.035 0.034	0.348	
PK20684901-4903	L P	0.035 0.034	0.348	
PK20685001-5003	L P	0.035 0.034	0.348	

CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN100025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

CE 0035 14 0035-CPR-A258 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia < PAGE : 172 > Testing and Inspection Team Leader NA SEON-HA

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000008647

Date : 09.12.2020

Page 9 of 19

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PL.TA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF = Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355 J2+N Plate Dimension -Thickness x Width x Length : 20.00MMX2950MMX11600MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
A02613	A0261302A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261302B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261302D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261303A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261303B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261303D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261304A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
A02613	A0261304B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	395	545	28		162	170	158	163.33	-20	Lo.
Sub Total		8	42.984																													

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification.
The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions
UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PL/10025 13.08.2020
Despatch Advice No:
Vehicle No
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
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Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000008647

Date : 09.12.2020

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355 J2+N Plate Dimension -Thickness x Width x Length : 20.00MMX2950MMX11600MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
A02613	A0261311B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261311D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261312A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261312B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261312D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261313A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261313B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261313D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02614	A0261401A0	1	5.373	L	0.187	1.37	0.003	0.013	0.18	0.026	0.004	0.001	0.005	0.002	0.0040	0.006	0.0004	0.009	59	0.41	394	553	32		210	210	190	203.33	-20	Lo.
A02614	A0261401B0	1	5.373	L	0.187	1.37	0.003	0.013	0.18	0.026	0.004	0.001	0.005	0.002	0.0040	0.006	0.0004	0.009	59	0.41	394	553	32		210	210	190	203.33	-20	Lo.
Sub Total		38	204.174																												

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification.
The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/10025 13.08.2020
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
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Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000008647

Date : 09.12.2020

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PL.TA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition: NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355 J2+N Plate Dimension -Thickness x Width x Length : 20.00MMX3000MMX12000MM

Heat No	Plate ID	Pcs	Wt. MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Origin
					Chemical Analysis																Mechanical Properties									
B08643	B0864303B0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864303D0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864304A0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864304B0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864304D0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864305A0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864305B0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864305D0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
Sub Total		9	50.868																											
G Total		161	813.897																											

Remarks :
1. Test Certificate as per EN 10204, 2004 Type 3.1

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification.
The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions
UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/10025 13.08.2020
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
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Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000008647

Date : 09.12.2020

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PI.TA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-M04606C: Rev.01, Dt.:08.08.2020
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class B
5. Surface Inspection: As per EN10163:2005 class A Subclass 3
6. Flatness: As per EN10029:2011 table 4 class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW): C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
11. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification.
The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/10025 13.08.2020
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

JINDAL STEEL & POWER

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INSPECTION CERTIFICATE

Test Certificate No. 0000011094

Date : 16.10.2021

Page 7 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** **Plate Dimension -**Thickness x Width x Length : **25.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)						
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orien
B17532	B1753211D0	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.018	56	0.42	419	552	27		322	334	309	321.67	-20	Lo.
B17532	B1753211D0	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.018	56	0.42	419	552	27		322	334	309	321.67	-20	Lo.
B17533	B1753301A0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753301B0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753301D0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753302A0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753302B0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753302D0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753303A0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753303B0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
Sub Total		17	99.246																													

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification.
The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
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Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

JINDAL STEEL & POWER

CE 0045

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0045 - CPR - 1835

INSPECTION CERTIFICATE

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olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N Plate Dimension** -Thickness x Width x Length : **8.000MMX3000MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)						
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orien
B16737	B1673710E0	1	2.211	L	0.180	1.33	0.004	0.016	0.21	0.050	0.007	0.001	0.021	0.002	0.0010	0.009	0.0005	0.014	56	0.40	432	589	28		94	98	107	99.670	-20	Lo.
Sub Total		1	2.211																												
G Total		114	670.884																												

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-00733A; Rev.02, Dt :09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B
5. Surface Inspection: As per EN10163 class A Subclass 3
6. Flatness: As per EN10029 Class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) :C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
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INSPECTION CERTIFICATE

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olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

Page 16 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

11. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
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INSPECTION CERTIFICATE

Test Certificate No. 0000011045

Date : 14.10.2021

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
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01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF = Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** **Plate Dimension -**Thickness x Width x Length : **50.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties									
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
			MT																											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
A13620	A1362001A0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0005	0.018	56	0.42	405	536	27		126	132	144	134.00	-20	Lo.
A13620	A1362001B0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0005	0.018	56	0.42	405	536	27		126	132	144	134.00	-20	Lo.
B17069	B1706906A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706906B0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706907A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706907B0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706908A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	390	538	26		144	134	133	137.00	-20	Lo.
Sub Total		7	82.075																											

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
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INSPECTION CERTIFICATE

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olan@olan.es

Test Certificate No. 0000011045

Date : 14.10.2021

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF = Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N Plate Dimension -**Thickness x Width x Length : **55.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)						
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orien
B16535	B1653506A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.001	0.0020	0.010	0.0003	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo.
B16535	B1653508A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.001	0.0020	0.010	0.0003	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo.
Sub Total		3	38.709																													
G Total		157	1150.149																													

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/- 00733A; Rev.2, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class B
5. Surface Inspection: As per EN10163:2005 class A Subclass 3
6. Flatness: As per EN10029:2011 table 4 class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) : C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
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INSPECTION CERTIFICATE

Test Certificate No. 0000011045

Date : 14.10.2021

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

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TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF = Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
11. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

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Date : 01.09.2019

INSPECTION CERTIFICATE

Test Certificate No. 0276
To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

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TEST RESULTS

Supply Condition: Furnace Normalized
Deoxidation :Fully Killed

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Material Grade : EN10025-2:2005 S355J2+N Plate Dimension -Thickness x Width x Length : 55.00MMX2500MMX12000MM

Heat No	Plate No	No of Pcs	Wt MT	Chemical Analysis (Laddle)																Mechanical Properties: <=25mm Flat & >25mm Round Sample				Impact (V Notch Charpy) Value at 0 C, Size (10*10*55 mm)					
				%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	%Zn	%Cu	YS(Mpa)	TS(Mpa)	%El	Orien	I	II	III	Avg	Temp	Orien
H83700	05A0, 09A0, 10A0, 11A0, 12A0, 13A0, 14A0	7	90.671	0.18	1.46	0.002	0.02	0.22	0.021	0.005	0.003	0.045	0.015	0	0.005	0.0015	0.023	49	0.429	391	555	28	T	121	100	130	117.00	-20	L
																				386	549	30	T	129	137	111	125.67	-20	L
H83702	01A0, 02A0, 03A0, 04A0, 05A0, 06A0, 07A0, 08A0, 09A0, 11A0, 12A0	11	142.483	0.173	1.45	0.002	0.015	0.2	0.024	0.007	0.002	0.046	0.018	0	0.006	0.0015	0.018	51	0.42	389	576	27	T	115	122	110	115.67	-20	L
																				382	542	27	T	110	108	98	105.33	-20	L
H83781	12A0	1	12.953	0.183	1.45	0.002	0.015	0.18	0.021	0.006	0.002	0.045	0.018	0.0000	0.006	0.0007	0.022	55	0.430	366	492	32	T	78	72	68	72.67	-20	L

Sridhar Behera
AGM, QA & QC
Jindal Steel & Power Ltd.
Angul, Odisha, India

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist. Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6, O.P.Jindal Marg, Hisar (Haryana)
Corporate Office: Jindal Center,12 Bhikaji Cama Palace, New Delhi -11 006 INDIA
Phone No.:(06761) 254100-05, Fax :+06761 -254141-44

CE
0045
13
0045 - CPR - 1835
Date : 01.09.2018

INSPECTION CERTIFICATE

Test Certificate No. 0276
To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition: Furnace Normalized
Deoxidation :Fully Killed

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Remarks :
1. Test Certificate as per EN 10204, 2004 Type 3. 1
2. Material mentioned above also conforms to EN10025-2:2005, S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANG/IL/TDC/-M1216; Rev.00, Dt. 22.01.2018
4. Supply Condition: Furnace Normalized at 900 ± 20°C, Cycle time: 1.4 minutes per mm thickness + 10 minutes Soaking
5. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class A
6. Surface Inspection: As per EN10163:2005 class A Subclass 3
7. Flatness: As per EN10029:2011 table 4 class N (L Type)
8. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
9. CE (IIW) : C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
10. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
11. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
12. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification
UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160:1999 S1E1 and found ok

Purchase Reference & Date: PRUV/EXP/PLT/8019/LOT 2/ 04.07.2018
" DOP can be viewed at www.jindalsteelpower.com", DOP No.: JSPL/CE/PL/S35512
" Gauge Length: 5.65(SO)1/2

Sridhar Behera
AGM, QA & QC
Jindal Steel & Power Ltd.
Angul , Odisha, India

Authorised Signatory
QA/QC Plate Mill

JSPL/ANG/PM-QA&QC/F-251

Gehäuse_housing_material certificates_PART-057669

검 사 증 명 서
MILL TEST CERTIFICATE

HYUNDAI STEEL
0038/07
당진제철소 : 충남 당진시 송악읍 복두산로 1480
1480 Bulbusanup-Ro, Songak-Eup, Dangjin-Si, Chungnam, Korea

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

주문번호 Order No. : F171200026
품 명 Commodity : Hot Rolled Steel Plate
제품규격 Specification : EN 10025-2 S355J2+N
고객사 Customer : OLAN
주문자 Contractor : HYUNDAI CORPORATION
증명서 번호 Certificate No. : 20180301-PS-010-003
발행일자 Date of Issue : 2018-03-01

제품치수 Dimension	수량 Quantity	중량 Weight (Kg)	제강번호 Heat No.	제품번호 Product No.	Position	인장시험 Tensile Test YP (N/mm²)	TS (N/mm²)	EL (%)	YP-EL (%)	RA (%)	YR (%)	YP Mtd	충격시험 Impact Test V Notch -20.0 ℃ Energy (Joule)	SF (%)	LE (mm)	Division	화학성분 Chemical Composition(%) C 4	Si 3	Mn 3	P 4	S 4	Cr 2	Ni 2	Cu 3	Mo 2	N 4	Nb 3	Ti 3	V 3	Sol-Al 3	CEQ 3
65 x 2500 x 12000	1	15,306	P59185	FA92167401	T	380.6	514.1	32				U	1: 263			L	1,152	210	1,454	147	40	2	10	82	0	41	31	16	1	30	374
													2: 312			P	1,201	207	1,453	160	37	2	10	78	0	37	29	16	2	27	379
													3: 255																		
													A: 277																		
65 x 2500 x 12000	1	15,306	P59185	FA92167501	T	380.6	514.1	32				U	1: 263			L	1,152	210	1,454	147	40	2	10	82	0	41	31	16	1	30	374
													2: 312			P	1,201	207	1,453	160	37	2	10	78	0	37	29	16	2	27	379
													3: 255																		
													A: 277																		
65 x 2500 x 12000	1	15,306	P59753	FA92223601	T	384.1	500.0	32				U	1: 313			L	1,142	198	1,455	145	38	2	9	81	1	43	29	15	2	32	374
													2: 272			P	1,147	191	1,452	118	25	2	9	82	1	35	29	16	1	34	374
													3: 320																		
													A: 302																		
65 x 2500 x 12000	1	15,306	P59750	FA92223701	T	389.8	501.2	32				U	1: 288			L	1,170	186	1,454	156	35	2	8	81	0	41	29	16	2	36	374
													2: 313			P	1,247	194	1,428	134	37	2	9	79	1	36	31	16	1	31	380
													3: 255																		
													A: 285																		

단위 Unit 2 : x 100 3 : x 1,000 4 : x 10,000 5 : x 100,000

NOTE
- Position – T:Top, M:Middle, B:Bottom
- Tensile test – Direction:Transverse, Gauge length:5.65√A, (Round), YP Mtd : 2 (0.2% off-set),5 (0.5% underload), U (Upper yield point), L (Lower yield point)
- Impact test – Direction:Longitudinal, Size:10mmX10mm, SF:Shear fracture, LE:Lateral Expansion
- Division – P:Product analysis, L:Ladle analysis

- THIS CERTIFICATE IS ISSUED ACCORDING TO EN 10204 3.1 AD2000W0(W1)
This Mill Test Certificate is issued in accordance with EN 10204 Type 3.1

상기의 제품은 검사의 결과 주문요구사항과 지정된 규격에 합격한 것을 증명합니다.
WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ORDER AND SPECIFICATION

Signature S. B. Park
Chief Of Quality Assurance Team

- 본 검사증명서는 원본인 전자문서(전자서명 정보 포함)로부터 출력된 사본입니다. 전자문서의 내용은 현대제철 고객포털에서 확인하실 수 있습니다.(http://sm.hyundai-steel.com/cs/cm/login.jsp)
- This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signing).
You are able to check an original electronic document at hyundaisteel's customer portal.(http://sm.hyundai-steel.com/cs/cm/login.jsp) ★ QRcode scanner App : 'QReal'
- [사용상 주의사항] 본 검사증명서에 명기된 규격 외 사용시 제품손상 및 안전상 문제가 발생할 수 있습니다.
- [Caution for Use] Damage on products and safety problems may arise if used other than to the spec stated in this Mill Test Certification.

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

JINDAL STEEL & POWER

CE 0045

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0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011096

Date : 16.10.2021

Page 1 of 2

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:FURNACE NORMALIZED

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** **Plate Dimension -**Thickness x Width x Length : **130.0MMX2200MMX8550MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																		Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)					
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orien
A13625	A1362506A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362507A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362508A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
A13625	A1362509A0	1	19.196	L	0.200	1.40	0.005	0.016	0.19	0.036	0.003	0.001	0.025	0.002	0.0010	0.006	0.0003	0.007	57	0.43	388	533	27		111	136	114	120.33	-20	Lo.
B16531	B1653102A0	1	19.196	L	0.182	1.47	0.002	0.016	0.20	0.037	0.006	0.045	0.046	0.011	0.0010	0.011	0.0005	0.015	57	0.44	330	524	26		188	159	166	171.00	-20	Lo.
Sub Total		5	95.980																											
G Total		5	95.980																											

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3. 1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-00733A; Rev.02, Dt.:09.03.2021
4. Supply Condition: Furnace Normalized at 900 ± 20°C, cycle time minimum: 1.4 minutes per mm thickness + 10 minutes.
5. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:48:30
Printing Date 18.10.2021 & Time 11:22:14

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

CE
0045
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0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011096

Date : 16.10.2021

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:FURNACE NORMALIZED

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

6. Surface Inspection: As per EN10163 class A Subclass 3
7. Flatness: As per EN10029 Class N (L Type)
8. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
9. CE (IIW) :C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
10. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
11. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
12. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:48:30
Printing Date 18.10.2021 & Time 11:22:14

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057669

OLAN, S.A.
PRODUCTOS METALICOS - CORTE A MEDIDA
OXICORTE - TRATAMIENTOS ANTICORROSIVOS

INFORME DE INSPECCIÓN POR ULTRASONIDOS
ULTRASONIC INSPECTION REPORT

Nº Informe (Report): **O.F. 170.454**

Cliente: Customer:	**JUAN LASA**	**Nº Pedido:** Order:	**66.835**	**Referencia:** Reference:	**OF.8618**
Descripción: Description:	**Chapa**	**Norma:** Standard:	**UNE-EN 10160:2000**	**Clase:** Grade:	**S2 + E2**
Tipo de material: Type of material:	**Chapas de acero**	**Acabado superficial:** Surface finish:	**Laminación**		
Equipo: Equipment:	**KRAUTKRAMER USM 32**	**Acoplamiento:** Couplant:	**AGUA**		

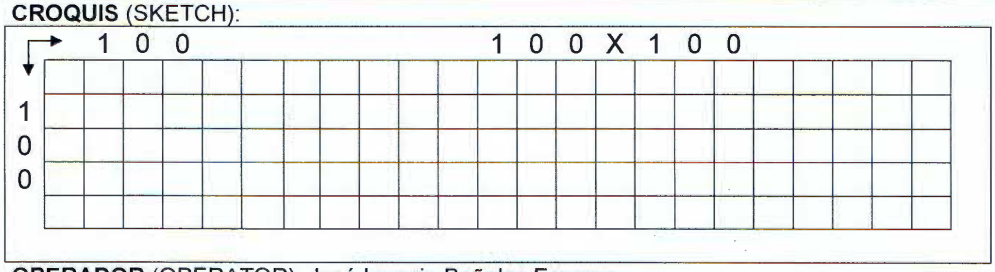
PALPADOR - PROBE				CALIBRACIÓN - CALIBRATION				
TIPO TYPE	**FREC.** FREQ (MHz.)	**TAMAÑO** SIZE (mm.)	**Espesor** Thickness (mm.)	**PARA CAMPO** FOR RANGE	**CAMPO** RANGE (mm.)	**TALADRO REGISTRO** REC. HOLD	**PARA LA GANANCIA** FOR GAIN	**GANANCIA** GAIN
SEB-4T	4	Ø 24 mm	8 / 65	Chapa	16 / 130	Ø 5 mm.	80 % ECO	42 / 56 dB
B2S-E	2	Ø 24 mm	130	Chapa	260	Ø 8 mm.	80 % ECO	46 dB

RESULTADOS (RESULTS):
Se ha efectuado la inspección por ultrasonidos según la norma UNE-EN10160:2000 según clases S2 + E2 al siguiente material / The inspection by ultrasonic test has been made in accordance with UNE-EN10160:2000 standard and S2 + E2 grade the following material:

1 chapa/*plate* 8 x 3000 x 12000 (S-355-J2+N):	PK20684701
1 chapa/*plate* 20 x 2500 x 12100 (S-355-J2+N):	A0261304A0 / A0261311D0
1 chapa/*plate* 25 x 2500 x 12000 (S-355-J2+N):	B1753303A0
1 chapa/*plate* 50 x 2500 x 12000 (S-355-J2+N):	B1706906A0
1 chapa/*plate* 55 x 2500 x 12000 (S-355-J2+N):	B8370204A0
1 chapa/*plate* 65 x 2500 x 12000 (S-355-J2+N):	FA92167401
1 chapa/*plate* 130 x 2200 x 8550 (S-355-J2+N):	A1362509A0

En dicha inspección se han detectado indicaciones que NO superan el nivel de referencia, por lo que se clasifica la chapa como ACEPTABLE / In this inspection weren't found indications exceeding the reference level, so the material is classified as **ACCEPTABLE.**

CROQUIS (SKETCH):



OPERADOR (OPERATOR): José Ignacio Bañales Esparza
Nº CERTIFICADO (CERTIFICATE NR.): E-A-004397-UT-2-M-2
FECHA (DATE): 14/02/2022

OLAN, S.A.
Pol. Ind. Asparrena - C/ Amezaga, 9
01250 ARAIA (ALAVA)
Tl.: 945 31 46 61 Fax 945 31 45 89

Gehäuse_housing_material certificates_PART-057669

INTEC Inspección Técnica email: intec.era@gmail.com Tel: 696 320 618 / Lasao, Gipuzkoa	INSPECCIÓN VISUAL *(Visual Testing)*	INFORME Nº *(ReportNr.)* 220302

CLIENTE *(Customer)*	ORDEN DE FABRICACIÓN *(Purchaseorder)*	PLANO CLIENTE *(CustomerDrwg).*
TALLERES JUAN LASA, S.A.	65.516/ OF 8618	PART-057669
DESIGNACIÓN *(Item)*	**MATERIAL** *(Material)*	**SOLDADURA** *(Welding)*
GEHÄUSE (2 piezas)	S355J2+N	FW / BW

CONDICIONES DE EXAMEN(Examination Conditions)

ILUMINACIÓN *(Ilumination)*		SOLDADURA *(Welding)*		ESTADO DE LA SUPERFICIE *(Surface status)*
				SOLDADURA EN BRUTO
Natural *(Natural)*	Artificial *(Artificial)*	Procedimiento *(Proced.)*	Tipo Junta *(Jointtype)*	PROCEDIMIENTO DE INSPECCIÓN *(Inspectionprocedure)*
	X	MAG	FW/BW	UNE EN ISO 17637

ESPECIFICACIÓN *(Specification)*	OBSERVACIONES (Observations)
S/EN5817	
GRADO *(Grade)*	**RESULTADO DEL EXAMEN** *(ExaminationResults)*
C	ACEPTABLE

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.

(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-002024-VT-2-S-3 *(Level 2 Inspector)*	FECHA *(Date)*
INTEC Inspección Técnica email: intec.era@gmail.com Tel: 696 320 618 / Lasao, Gipuzkoa	01/03/2022

Gehäuse_housing_material certificates_PART-057669

INTEC Inspección Técnica	EXAMEN POR LÍQUIDOS PENETRANTES *(Examfor penetran liquids)*	INFORME Nº *(ReportNr.)* 220219

CLIENTE *(Customer)*	PEDIDO CLIENTE *(Purchaseord.)*	PLANO CLIENTE *(PurchaseDrwg.)*
TALLERES JUAN LASA, S.A.	65.516/ OF 8618	PART-057669

MATERIAL *(Material)*	COLADA *(Heat)*
S355J2+N	--

DESIGNACIÓN *(Item)*
GEHÄUSE

LIMPIEZA *(Cleaning)*	TIPO DE PENETRANTE *(Type of penetrating)*	ELIMINADOR *(Eliminator)*	REVELADOR *(Revealer)*
ARDROX 9PR5	ARDROX 996 PB	ARDROX 9PR5	ARDROX LD7

MÉTODO *(Method)*
LIQUIDOS PENETRANTES COLOREADOS LAVABLES CON DISOLVENTE

ESTADO DE LA SUPERFICIE *(State of thesurface)*
SOLDADURAS EN BRUTO

OBSERVACIONES *(Observations)*

ACEPTADOS *(Accepted)*	RECHAZADOS *(Rejected)*
2 PIEZAS	--

PROCEDIMIENTO *(Specification)*	GRADO DE EXIGENCIA *(Demand grade)*
EN ISO 23277	3X

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.
(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-002024-PT-2-S-3	FECHA
INTEC Inspección Técnica email: intec.eus@gmail.com tl: 696 320 618 / Lazkao Gipuzkoa	01/03/2022

05 – PT – IT – M

Gehäuse_housing_material certificates_PART-057669

Juan Lasa Steel-Work	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order* 4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL* 8618-1

Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		568		22				
2	485+D		499		23				
3	185		183		24				
4	330		330		25				
5	65		65		26				
6	Ø360-D		Ø337		27				
7	Ø330-D		Ø307		28				
8	310		310		29				
9.	Ø300-D		Ø277		30				
10	Ø300-D		Ø277		31				
11	520		522		32				
12	770+D		779		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

Responsable control final/ *Final Control responsable*

2-3-22

www.juanlasa.com www.jlsteelwork.com

Gehäuse_housing_material certificates_PART-057669

Juan Lasa steel-works	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order* 4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL* 0618-2

Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		570		22				
2	485+D		500		23				
3	185		183		24				
4	330		330		25				
5	65		65		26				
6	Ø350-D		Ø357		27				
7	Ø330-D		Ø308		28				
8	310		310		29				
9.	Ø300-D		Ø277		30				
10	Ø300-D		Ø278		31				
11	520		523		32				
12	770+D		783		33				
13					34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

Responsable control final/ *Final Control responsable*

2-3-22

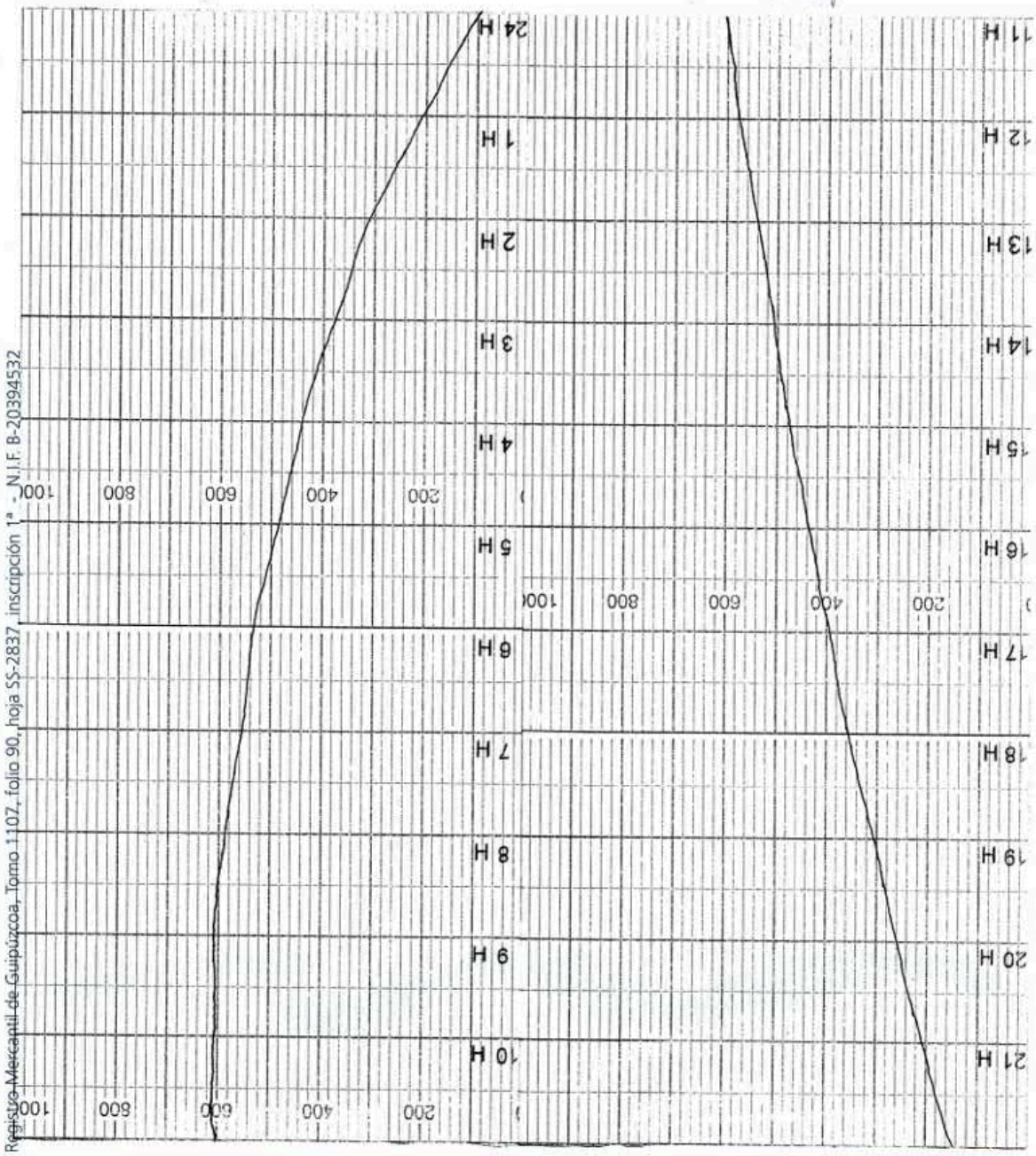
www.juanlasa.com

Gehäuse_housing_material certificates_PART-057669

muñagorri S.L.
recubrimientos

Talleres Juan Lasa, S.A.
Nº Reg. 03-03-2022
Pdo. 65.525, OF 8618
2 GEHÄUSE s/p PN-00077481.000.01-0
Estabilizado 600ºC

RECUBRIMIENTOS MUÑAGORRI, S.L.
Polígono Industrial Beotibar
20491 BELAUNTZA



Registro Mercantil de Guipúzcoa, Tomo 1107, folio 90, hoja SS-2837, inscripción 1ª - N.I.F. B-20394532

Polígono Industrial Beotibar, s/n Tel. 943 67 30 28 Fax 943 67 01 35 20491 BELAUNTZA (Gipuzkoa)

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057669
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.451+551	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002292-93

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Gehäuse / housing	PN-00077481.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagerbohrung	Ø 360 H7	+0,057 0	360,045-360,05
Lagerbohrung	Ø 360 H7	+0,057 0	360,045-360,05
Lagerbohrung	Ø 300 H7	+0,052 0	300,03-300,04
Lagerbohrung	Ø 300 H7	+0,052 0	300,03-300,04
Achshöhe	550	0 -0,2	i.O.
Ankerlöcher	Ø 42		i.O.
Lochabstand	400		i.O.
	700		i.O.
	380		i.O.
	380		

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	23.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 2

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060562
Werks-Nr.: *Works no.:*	Material-No.: 2000064792	Kennwort: *Code word:*	Projekt-Nr. 4000369 S/No. 10002293

Menge *Quantity*	Benennung *Designation*	Getriebetyp *Gearbox type*	Zeichnungs-Nr. *Drawing no.*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW	PN-00096635.001.01

Technische Daten Getriebe / *Technical data gear unit*			
Leistung/*power*	3600 kW	Übersetzung/*ratio*	i = 2,931:1
Ölmenge/*oil quantity*	270 l / 56 l/min	Drehzahl/*number of revolution*	n_1 =1493 min^{-1}
Ölviscosität/*oil viscosity*	ISO VG 320	Drehzahl/*number of revolution*	n_2 = 510,8 min^{-1}
Anordnung Antrieb *drive arrangement*	Horizontal	Anordnung Abtrieb *output arrangement*	Horizontal
Drehrichtung Abtrieb *sense of rotation (output)*	CCW	Schmierung *lubrication*	recirculation lubrication

Messprotokoll für Getriebe / *measuring data report for gear unit*

Tragbilder und Zahnspiele
meshing patterns and gear clearance of the toothing

Prüfergebnis:

Die Tragbilder und Zahnspiele der Verzahnungen wurden während der Getriebemontage nach den Zeichnungen geprüft und entsprechen den, der Konstruktion vorgegebenen, Qualitätsanforderungen.

Test result:

The meshing patterns and gear clearances of the gear toothing were checked during gear assembly according to the drawings and correspond to the quality instructions specified by the construction.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	18.05.2022	P. Heikaus	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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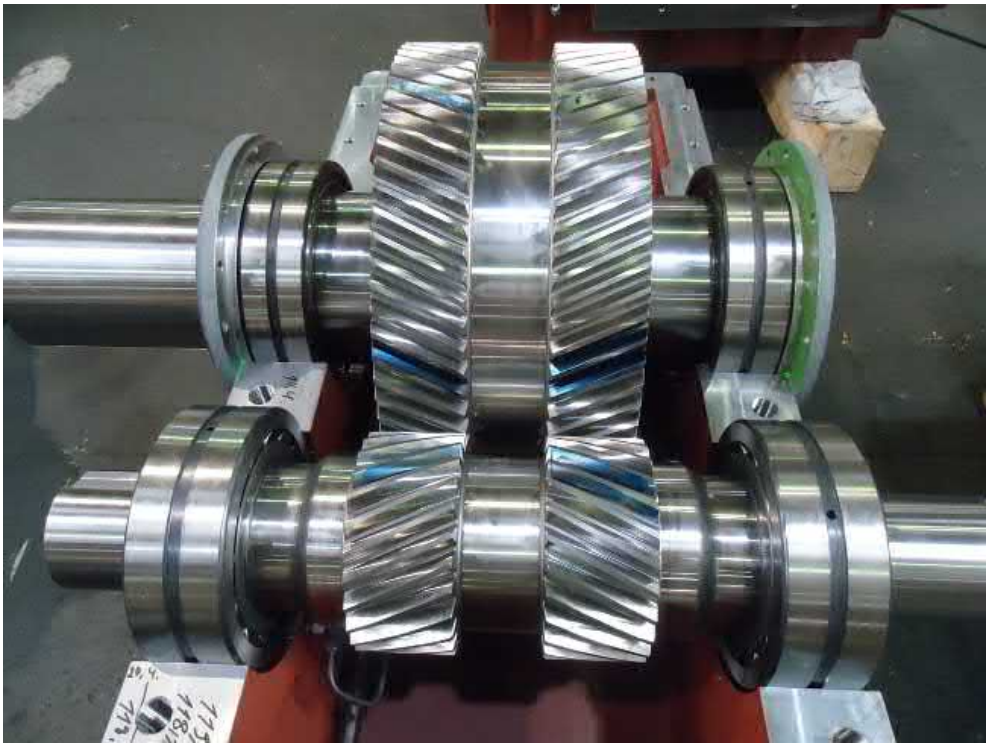
Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]



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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060562
Werks-Nr.: *Works no.:*	Material-No.: 2000064792	Kennwort: *Code word:*	Projekt-Nr. 4000369 S/No. 10002293

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Stirnradgetriebe /*spur gear gearbox*	PN-00096635.001.01

Maßprotokoll der Anschlussmaße
measurement report of the connection dimensions

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Antriebswelle / *Input shaft*	Ø 140 m6	+0,040 +0,015	140,04
Höhe / *height*	550	0 -0,2	i.O.
Länge / length	180	+0,5 -0,5	i.O.
Abtriebswelle / Output shaft	Ø 240 m6	+0,046 +0,017	240,04
Höhe / *height*	550	0 -0,2	i.O.
Länge / *length*	292	+0,5 -0,5	i.O.
Fußlochabstand / *distance of the Housing holes*	400/220/480	+0,8 -0,8	i.O.
Fußlochabstand / *distance of the Housing holes*	380/380	+0,8 -0,8	i.O.
Fußlöcher / *housing holes*	Ø 42	+0,3 -0,3	i.O.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	31.05.2022	J. Nenast	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 1 von 3

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/20-2
Bestell-Nr.: *Order no.:*		Artikel-Nr.: *Article no.:*	PART-060562
Serial-Nr.: *Serial- No.:*	10002293	Probelaufdatum: *Test run date::*	27.05.2022

Menge/*Quantity*	Benennung/*Designation*	Getriebe-Typ/*Gearbox type*
1	Getriebe	ASR 450-R-CCW

Technische Daten Getriebe / *Technical data gear unit*					
Leistung/ *power*	P [kW]	3600	Drehmoment/ *torque*	T [Nm]	-
Übersetzung/ *ratio*	i	2,9231:1	Drehzahl/ *number of revolution*	n1 [1/min]	1493
Drehrichtung/ *sense of rotation*		CCW	Drehzahl/ *number of revolution*	n2 [1/min]	510,8
Ölviscosität/ *oil viscosity*	[cST 40°C]	320	Schmierung/ *lubrication*		Circulating oil lub.
Ölmenge / *oil quantity*	[l/min]	56	Ölfüllmenge/ *oil filling quantity*	[l]	270

Probelaufprotokoll / test run report

Antriebsdrehzahl beim Probelauf *drive number of revolution during test run*	n1 [1/min]	Ist / *actual value* 1493
Abtriebsdrehzahl beim Probelauf *output number of revolution during test run*	n2 [1/min]	Ist / *actual value* 511

Temperaturen nach Laufzeit *Temperature after running time*			Lager antriebsseitig *bearing on drive side*	Lager abtriebsseitig *bearing on output side*
Antrieb/*drive*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	42	49
Abtrieb/*output*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	34	44
Öltemperatur /*oil temperature*		[°C]	40	

Separate Temperaturaufzeichnung mit Datenlogger, mit „JA“ oder „NEIN“ bestätigen *Separate temperature recording with data logger, confirm with "YES" or "NO*		Ja
Laufzeit Probelauf /*running time test run*	[h]	4
Ölfüllmenge/ *oil filling quantity*	[l]	270
Ölmenge/ *oil flow rate*	[l/min]	56
Probelauföl/ *test run oil*	[cST 40°C]	ISO VG 320

Erfassen des Öldruckes/ *recording the oil pressure*		
Öldruck bei Probelaufstart/ *oil pressure at test run start* (mit Angabe der Öltemperatur / with indication of the oil temperature)	2,9bar @ 25C°	
Öldruck bei Beharrungstemperatur (alternativ nach Laufzeit h) *Oil pressure at steady-state temperature (alternatively after running time h)*	Soll / *nominal value* bar @ C°	Ist / *actual value* 1,9bar @ 40C°

Öldichtigkeit des Getriebes, mit „i.O.“ oder „n.i.o.“ bestätigen *oil tightness of the gearbox, confirm with "i.O." or "n.i.o.*	i.O

Schwingungsmessung/ *vibration measurement*	
Schwingungsmessung gemäß Beschreibung, mit „JA“ oder „NEIN“ bestätigen *vibration measurement acc. to description, confirm with "YES" or "NO*	Ja
Messpositionen nach Vorgaben in der Maßzeichnung, mit Angabe (x) bestätigen *measuring positions acc. to specifications in the dimensional drawing, confirm with indication (x)*	x

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 2 von 3

Funktionsprüfung von Zubehörteilen/ *functional test of accessory parts*	
Zubehör auf Funktion geprüft (Durchflusswächter, Druckwächter, etc.), mit Angabe (x) bestätigen *Accessories checked for function (flow monitor, pressure monitor, etc.), confirm with indication (x)*	-

Erfassen der Serialnummern/ *recording the serial numbers*	
Erfassen aller Serialnummern des verbauten Zubehörs am Getriebe, mit Angabe (x) bestätigen *recording of all serial numbers of the installed accessories on the gearbox,/ confirm with indication (x)*	x

Prüfungen Mühlengetriebe/ *tests mill gear unit*		
Maß X/ *dimension X*	[mm]	
Anschlussflanch/ *connecting flange*		
Radialschlag/ *radial run-out*	[mm]	
Axialschlag/ *axial run-out*	[mm]	

Weitere Prüfungen/ *further tests*			
Schallpegel in 1m Entfernung *sound level at 1m distance*	[dB(A)]	Soll / *nominal value*	Ist / *Actual value*
		-	76 dB
Innenkonservierung, mit Angabe Konservierungsmittel *interior conservation,* with indication of preservative			VCI
Ölfilter gereinigt, mit Angabe (x) bestätigen *oil filter cleaned, confirm with indication (x)*			-

Bilder Probelaufaufbau / *pictures test run bench*

Bilder Öldruck bei Start /
pictures oil pressure at start

Bilder Öldruck bei Beharrungstemperatur /
Pictures oil pressure at steady-state temperature

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 3 von 3

Bilder Durchflusswächter bei Start /
Pictures flow monitor at start

Bilder Durchflusswächter bei Beharrungstemperatur /
Pictures Flow monitor at steady-state temperature

Bilder Funktionsprüfung Instrumentierung und Zubehör /
Pictures Functional test instrumentation and accessories

Bemerkung: Probelauf ohne Last. Während des Probelaufs wurden keine Undichtigkeiten am Getriebe festgestellt.

Remark : Test run without load. During the test run, no leaks were detected at the gearbox.

Prüfer / Inspector:	J. Nenast
Datum / Date:	27.05.2022

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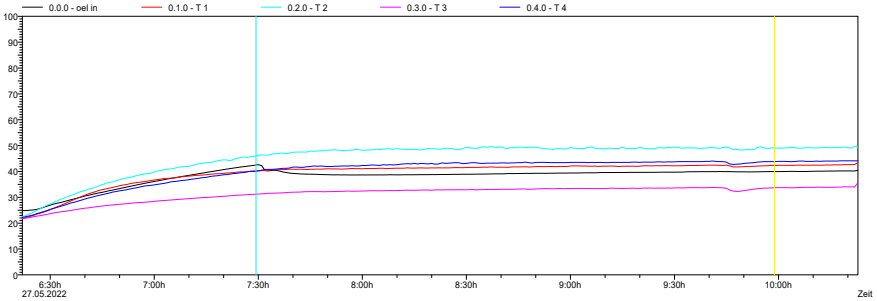
Probelaufdiagramm
test run diagram

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	Werks-Nr.: *Works no.:*	Material No. 2000064792	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-20-2
Bestell-Nr.: *Order no.:*	4500494756	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002293	Artikel-Nr.: *Article no.:*	PART-060562

Temperaturverlauf / *temperature profile*



Messstelle	Linker Cursor		Rechter Cursor		Differenz		Mittelwert	
Zeit	27.05.2022, 07:29:19		27.05.2022, 09:58:47		02:29:27			
0.0.0 - oel in	42,41	°C	39,93	°C	-2,48	°C	39,344	°C
0.1.0 - T 1	40,21	°C	42,26	°C	2,05	°C	41,618	°C
0.2.0 - T 2	45,9	°C	49	°C	3,1	°C	48,64	°C
0.3.0 - T 3	31,18	°C	33,71	°C	2,53	°C	32,937	°C
0.4.0 - T 4	40	°C	43,8	°C	3,8	°C	42,97	°C

	58640 Iserlohn	27.05.2022	J. Nenast
	ORT / *INSPECTION LOCATION*	DATUM / *DATE*	PRÜFER / *INSPECTOR*

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
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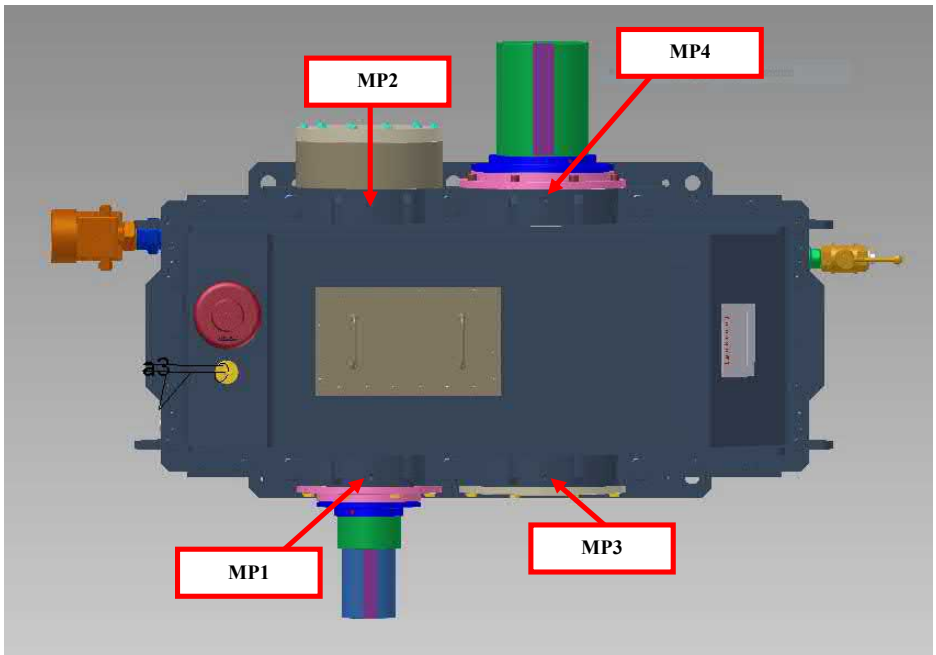
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Auftraggeber: customer:	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: PEKRUN com.-no.:	19396/20-2
Bestell-Nr.: order no.:	4500494756	Zeichnungs-Nr.: drawing no.:	PART-060562
Auftrags-Nr.: works no.:	Material-No.: 2000064792	Kennwort: code word:	Projekt-Nr. 4000369 S/No. 10002293

Menge/quantity	Benennung/designation	Getriebe-Typ/gear unit type
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW

Gearbox overview



Remarks:
Measuring points acc. to dimensional drawing.

Test result:
The results of the test run comply with the Pekrun quality specifications. The test results are listed on the second page.

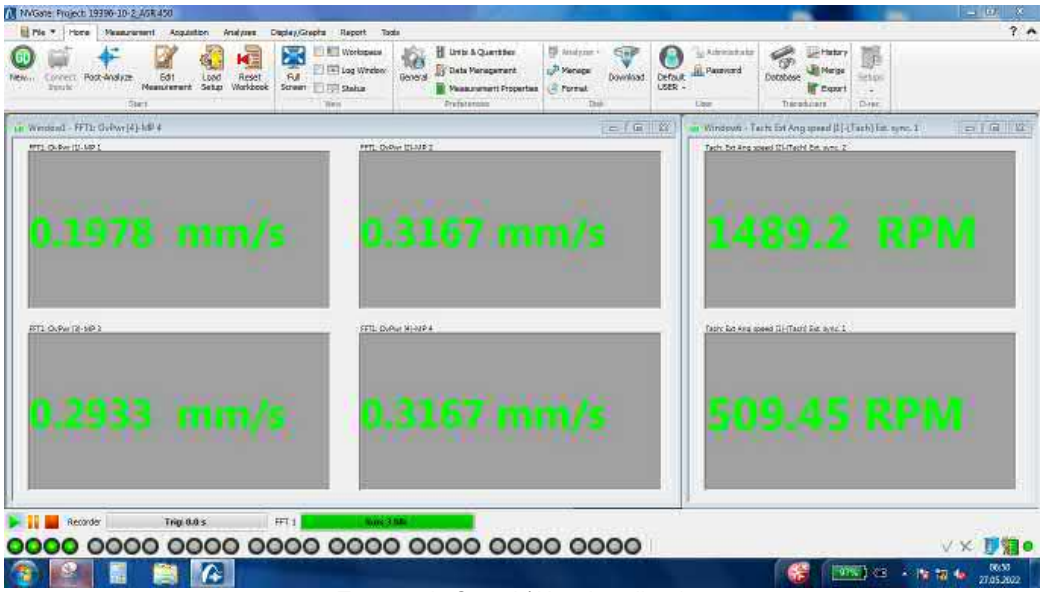
J. Nenast

Datum: 27.05.2022

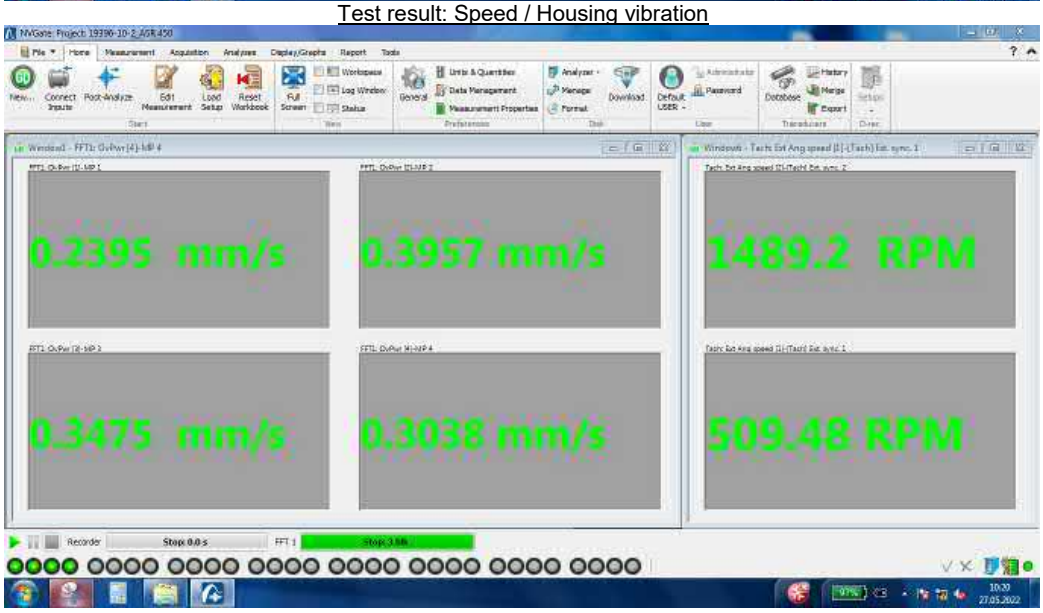
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Test result: Speed / Housing vibration



Test result: Speed / Housing vibration



Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 2

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060563
Werks-Nr.: *Works no.:*	Material-No.: 2000064792	Kennwort: *Code word:*	S/No. 10002293

Menge *Quantity*	Benennung *Designation*	Getriebe-Typ *Gearbox type:*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 450-R-CCW

Anstrichprüfung / *coat of paint report*

Anforderungen / ***requirements:***			
Spezifikation (PEKRUN oder Kunden-Nr.): *Specification (PEKRUN or customer no.):*	QH00510B_01		
Vorbehandlung nach ISO 12944-4 *Surface preparation treatment acc to EN ISO 12944-4*	Shot blasting ☐SA 2 / ☒SA 2½ / ☐SA 3		
Oberflächenreinheit *Surface cleanliness*	Acc. to ISO 8501 (free of rust, oil, tinder and other impurities)		
Oberflächenrauheit *Surface roughness*	acc. to SA 2½		
	Grundanstrich *1st. Coat (Primary coat)*	Zwischenanstrich *2nd. Coat (Intermediate coat)*	Deckanstrich *3rd. Coat (Top coat)*
Produktname Name of Product	Vestozink 2K EP Zink	VESTOPOX 2K-EP-1.Deck EG RAPID	VESTOPUR 2K-DT-Deck – ATEX
Chargen Nr.: *Charge No.*	2200964	2200193	2200781
Farbe (RAL Nr.) *Color (RAL no.)*	graumatt	RAL 7703	RAL 5001
Trockenschichtdicke *DFT (dry film thickness)*	65 µm – 95 µm	130 µm -165 µm	230 µm – 280 µm
Lufttemperatur °C *Air temperature °C*	20 °C	22 °C	22 °C
Oberflächentemperatur °C *Surface temperature °C*	22 °C	22 °C	22 °C
Relative Luftfeuchte % *Relative air humidity %*	47 %	50 %	49 %
Datum Date	14.05.2022	30.05.2022	03.06.2022
Haftfähigkeit der Farbe nach ISO 2409 Gitterschnittkennwert: *Adhesion test acc. to ISO 2409 Parameter of grid cut test:*	ISO GT (1)		

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

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Bemerkungen	Schichtdickenangaben nach DIN EN ISO 12944-5

Die Sollschichtdicke gilt auch als erreicht, wenn Einzelmesswerte den Sollwert um höchstens 20% unterschreiten und der Mittelwert aller Einzelmessungen gleich oder größer der Sollschichtdicke ist.

Remarks: *Layer thickness information according to DIN EN ISO 12944-5*

The nominal layer thickness is also complied, to be achieved if individual measured values fall below the setpoint value by at most 20% and the mean value of all individual measurements is equal to or greater than the nominal layer thickness.

Prüfergebnis:	Die Anforderungen sind erfüllt.
Test result:	*The requirements are complied*

58640 Iserlohn	27.06.2022	Z. Acikgöz	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
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Cooling gas stage

TAG No. AERZEN	Link
2.7.1.651	

[pekrun]

Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Deutschland
www.pekrun.de

TECHNISCHE DOKUMENTATION

TECHNICAL DOCUMENTATION

DEUTSCH

ZUM AUFTRAG
TO THE ORDER

IHRE BESTELL NR. YOUR ORDER NO.	4500494756 Pos. 30
WERKS NR. WORKS NO.	2000064793 4001310648, 4001308822
KENNWORT CODE WORD	GLAUCH TOOBA
TAG-No	2.7.1.651
PEKRUN SERIAL NR.	10002294
PEKRUN KOM. NO.	19396-30
GETRIEBE TYP GEAR UNIT TYPE	ASR 413-R-CCW
GEWICHT WEIGHT	3028 kg
BAUJAHR YEAR OF MANUVACTURE	2022

[pekrun]

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn

Original

Betriebsanleitung

(inkl. Montageanleitung nach EG-Maschinenrichtlinie
2006/42/EG, Anhang VI für unvollständige Maschinen)

für

Pekrun Getriebe

Geltungsbereich :	Schneckengetriebe, Stirnradgetriebe(außer Turbogetriebe), Kegelradgetriebe(außer Mühlengetriebe), Planetengetriebe, Sondergetriebe und Kombinationen hieraus
Typ :	…ALG... / ..AGZ… / ..AG… /..PG… / ..GV… / ..LG… / ..HS… ASR… / BSR… / CSR… / DSR… /..SR… / ..SH… / ..VN… / ..VG… / ..VH… AKR… / BKR… / ..KR… / ..KS.. / ...PL… …SO… / ..KZ… / ..MK…/ ..SV… / ..VH… / ..VH… / ..VN… SN*../ SNU*../ SNO*../ SNV*../ SNC*../ SNA*../ SNAF*.. SW*../SHS*../ SDA*../ SVA*../.SZA*../ ZVA*../ SEO*.. K*../KN*../ KNV*../ KNA*../ KS*../ KW*../ KZV*../ VKZ*../ SKV*.. SSN *../ SSNV*../ SSW*../ KSN*..

Dokument-Nr.: OFF-035241	Rev.: B
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1 Wichtige grundlegende Informationen

1.1 Lieferumfang

- Getriebe
(Liefermenge und Getriebetyp siehe Auftragsbestätigung bzw. Leistungs- und Liefervertrag)
- Betriebsanleitung incl. Einbauerklärung

1.2 Verantwortlichkeiten

1.2.1 Verantwortlichkeiten des Herstellers

Der Zusammenbau des Getriebes wird von der Firma Pekrun Getriebebau GmbH durchgeführt.

Die Instrumentierung und alle benötigten Überwachungsgeräte werden am Getriebe montiert. (wenn im Lieferumfang enthalten bzw. vom Kunden beigestellt).

1.2.2 Verantwortlichkeiten des Herstellers der Gesamtmaschine

Die Ausführung und Festigkeit des Fundaments liegt im Verantwortungsbereich des Anlagenherstellers bzw. Endkunden.

Die weitere Montage in die Anlage liegt in der Verantwortung des Anlagenherstellers bzw. Endkunden. Das gleiche gilt für die Elektroinstallation der Instrumentierung und aller benötigten Überwachungsgeräte am Getriebe.

Die Montage und Bereitstellung der benötigten Versorgungsanschlüsse bzw. -leitungen liegt in der Verantwortung des Anlagenherstellers/Betreibers.

Der Hersteller der Gesamtanlage ist verpflichtet alle betriebsrelevanten Informationen (z.B. Sicherheitshinweise, Vorschriften und Beschreibungen) dieser Betriebsanleitung in die Betriebsanleitung der Gesamtmaschine zu integrieren und diese über die gesamte Lebensdauer des Getriebes mit zu pflegen.

1.2.3 Verantwortlichkeiten des Betreibers

Die Inbetriebnahme liegt in der Verantwortung des Betreibers bzw. Endkunden.

Die Betriebsanleitung ist Bestandteil der Lieferung. Sie ist in jedem Fall für alle mit der Montage, Bedienung, Instandsetzung sowie der Pflege und Wartung betrauten Personen zur Verfügung zu stellen.

	HINWEIS
	Der Betreiber hat sicherzustellen, dass alle vorgenannten Personen die Betriebsanleitung gelesen und verstanden haben. Er hat dafür zu sorgen, dass sie in allen Punkten beachtet wird, um: -Gefahren für Leib und Leben des Benutzers und Dritter abzuwenden. -Die Betriebssicherheit des Getriebes sicherzustellen. -Nutzungsausfall und Umweltschäden durch falsche Handhabung auszuschließen.

1.3 Externe Schnittstellen

Vorhandene bzw. relevante Schnittstellen entnehmen Sie der auftragsabhängig erstellten Maß- bzw. Schnittzeichnung bzw. dem technischen Datenblatt im Anhang dieser BA.

Getriebe – Anlage:

Das Getriebe wird durch ein oder mehrere Antriebswellen bzw. ein oder mehrere Abtriebswellen mit der weiteren Anlage verbunden.

Getriebe – Energieversorgung:

Die elektrische Energieversorgung der Instrumentierung und Überwachungsgeräte (wenn im Lieferumfang enthalten bzw. vom Kunden beigestellt) wird vom Betreiber bzw. Endkunden angeschlossen und bereitgestellt.

Die hydraulische Energieversorgung für Schaltzylinder (wenn im Lieferumfang enthalten) wird vom Betreiber bzw. Endkunden angeschlossen und bereitgestellt.

Getriebe – Medienversorgung:

Bei Anschluss an eine externe Ölversorgungsanlage:

- Die vorgesehenen Ölzulauf- bzw. –ablaufanschlüsse werden durch den Betreiber bzw. Anlagenhersteller angeschlossen und bereitgestellt.

Bei Anschluss an eine Kühlwasserversorgung (Wasser- Ölkühler/Kühlschlage)

- Die vorgesehenen Anschlüsse für den Kühlwasserzu- bzw. -ablauf werden durch den Betreiber bzw. Anlagenhersteller angeschlossen und bereitgestellt.

Getriebe – Gebäude:

Das Getriebe wird durch Befestigungsschrauben mit dem Fundament bzw. der Stahlkonstruktion des Betreibers bzw. Endkunden verbunden. Endanschläge die zum genauen Ausrichten des Getriebes auf dem Fundament vorgesehen sind, werden vom Anlagenhersteller, Betreiber bzw. Endkunden bereitgestellt.

1.4 Rechtliche Hinweise

Das Urheberrecht an dieser Betriebsanleitung verbleibt bei der:

Pekrun Getriebebau GmbH

Die vorliegende Betriebsanleitung ist Bestandteil der Lieferung und muss stets in der Nähe des Getriebes aufbewahrt werden.

Für Schäden und Betriebsstörungen, die aus der Nichtbeachtung der BA resultieren, übernimmt Pekrun Getriebebau GmbH keine Haftung!

Das Getriebe darf im Gewährleistungszeitraum nur durch Mitarbeiter von Pekrun geöffnet werden. Ist dies nicht möglich, bedarf das Öffnen des Getriebes durch andere der schriftlichen Genehmigung von Pekrun, ansonsten wird keine Haftung übernommen! Öffnen von Schaulochdeckeln bzw. Öleinfüllöffnungen ist hiervon ausgenommen.

1.5 Dokumentation

1.5.1 Hintergrundinformation zu Inhalt und Aufbau

Die vorliegende Betriebsanleitung gibt Ihnen wichtige Informationen über Ihr Getriebe.

Sie soll Ihnen zu einem sicheren Umgang mit dem Getriebe verhelfen.

1.5.2 Inhalt und Aufbau

Der Inhalt dieser Betriebsanleitung gibt Ihnen wichtige Sicherheitshinweise zu allen Lebensphasen des Getriebes.

Im auftragsabhängig erstellten Anhang sind folgende Unterlagen enthalten: Handhabungshinweise sowie technische Daten bzw. Zeichnungen und Ersatzteillisten (wenn anwendbar)

Benutzerinformationen weiterer Lieferanten (die ebenfalls im Anhang enthalten sind) sind außerdem Bestandteil dieser Betriebsanleitung.

1.5.3 Konventionen

Allgemeine Begriffe:

Maßzeichnung / Maßblatt: *

Zusammenbauzeichnung des Getriebes welche die wichtigsten Maße zum Einbau in die Gesamtanlage und grundlegende Daten zur bestimmungsgemäßen Verwendung enthält. In dieser BA wird der Begriff Maßzeichnung verwandt.

Schnittzeichnung / Disposition: *

Zusammenbauzeichnung des Getriebes welche den Aufbau des Getriebes und die Positionierung aller Bauteile in der Schnittdarstellung enthält. In dieser BA wird der Begriff Schnittzeichnung verwandt.

Ersatzteilliste / Stückliste: *

Liste aller Bauteile des Getriebes welche zur Reparatur bzw. Ersatzteilbeschaffung benötigt werden. In dieser BA wird der Begriff Ersatzteilliste verwandt.

Technisches Datenblatt (zum Auftrag): *

Datenblatt welches auftragsabhängig erstellt wird und weitere wichtige Daten (wenn nötig) zur bestimmungsgemäßen Verwendung enthält. Diese sind zusätzlich zur BA und Maßzeichnung zu beachten.

* Die mitgelieferten Unterlagen variieren je nach Anforderung und Einsatzfall.

Abkürzungen:

BA = Betriebsanleitung

PSA = persönliche Schutzausrüstung

E-Motor = Elektromotor

ÖVA= Ölversorgungsanlage

Technische Fachbegriffe:

Fachkraft, Qualifiziertes Personal:

Person, die aufgrund ihrer einschlägigen Ausbildung und ihrer Erfahrung befähigt ist, Risiken zu erkennen und mögliche Gefährdungen zu vermeiden, die der Betrieb oder die Instandhaltung eines Produkts verursachen kann.

Benutzer:

Person oder Organisation mit der Fähigkeit, ein Produkt in Betrieb zu nehmen und/oder anzuwenden, um eine geforderte Funktion auszuführen, einschließlich einer Reihe von Tätigkeiten vom Reinigen bis zur Außerbetriebnahme am Ende der Lebensdauer des Produkts.

Trennende Schutzeinrichtung:

Körperliche Sperre, die als Teil der Maschine ausgelegt ist, um Schutz zu bieten.

1.6 Serviceadresse

Wenden Sie sich bitte mit allen technischen Fragen an unser Werk

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24h Service- Hotline: +49 (0) 2371/945-116

2 Sicherheit

2.1 Konvention für Sicherheitshinweise

2.1.1 Formatierung

Bestimmte Informationen werden durch die entsprechende Formatierung hervorgehoben und gekennzeichnet:

Tabelle 2-1

Konvention	Informationstyp
Fettdruck	Komponenten von besonderer Wichtigkeit sowie Überschriften
In roter Farbe dargestellt	Wichtige Warnhinweise

2.1.2 Symbole

Die folgenden Symbole werden in der gesamten BA verwendet:

Tabelle 2-2

Symbol	Beschreibung
	Gefahr von **Personenschäden** Bei Nichtbeachtung dieses Sicherheitshinweises kann es zu schweren Verletzungen oder zum Tod führen.
	Warnung, allgemein
	Warnung vor der Gefahrenquelle Einzugsgefahr
	Warnung vor der Gefahrenquelle (Heiße Oberfläche) Verbrennungsgefahr
	Warnung vor der Gefahrenquelle Schwebende Lasten
	Betriebsanleitung allgemein Betriebsanleitung und Unterlagen der Dokumentation beachten
	Allgemeines Gebotszeichen Vermeidung von Sachschäden
	Gebotsschild Hebepunkt / Krantransport Vorgesehene Anschlagpunkte benutzen

2.1.3 Erklärung der Hinweise zur Sicherheit

In der BA werden folgende Signalwörter und Symbole für Warnhinweise verwendet. Wenn mehrere Gefahren auftreten, wird der Warnhinweis der jeweils höchsten Stufe verwendet.

	GEFAHR Kennzeichnung einer unmittelbaren Gefährdung. Die Nichtbeachtung des Sicherheitshinweises kann zum Tod oder zu schweren Verletzungen führen.

	WARNUNG Kennzeichnung einer möglichen Gefährdung mit mittlerem Risiko. Die Nichtbeachtung des Sicherheitshinweises kann zum Tod oder zu schweren Verletzungen führen.

	VORSICHT Kennzeichnung einer Gefährdung mit geringem Risiko. Die Nichtbeachtung des Sicherheitshinweises kann zu leichten oder mittleren Verletzungen führen.

	ACHTUNG Kennzeichnung von Hinweisen zur Vermeidung von Sachschäden. Die Nichtbeachtung dieser Sicherheitshinweise kann zu Schäden am Getriebe bzw. der Gesamtanlage und zu Umweltschäden führen..

	HINWEIS Kennzeichnung von Hinweisen zur allgemeinen Handhabung und Bedienung. Diese sind besonders zu beachten.

	HINWEIS Kennzeichnung von Hinweisen zur Betriebsanleitung und den auftragsabhängigen Unterlagen.

2.2 Verhalten im Notfall

GEFAHR

Lebensgefahr durch defektes Getriebe bzw. Gesamtanlage

Im Notfall ist das Antriebsaggregat sofort auszuschalten!

Das Antriebsaggregat ist sofort außer Betrieb zu setzen, wenn während des Betriebes Veränderungen an dem Getriebe festgestellt werden, wie z.B. eine erhöhte Betriebstemperatur oder veränderte Getriebegeräusche.

ACHTUNG

Sachschaden

Durch Versagen des Getriebes kann es zu Folgeschäden kommen.

Verhindern Sie weitere Schäden am Getriebe durch geeigneten Maßnahmen.

2.3 Bestimmungsgemäße Verwendung

2.3.1 Einsatzbereich

Das Getriebe ist ausschließlich zur industriellen Verwendung vorgesehen.

Das Getriebe ist zum Einbau in eine Maschine bestimmt.

Das Getriebe darf nur im Rahmen der im Leistungs- und Liefervertrag festgelegten Betriebsbedingungen und Leistungen eingesetzt und betrieben werden.

HINWEIS

Wichtige Hinweise zur bestimmungsgemäßen Verwendung für den Einsatzbereich finden Sie weiterhin auf dem Typenschild und der Maßzeichnung bzw. im technischen Datenblatt zum Auftrag.

2.3.2 Anforderungen an das Personal

Die Betriebsanleitung ist Bestandteil der Lieferung. Sie ist in jedem Fall für alle, mit der Montage, Bedienung und Wartung betrauten Personen zur Verfügung zu stellen.

HINWEIS

Es ist sicher zu stellen, dass alle vorgenannten Personen die Betriebsanleitung gelesen und verstanden haben. Es empfiehlt sich Personen mit den vorgenannten Aufgaben zu betrauen, die eine entsprechende Berufsausbildung absolviert haben.

(Fachkräfte bzw. Qualifiziertes Personal)

Folgende Personen sind im Umgang mit dem Produkt befugt:

- Transporteur: gründlich geschultes Personal
- Montageperson: Fachkräfte, Qualifiziertes Personal
- Installationsperson: Fachkräfte, Qualifiziertes Personal
- Bedienperson: geschultes Personal
- Instandhaltungspersonal: Fachkräfte, Qualifiziertes Personal

HINWEIS

Führen Sie alle Arbeiten sorgfältig und unter dem Aspekt **Sicherheit** durch. Beachten Sie die Mindestvorschriften für Sicherheit und Gesundheitsschutz bei der Benutzung von Arbeitsmitteln gemäß den jeweils gültigen Vorschriften des Anwenderlandes.

2.3.3 Sicherheitsrelevante Umgebungsbedingungen

GEFAHR

Lebensgefahr beim Betrieb in explosionsfähiger Atmosphäre!

Das Getriebe darf nur im Rahmen der im Leistungs- und Liefervertrag festgelegten Umgebungsbedingungen eingesetzt und betrieben werden.

HINWEIS

Wichtige sicherheitsrelevante Hinweise zu den Umgebungsbedingungen finden Sie auf der Maßzeichnung bzw. im technischen Datenblatt zum Auftrag

2.3.4 Sicherheitsrelevante Hinweise für bestimmte Lebensphasen

Aufstellbedingungen:

Stellen Sie das Getriebe auf einem ebenen, sicheren und möglichst starren Fundament bzw. Stahlgerüst auf. Die Verwindung der Aufstellfläche darf einen Wert von 0,1mm je 1m nicht überschreiten.

Anschlussbedingungen:

Die Verbindung zum Antriebsaggregat und zur Arbeitsmaschine muss vom Anlagenhersteller/Betreiber, über die jeweiligen Getriebewellen mittels geeigneter Kupplung, installiert werden. Hierzu gehört auch die zu installierenden trennenden Schutzeinrichtungen gem. DIN EN ISO 12100-1 für alle Wellen und beweglichen Teile.

Die Verbindung von einer externen Ölversorgungsanlage zum Getriebe muss vom Anlagenhersteller/Betreiber mittels geeigneten Anschlüssen/Leitungen bereitgestellt und montiert werden. (wenn anwendbar). Zur Vermeidung von Überdruck bzw. undichten Ölleitungen sollte der Anlagenhersteller/Betreiber eine Drucküberwachung bzw. ein Überdruckventil installieren.

Die Verbindung von der Hydraulik- bzw. Pneumatik Versorgungseinheit zu den Schaltzylindern muss vom Anlagenhersteller/Betreiber mittels geeigneten Anschlüssen/Leitungen bereitgestellt und fachgerecht montiert werden. (wenn anwendbar)

Die Elektroinstallation der Instrumentierung und Überwachungsgeräte am Getriebe muss

vom Anlagenhersteller/Betreiber durch qualifiziertes Personal (Fachkräfte der Elektrotechnik) erfolgen. (wenn anwendbar)

Montage

Während des Aufstellens des Getriebes besteht die Gefahr des Quetschens und Scherens von Gliedmaßen. Ebenso kann es zu Störung des Bewegungsapparates, Ermüdung und Unbehagen durch falsche Körperhaltung kommen.

Durch fehlerhaft montierte Schutzeinrichtungen kann es zu einer Gefährdung durch Berühren kommen.

Bei der Demontage besteht die Gefahr des Ausrutschens und Stürzens durch Öllachen von undichten Leitungen bzw. Flanschverbindungen.

Während der Installationsarbeiten besteht Verletzungsgefahr durch Montage unter Spannung. Spannungsführende Teile sind vor Montagearbeiten spannungslos zu machen.

Vermeiden Sie jede Gefährdung des Montagepersonals. Halten Sie Sicherheitsabstände ein.

Betrieb

Durch das Rotieren der Wellen besteht die Gefahr erfasst zu werden.

Durch die Bewegung von außenliegenden Bauteilen (z. B Schaltzylinder beim Schaltvorgang) besteht die Gefahr des Quetschens und Scherens von Gliedmaßen.

Bringen Sie eine trennende Schutzeinrichtung gem. DIN EN ISO 12100-1 an.

Je nach Betriebsbedingungen kann das Getriebe hohe Oberflächentemperaturen erreichen. Durch Kontakt mit dem Gehäuse kann es zu Verbrennungen auf der Haut kommen.

Das Getriebe darf nur im Stillstand und ohne anliegendes Drehmoment geschaltet werden. (wenn anwendbar)

Instandhaltung, Wartung

Durch fehlerhaft montierte Schutzeinrichtungen kann es zu einer Gefährdung durch Berühren kommen.

Die Instandhaltung und Wartung des Getriebes darf nur im Stillstand erfolgen.

Während Wartungsarbeiten besteht Verletzungsgefahr durch Montage unter Spannung. Spannungsführende Teile sind vor Montagearbeiten spannungslos zu machen.

Bei der Instandhaltung und Wartung besteht die Gefahr des Ausrutschens und Stürzens durch Öllachen von undichten Leitungen bzw. Flanschverbindungen.

Beim Ölwechsel kann es durch austretendes heißes Öl zu Verbrühungen auf der Haut kommen.

Je nach Betriebsbedingungen kann das Getriebe hohe Oberflächentemperaturen erreichen. Auch einige Zeit nach dem Stillstand kann es durch Kontakt mit dem Gehäuse zu Verbrennungen auf der Haut kommen.

Demontage

Die Demontage des Getriebes darf nur im Stillstand erfolgen.

Beim Ölablassen kann es durch austretendes heißes Öl zu Verbrühungen auf der Haut kommen.

Je nach Betriebsbedingungen kann das Getriebe hohe Oberflächentemperaturen erreichen. Auch einige Zeit nach dem Stillstand kann es durch Kontakt mit dem Gehäuse zu Verbrennungen auf der Haut kommen.

Bei der Demontage besteht die Gefahr des Ausrutschens und Stürzens durch Öllachen von undichten Leitungen bzw. Flanschverbindungen.

Während der Demontage des Getriebes aus der Anlage besteht die Gefahr des Quetschens, Scherens und Abschneidens von Gliedmaßen.

Entsorgung

Während der Entsorgung kann es zu Hautkontakt mit verunreinigtem Öl kommen. Verwenden Sie geeignete PSA.

Beachten Sie die jeweils gültigen Umweltschutzbestimmungen des Anwenderlandes.

2.4 Mögliche Fehlanwendung

Betreiben des Getriebes in explosionsfähiger Atmosphäre
⇨ Folge: Gefährdung durch Explosion.

Betreiben des Getriebes entgegen der vorgesehenen Drehrichtung bzw. mit zu hoher Drehzahl. Hierdurch besteht die Möglichkeit eines Getriebeschadens bzw. Verzahnungsteile und Lager können zerstört werden
⇨ Folge: Gefährdung durch Bruch beim Betrieb

Betreiben des Getriebes mit geöffnetem Inspektionsdeckel.
Es kann Schmutz in das Gehäuse eindringen und Öl oder andere Partikel können aus dem Gehäuse geschleudert werde.
⇨ Gefährdung durch herausgeworfene Gegenstände und Flüssigkeiten
Personen können während des Betriebes in das Gehäuse greifen und mit den Gliedmaßen zwischen rotierende Wellen im Getriebeinneren kommen
⇨ Gefährdung durch Abscheren und Quetschen

Betreiben des Getriebes ohne funktionierende Ölversorgung oder mit der falschen Ölsorte/Ölmenge. Hierdurch besteht die Möglichkeit eines Getriebeschadens bzw. Verzahnungsteile und Lager können zerstört werden.
⇨ Gefährdung durch Bruch beim Betrieb möglich

Schalten des Getriebes im Betrieb. Hierdurch besteht die Möglichkeit eines Getriebeschadens bzw. Verzahnungsteile und Lager können zerstört werden.
⇨ Gefährdung durch Bruch beim Betrieb möglich

Durchführen von Schweißarbeiten am Getriebe. Verwenden des Getriebes als Massepunkt für Schweißarbeiten. Verzahnungsteile und Lager können zerstört werden.
⇨ Gefährdung durch Bruch beim Betrieb möglich

Es wird **nicht** qualifiziertes Personal mit der Montage, Inbetriebnahme und Wartung betraut. Alle mit der Montage, Inbetriebnahme und Wartung betrauten Personen müssen die Betriebs- und Wartungsanleitung zum Getriebe, gelesen und verstanden haben. Es empfiehlt sich Personen mit den vorgenannten Aufgaben zu beauftragen, die eine entsprechende Berufsausbildung absolviert haben.
⇨ Gefährdung durch fehlerhafte Montage

2.5 Beachtung der Betriebsanleitung

Die vorliegende Betriebsanleitung ist Bestandteil der Getriebelieferung.

Bewahren Sie diese BA stets in der Nähe des Getriebes auf.

Behalten Sie die BA während der gesamten Lebensdauer des Getriebes.

Geben Sie die BA gegebenenfalls an nachfolgende Besitzer oder Benutzer des Getriebes weiter.

2.6 Restgefahren und Schutzmaßnahmen

2.6.1 Restgefahren und Schutzmaßnahmen für bestimmte Lebensphasen

⚠ **Gefahrenort: Transport (Hersteller, Spedition, Betreiber)**	
Restrisiken:	Schutzmaßnahmen:
Beim Transport und Auf-/Abladen des Getriebes kann es zum Verrutschen, Absturz und Herabfallen auf Personen durch unsachgemäße Ladungssicherung und unsachgemäßes Anschlagen der Last bzw. Auswahl nicht geeigneter Lastaufnahmemittel kommen. Es besteht die Gefahr des Quetschens und Scherens von Gliedmaßen, wenn Bediener zwischen Hindernisse und die Last kommen.	- Unterrichten Sie alle mit dem Transport und Aufstellen des Getriebes beauftragten Personen über die vorhandenen Restrisiken, insbesondere über die Auswahl von Lastaufnahmeeinrichtungen sowie das Anschlagen von Lasten. - Beauftragen Sie nur gründlich geschultes Personal mit dem Transport und Auf-/Abladen des Getriebes. - Halten Sie die Verfahrgeschwindigkeit möglichst gering. - Vermeiden Sie schnelles Wechseln zwischen Bewegen und Stoppen der Last und hieraus resultierendes Pendeln. - Vermeiden Sie jede Gefährdung des Personals. - Achten Sie darauf, dass keine Personen zwischen Hindernisse und die Last kommen. - Halten Sie Sicherheitsabstände ein. Tragen Sie PSA. - Transportieren Sie das Getriebe langsam und vorsichtig, besonders in angehobenem Zustand. - Achten Sie auf ordnungsgemäßes Anschlagen des Getriebes - Lage des Schwerpunkts (eventuell außermittig), Gewicht, Abmessungen des Getriebes beachten. Beachten Sie Hinweise zur Lastverteilung auf der Verpackung bzw. Maßzeichnung. - Geeignete Transportfahrzeuge bzw. Ladefläche (Tragfähigkeit, Dimension) - Getriebe sicher auf Ladefläche fixieren. - Benötigte Hilfsmittel: geeignete Vorrichtung zum Fixieren und Heben, ausreichend dimensioniert. (siehe Kapitel 5)

[pekrun]

Sicherheit

Gefahrenort: Montage und Installation (Betreiber)	
Restrisiken:	Schutzmaßnahmen:
Allgemein	- Beauftragen Sie nur qualifiziertes Personal mit der Montage und Installation des Getriebes, möglichst mit entsprechender Berufsausbildung. - Tragen Sie geeignete PSA. - Unterrichten Sie alle mit der Montage und Installation des Getriebes beauftragten Personen über die vorhandenen Restrisiken. (siehe Kapitel 5+6+7+8)
Beim Aufstellen des Getriebes auf den Grundrahmen kann es zum Verrutschen, Absturz und Herabfallen auf Personen durch unsachgemäßes Anschlagen der Last bzw. Auswahl nicht geeigneter Lastaufnahmemittel kommen. Es besteht die Gefahr des Quetschens und Scherens von Gliedmaßen, wenn Bediener zwischen Hindernisse und die Last kommen	- Halten Sie die Verfahrgeschwindigkeit möglichst gering. - Vermeiden Sie schnelles Wechseln zwischen Bewegen und Stoppen der Last und hieraus resultierendes Pendeln. - Vermeiden Sie jede Gefährdung des Personals. - Achten Sie darauf, dass keine Personen zwischen Hindernisse und die Last kommen. - Halten Sie Sicherheitsabstände ein. Tragen Sie PSA. - Transportieren Sie das Getriebe langsam und vorsichtig, besonders in angehobenem Zustand. - Achten Sie auf ordnungsgemäßes Anschlagen des Getriebes - Lage des Schwerpunkts (eventuell außermittig), Gewicht, Abmessungen des Getriebes beachten. Beachten Sie Hinweise zur Lastverteilung auf der Verpackung bzw. Maßzeichnung. - Einsatz von Personal mit körperlicher Eignung
Es kann zu Störung des Bewegungsapparates, Ermüdung und Unbehagen durch falsche Körperhaltung kommen	
Bei der Montage der Kupplungen auf die Welle bzw. der Montage in die weitere Anlage besteht die Gefahr des Quetschens und Scherens von Gliedmaßen	
Durch fehlerhaft oder nicht montierte Schutzeinrichtungen kann es zu einer Gefährdung durch Berühren kommen.	- Unterweisen Sie Personen die mit der Montage und Installation beauftragt sind in der Bedeutung von Schutzeinrichtungen
Während der Installationsarbeiten besteht Verletzungsgefahr durch Montage unter Spannung.	- Spannungsführende Teile sind vor Montagearbeiten spannungslos zu machen.
Bei der Entfernung der Konservierung mit Lösungsmitteln bzw. dem Öffnen der Schaulochdeckel kann es zu einer Gefährdung durch entweichende schädliche bzw. brennbare Gase kommen.	- Der Umgang mit Gefahrstoffen (Lösungsmittel bzw. entweichendes Konservierungsöl) sollte nur durch qualifiziertes Personal, möglichst mit entsprechender Berufsausbildung erfolgen. - Folgende Vorschriften sind zu beachten: Gefahrenstoff-Verordnung, der EG-Verordnung 1907/2006 sowie den EG-Richtlinien 2010/75/EU und 89/656/EWG
Beim Öffnen der Schaulochdeckel bzw. den Arbeiten an der ÖVA kann es zu einer	- Beachten Sie das Sicherheitsdatenblatt der

[pekrun]

Gefährdung durch entweichende schädliche bzw. brennbare Gase und Austreten von Schmierstoffen kommen.	eingesetzten Medien. - Tragen Sie geeignete PSA (Schutzbrille,-handschuhe).
Bei Arbeiten an mit Öl gefüllten Bauteilen z.B. den Rohrleitungen und im Getriebeinneren kann es zum Kontakt der Haut mit aggressiven Medien kommen.	- Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).
Bei der Montage und Installation kann es zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen.	- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel. - Dichten Sie undichte Stellen unverzüglich ab.

⚠ **Gefahrenort: Inbetriebnahme (Betreiber)**	
Restrisiken:	Schutzmaßnahmen:
Allgemein	- Beauftragen Sie nur qualifiziertes Personal mit der Inbetriebnahme, möglichst mit entsprechender Berufsausbildung - Tragen Sie geeignete PSA. - Unterrichten Sie alle mit der Inbetriebnahme des Getriebes beauftragten Personen über die vorhandenen Restrisiken. (Siehe Kapitel 8 + 9)
Bei der Inbetriebnahme kann es durch undichte Leitungen bzw. Flanschverbindungen durch Überdruck in der Ölversorgungsanlage bzw. beim Beaufschlagen mit Druck der Hydraulikleitungen der Schalteinheit zum Herausspritzen von Öl auf den Körper (z.B. in die Augen) kommen.	- Prüfen Sie vor Inbetriebnahme die Ölversorgungsleitungen und Flansch-verbindungen zum Getriebe auf festen Sitz sowie auf Leckagen. - Prüfen Sie vor Inbetriebnahme die Hydraulik-Anschlussverbindungen und die Schläuche auf korrekten Sitz sowie auf Leckagen - Verwenden Sie geeignete PSA (Augenschutz)
Bei der Inbetriebnahme kann es zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen.	- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel. - Dichten Sie undichte Stellen unverzüglich ab.
Durch fehlerhaft oder nicht montierte Schutzeinrichtungen kann es zu einer Gefährdung durch Berühren kommen.	- Unterrichten Sie alle mit der Inbetriebnahme des Getriebes beauftragten Personen über die vorhandenen Restrisiken
Während des Betriebes können Fremdmaterialien wie z.B. Sand, Staub auf rotierende Teile treffen und durch diese zurückgeschleudert werden. Beim Betrieb eines Getriebes mit einer Öldruckschmierung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen. Hierdurch kann es zu einer Verletzung der Augen durch Herausschleudern von Gegenständen und Herausspritzen von unter Druck stehenden Flüssigkeiten kommen.	- Vom Betreiber/Kunden sind trennende Schutzeinrichtungen gegen das Erreichen des Gefahrenbereichs der rotierenden Wellen vorzusehen. - Die Ölversorgungsleitungen und Flanschverbindungen zum Getriebe sind vor Inbetriebnahme auf festen Sitz sowie auf Leckagen zu prüfen.(wenn anwendbar) - Die Hydraulik-Anschlussverbindungen und die Schläuche auf korrekten Sitz sowie auf Leckagen zu prüfen.(wenn anwendbar) - Einhaltung der Wartungsintervalle (Überprüfung von Undichtigkeiten an mit

	Druck beaufschlagten Verbindungs-stellen/Bauteilen) - Gehen Sie bei allen Arbeiten an Rohrleitungen mit der gebotenen Sorgfalt vor. - Tragen Sie geeignete Schutzkleidung und einen geeigneten Augenschutz.

Gefahrenort: Fehlersuche und –beseitigung, Instandhaltung, Wartung und Reinigung (Betreiber)	
Restrisiken:	Schutzmaßnahmen:
Allgemein	- Beauftragen Sie nur qualifiziertes Personal mit der Fehlersuche und –beseitigung, Instandhaltung und Reinigung, möglichst mit entsprechender Berufsausbildung - Tragen Sie PSA. - Arbeiten am Getriebe dürfen nur im Stillstand erfolgen. - Unterrichten Sie alle mit der Fehlersuche und –beseitigung, Instandhaltung, Wartung und Reinigung des Getriebes beauftragten Personen über die vorhandenen Restrisiken. (Siehe Kapitel 10 + 11)
Es kann zu Quetschungen von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteile (z.B. Schaulochdeckel) kommen	- Tragen Sie PSA (Handschuhe und Schuhe).
Es kann zu Kontakt mit der heißen Oberfläche des Getriebegehäuses (auch einige Zeit nach dem Stillstand) kommen und dadurch zu Verbrennungen durch Berühren führen.	- Prüfen Sie die Temperaturen am Getriebe bzw. der Getriebeoberfläche und vermeiden Sie den Beginn der Arbeiten bevor die Oberfläche auf eine ungefährliche Temperatur heruntergekühlt ist.
Beim Ölwechsel kann es durch austretendes heißes Öl zu Verbrühungen auf der Haut kommen.	
Bei der Fehlersuche und –beseitigung kann es durch undichte Leitungen bzw. Flanschverbindungen durch Überdruck in der Ölversorgungsanlage bzw. beim Beaufschlagen mit Druck der Hydraulikleitungen der Schalteinheit zum Herausspritzen von Öl auf den Körper (z.B. in die Augen) kommen.	- Prüfen Sie vor Inbetriebnahme die Ölversorgungsleitungen und Flansch-verbindungen zum Getriebe auf festen Sitz sowie auf Leckagen. - Prüfen Sie vor Inbetriebnahme die Hydraulik-Anschlussverbindungen und die Schläuche auf korrekten Sitz sowie auf Leckagen
Beim Öffnen der Schaulochdeckel bzw. den Arbeiten an der ÖVA kann es zu einer Gefährdung durch entweichende schädliche bzw. brennbare Gase und Austreten von Schmierstoffen kommen.	- Beachten Sie das Sicherheitsdatenblatt der eingesetzten Medien. - Tragen Sie geeignete PSA (Schutzbrille,-handschuhe). - Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).
Bei Arbeiten an mit Öl gefüllten Bauteilen z.B. den Rohrleitungen und im Getriebeinneren kann es zum Kontakt der Haut mit aggressiven Medien kommen.	
Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen	- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem

kommen.	Ölbindemittel. - Dichten Sie undichte Stellen unverzüglich ab.
Während der Arbeiten besteht Verletzungsgefahr durch Montage unter Spannung.	- Spannungsführende Teile sind vor Montagearbeiten spannungslos zu machen.

Gefahrenort: Außerbetriebnahme und Demontage (Betreiber)	
Restrisiken:	Schutzmaßnahmen:
Allgemein	- Beauftragen Sie nur qualifiziertes Personal mit der Außerbetriebnahme und Demontage, möglichst mit entsprechender Berufsausbildung - Tragen Sie PSA. - Arbeiten am Getriebe dürfen nur im Stillstand erfolgen. - Unterrichten Sie alle mit der Außerbetriebnahme und Demontage des Getriebes beauftragten Personen über die vorhandenen Restrisiken. (siehe Kapitel 12)
Es kann zu Quetschungen von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteile (z.B. Schaulochdeckel) kommen	- Tragen Sie PSA (Handschuhe und Schuhe).
Bei der Demontage des Getriebes aus der Anlage bzw. vom Grundrahmen kann es zum Verrutschen, Absturz und Herabfallen auf Personen durch unsachgemäßes Anschlagen der Last bzw. Auswahl nicht geeigneter Lastaufnahmemittel kommen. Es besteht die Gefahr des Quetschens und Scherens von Gliedmaßen, wenn Bediener zwischen Hindernisse und die Last kommen	- Halten Sie die Verfahrgeschwindigkeit möglichst gering. - Vermeiden Sie schnelles Wechseln zwischen Bewegen und Stoppen der Last und hieraus resultierendes Pendeln. - Vermeiden Sie jede Gefährdung des Personals. - Achten Sie darauf, dass keine Personen zwischen Hindernisse und die Last kommen. - Halten Sie Sicherheitsabstände ein. Tragen Sie PSA. - Transportieren Sie das Getriebe langsam und vorsichtig, besonders in angehobenem Zustand. - Achten Sie auf ordnungsgemäßes Anschlagen des Getriebes - Lage des Schwerpunkts (eventuell außermittig), Gewicht, Abmessungen des Getriebes beachten. Beachten Sie Hinweise zur Lastverteilung auf der Verpackung bzw. Maßzeichnung. - Einsatz von Personal mit körperlicher Eignung
Es kann zu Störung des Bewegungsapparates, Ermüdung und Unbehagen durch falsche Körperhaltung kommen	
Bei der Demontage der Kupplungen von der Welle bzw. aus der weiteren Anlage besteht die Gefahr des Quetschens und Scherens von Gliedmaßen	
Es kann zu Kontakt mit der heißen Oberfläche des Getriebegehäuses (auch einige Zeit nach dem Stillstand) kommen und dadurch zu Verbrennungen durch Berühren führen.	- Prüfen Sie die Temperaturen am Getriebe bzw. der Getriebeoberfläche und vermeiden Sie den Beginn der Arbeiten bevor die Oberfläche auf eine ungefährliche

	Temperatur heruntergekühlt ist.
Beim Öffnen der Schaulochdeckel bzw. den Arbeiten an der ÖVA kann es zu einer Gefährdung durch entweichende schädliche bzw. brennbare Gase und Austreten von Schmierstoffen kommen. Bei Arbeiten an mit Öl gefüllten Bauteilen z.B. den Rohrleitungen und im Getriebeinneren kann es zum Kontakt der Haut mit aggressiven Medien kommen.	- Beachten Sie das Sicherheitsdatenblatt der eingesetzten Medien. - Tragen Sie geeignete PSA (Schutzbrille,-handschuhe). - Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).
Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen.	- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel.
Während der Demontagearbeiten besteht Verletzungsgefahr durch Montage unter Spannung.	- Spannungsführende Teile sind vor Montagearbeiten spannungslos zu machen.
Beim Betrieb eines Getriebes mit einer Öldruckschmierung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen. Hierdurch kann es zu einer Verletzung der Augen durch Herausschleudern von Gegenständen und Herausspritzen von unter Druck stehenden Flüssigkeiten kommen.	- Die Ölversorgungsleitungen und Flanschverbindungen zum Getriebe sind bei Demontage auf Leckagen zu prüfen. (wenn anwendbar) - Die Hydraulik-Anschlussverbindungen und die Schläuche auf Leckagen zu prüfen. (wenn anwendbar) - Gehen Sie bei Demontagearbeiten an Rohrleitungen mit der gebotenen Sorgfalt vor. - Tragen Sie geeignete Schutzkleidung und einen geeigneten Augenschutz.

2.6.2 Allgemeine Schutzmaßnahmen

GEFAHR

Lebensgefahr durch Arbeiten an eingeschalteter Anlage

Setzen Sie das Getriebe und alle Bauteile einer eventuell angebauten Ölversorungsanlage grundsätzlich still.

Stellen Sie sicher das die gesamte Anlage lastfrei und drucklos ist.

Sichern Sie das Antriebsaggregat gegen unbeabsichtigtes Einschalten (z.B. durch Abschließen des Schlüsselschalters oder das Entfernen der Sicherung in der Stromversorgung). Sichern Sie an der Einschaltstelle mit einem Hinweisschild, aus dem hervorgeht, dass an dem Getriebe gearbeitet wird.

Arbeiten am Getriebe dürfen nur im Stillstand durchgeführt werden.

[pekrun]

Sicherheit

GEFAHR

Lebensgefahr durch rotierende und/oder bewegliche Teile

Gefahr von rotierenden und/oder sich bewegenden Bauteilen erfasst und eingezogen zu werden.

Sichern Sie alle rotierenden Antriebsteile wie Kupplungen, Zahn- oder Kettenräder, Riementriebe gegen Berührung.

Sichern Sie alle außenliegenden beweglichen Teile wie z.B. Schaltzylinder gegen Berührung.

Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen)

Sichern Sie rotierende und/oder sich bewegende Bauteile durch Schutzvorrichtungen gegen Berühren.

GEFAHR

Lebensgefahr durch gefährliche elektrische Spannung

Bei Installationsarbeiten am Getriebe besteht Verletzungsgefahr durch Montage unter Spannung.

Lassen Sie alle Arbeiten an elektrischen Bauteilen nur durch Fachkräfte der Elektrotechnik durchführen.

Halten Sie sich an die 5-Sicherheitsregeln nach DIN EN 50110-1:
Vor Beginn der Arbeiten:

- -Freischalten (Schalten Sie alle Zuleitungen spannungsfrei, auch Hilfsstromkreise)
- -Gegen Wiedereinschalten sichern
- -Spannungsfreiheit feststellen
- -Erden und Kurzschließen
- -Benachbarte unter Spannung stehende Teile abdecken oder abschranken

Spannungsführende Teile sind vor Arbeiten am Getriebe spannungslos zu machen.

WARNUNG

Verletzung der Augen durch Herausschleudern von Gegenständen und Herausspritzen von unter Druck stehenden Flüssigkeiten

Während des Betriebes können Fremdmaterialien wie z.B. Sand, Staub auf rotierende Teile treffen und durch diese zurückgeschleudert werden.

Tragen Sie einen geeigneten Augenschutz.

Beim Betrieb eines Getriebes mit einer Öldruckschmierung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen.

Tragen Sie geeignete Schutzkleidung und Augenschutz.

Verwenden Sie bei allen Arbeiten geeignete PSA, z.B. Handschutz (Schutzhandschuh), Augenschutz (Schutzbrille), Kopfschutz (Schutzhelm), Fußschutz (Sicherheitsschuhe) und Gehörschutz (Kapseln oder Stöpsel).

Benutzen Sie nur PSA die, die Sicherheitsanforderungen gemäß der PSA-Verordnung (EU) 2016/425 erfüllen.

	WARNUNG **Verbrennungsgefahr durch Berühren des Getriebes** **Schwere Verletzungen durch Verbrennungen möglich.** Während des Betriebes und noch einige Zeit nach dem Stillstand kann es zu schwere Verletzungen durch Berührungen von heißen Oberflächen (>55°C) kommen. -Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen) -Lassen Sie das Getriebe auf eine sichere Temperatur abkühlen, bevor Sie es berühren. -Tragen Sie geeignete Schutzhandschuh und Schutzkleidung.

	WARNUNG **Verbrühungsgefahr durch austretendes heißes Betriebsmedium** **Schwere Verletzungen durch Verbrühungen möglich.** Während Wartungs- und Instandsetzungsarbeiten bzw. Ölwechselarbeiten direkt nach dem Betrieb und noch einige Zeit nach dem Stillstand kann es zu schwere Verletzungen durch Austreten von heißem Betriebsmedium (>55°C) kommen. -Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen) solange keine sicheren Temperaturen vorhanden sind. -Lassen Sie vor allen Arbeiten das Betriebsmedium auf eine sichere Temperatur abkühlen. -Tragen Sie geeignete Schutzhandschuh und Schutzkleidung.

	WARNUNG **Verletzungsgefahr durch Berühren** **Schwere Verletzungen durch Kontakt mit kalten Oberflächen möglich.** Während des Stillstands der Anlage (wenn diese auf die Umgebungstemperatur abgekühlt ist) kann es zu schwere Verletzungen durch Kälteschäden (Schmerz, Taubheit, Erfrierungen) durch Berühren kalter Oberflächen (<0°C) kommen. -Prüfen Sie die Temperaturen der Getriebeeinheit bzw. Getriebeoberfläche bevor Sie es berühren. -Tragen Sie geeignete Schutzhandschuh und Schutzkleidung.

[pekrun]

Sicherheit

⚠ VORSICHT

Verletzungsgefahr durch falsche Körperhaltung

Durch falsche bzw. ungesunde Körperhaltung kann während der Montagearbeiten eine Ergonomische Gefährdung in Form von Störung des Bewegungsapparates, Ermüdung und Unbehagen auftreten.

- Alle mit der Montage beauftragten Personen müssen über die Restrisiken bei der Montage unterrichtet sein.
- Montage nur durch qualifiziertes Personal, möglichst mit entsprechender Berufsausbildung.

ACHTUNG

Sachschaden

Beschädigungen durch eindringende Feuchtigkeit

Die Reinigung des Getriebes mit einem Hochdruckreinigungsgerät ist **nicht zulässig**, da Feuchtigkeit in das Getriebe eindringen und zu Beschädigungen führen kann.

Beschädigungen am Getriebe durch Schaltvorgang im Betrieb möglich.

Das Getriebe darf nur im Stillstand geschaltet werden.

Gleichzeitig muss das Getriebe lastfrei sein. An- und Abtrieb müssen frei drehbar sein.

Eine Betätigung der Schaltzylinder darf nur möglich sein wenn keine Rotation der Wellen vorhanden ist und kein Drehmoment an den Wellen anliegt.

Es ist eine Verriegelung vorzusehen.

Wenn erforderlich verändern Sie die Position der Schaltverzahnung durch Tippbetrieb des Antriebsaggregates, um das Einfädeln der Schaltverzahnung zu erleichtern.

Erst nachdem das vollständige Einlegen des Ganges in seine endgültige Stellung erfolgt ist darf das Antriebsaggregat freigegeben werden.

Beschädigungen durch Veränderungen am Getriebe möglich.

Das Antriebsaggregat ist sofort außer Betrieb zu setzen, wenn während des Betriebes Veränderungen an dem Getriebe festgestellt werden, wie z.B. eine erhöhte Betriebstemperatur oder veränderte Getriebegeräusche.

Beschädigungen durch Schweißarbeiten

Führen Sie keine Schweißarbeiten am Getriebe durch. Verwenden des Getriebes als Massepunkt für Schweißarbeiten.

Verzahnungsteile und Lager können beschädigt werden.

HINWEIS

Ersetzen Sie die bei der Montage- oder Demontage unbrauchbar gewordenen Schrauben. Achten Sie dabei auf gleiche Festigkeitsklasse und Ausführung (Sicherung, Anzugmoment usw.)

	HINWEIS
	Tragen Sie zum Umweltschutz bei! - Fangen Sie beim Ölwechsel das Altöl in geeigneten Fässern auf - Beseitigen Sie eventuell entstandene Öllachen sofort. - Bewahren Sie Konservierungsmittel getrennt von Altöl auf. - Entsorgen Sie Altöl, Konservierungsmittel, Ölbindemittel und ölgetränkte Reinigungstücher entsprechend den jeweils gültigen Umweltschutz-bestimmungen.

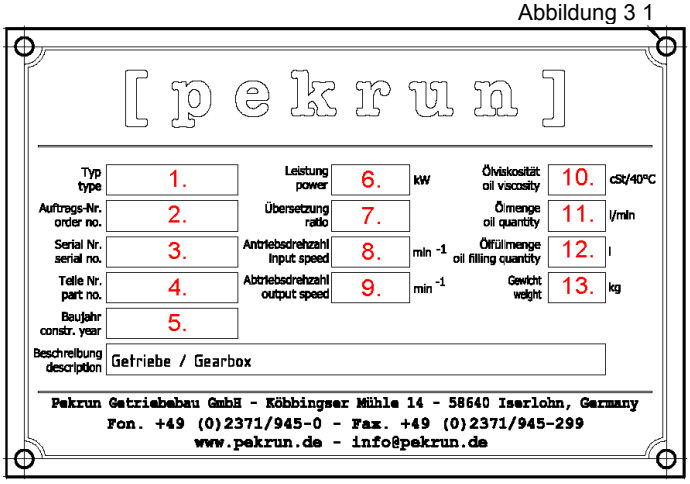
	HINWEIS
	Beachten Sie am Getriebe angebrachte Hinweise wie Typenschild, Drehrichtungspfeil usw. Sie müssen frei von Schmutz und Farbe sein. Ersetzen Sie fehlende Schilder.

[pekrun]

3 Technische Daten

Die technischen Daten und die vertraglich festgelegten Vereinbarungen zwischen Besteller und Pekrun legen die Grenzen seiner bestimmungsgemäßen Verwendung fest. Die wichtigsten technischen Daten können Sie dem Typenschild entnehmen, dass an jedem Pekrun- Getriebe dauerhaft angebracht ist.

Abbildung 3 1



1. Typ: Serien-/Typenbezeichnung setzt sich zusammen aus Bauart und Größe

2. Auftrags- Nr.: Pekrun Auftragsnummer z.B. 12345

3. Serial- Nr.: fortlaufende Seriennummer z.B. 10000123

4. Teile Nr.: Material-/ Artikelnummer z.B. PART-012345

5. Baujahr: Jahr der Herstellung

6. Leistung: Leistungsangabe in kW

7. Übersetzung: i, z.B. 1 : 2,345

8. Antriebsdrehzahl: n_1 in min $^{-1}$

9. Abtriebsdrehzahl: n_2 in min $^{-1}$

10. Ölviskosität: ISO VG XXX in c/St/40°C

11. Ölmenge: Ölumlaufmenge bei Umlaufschmierung in l/min.

12. Ölfüllmenge: bei Getriebe mit Mindest-Ölfüllstand z.B. für Tauchschmierung

13. Gewicht: Gesamtgewicht in kg

	HINWEIS
	Weitere technische Daten finden Sie in der Maßzeichnung und dem technischen Datenblatt, welchen auftragsabhängig erstellt wird. (siehe Anhang)
	Typenschilder oder sonstige Hinweise auf dem Gerät dürfen weder entfernt noch unleserlich bzw. unkenntlich gemacht werden. Bei Zuwiderhandlungen erlischt jegliche Garantie und Herstellerverantwortung. Typenschilder der Anbauteile haben ebenfalls Gültigkeit.

4 Aufbau und Funktion

4.1 Aufbau

Diese BA gilt für Pekrun-Getriebe, die aus Stirnradgetriebe, Kegelradgetriebe, Planetengetriebe, Schneckengetriebe oder Kombinationen hieraus bestehen. Die Getriebe können sowohl 1-stufig als auch mehrstufig ausgeführt sein.

Der Aufbau des Getriebes ist aus der mitgelieferten Maß- bzw. Schnittzeichnung zu entnehmen.

Die drehmomentübertragenen Bauteile (außer An- bzw. Abtriebswellen) sind vollständig vom Gehäuse umschlossen. Die aus dem Gehäuse herausgeführten Wellenenden sind zum Anschluss in der weiteren Maschine bestimmt.

ACHTUNG

Sachschaden

Zerstörung des Getriebes oder von Bauteilen durch falsche Drehrichtung möglich.

Die Drehrichtung entnehmen Sie dem Drehrichtungspfeil am Getriebe oder der beiliegenden verbindlichen Maßzeichnung bzw. dem technischen Datenblatt zum Auftrag.

Ist in den mitgelieferten technischen Unterlagen keine Drehrichtung vorgegeben, kann das Getriebe grundsätzlich in beiden Drehrichtungen betrieben werden.

4.1.1 Gehäuse

Das Getriebegehäuse ist entweder aus Gusseisen oder aus Baustahl (geschweißte Ausführung) hergestellt. Es ist verwindungssteif ausgeführt.

Für die Kontrolle der Verzahnung sind Inspektionsöffnungen in Form von Schaulochdeckel oder Schaulochöffnungen vorgesehen.

Die Ölstandskontrolle (wenn anwendbar) erfolgt über ein seitlich angebrachtes Ölstandsfenster, Ölauge, Ölpeilstab oder Ölstandsanzeige.

Möglichkeiten zur Öleinfüllung bestehen über Bohrungen (z.B. für den Belüftungsfilter), sonstige Öffnungen bzw. Schaulochdeckel.

Für einen Ölwechsel ist eine Ölablassschraube (Flanschanschluss bzw. angebauter Kugelhahn bei ÖVA) zum Ablassen des Öls vorhanden.

Das Gehäuse ist mit ausreichend dimensionierten Transportnocken oder Transportösen versehen.

Die genaue Ausführung entnehmen Sie der auftragsabhängig erstellten Maß- bzw. Schnittzeichnung.

4.1.2 Verzahnung und Wellen

Je nach Anforderung und Einsatzfall werden in den Getrieben verschiedene Arten von Verzahnungen bzw. Kombinationen hieraus eingesetzt. Diese können aus Stirnrad- und Kegelradpaaren bzw. Planeten- und Schneckenradsätzen bestehen.

Die genaue Ausführung entnehmen Sie der auftragsabhängig erstellten Maß- bzw. Schnittzeichnung.

Die Zahnräder mit den Wellen (z.T. auch Hohlwellen) sind durch Passfederverbindungen, Presspassungen etc. miteinander gefügt.

Die Drehmomentübertragenen Bauteile werden aus Stahl (z.T. Buntmetall für Schneckenradsätze) hergestellt. Die genauen Werkstoffe werden bei der konstruktiven Auslegung anhand der bestimmungsgemäßen Verwendung festgelegt.

Die hohe Qualität der Verzahnungen bzw. Schneckenradpaare garantiert einen betriebssicheren Lauf und minimiert den Geräuschpegel.

4.1.3 Wellenlagerung

Normalerweise sind die Wellen des Getriebes in Wälzlagern gelagert. Je nach Anforderung und Einsatzfall kann auch eine Lagerung in Gleitlagern bzw. Lagerbuchsen erfolgen.

Die genaue Ausführung entnehmen Sie der auftragsabhängig erstellten Maß- bzw. Schnittzeichnung.

4.1.4 Schmierung

Die Art der Schmierung (Öl- oder Fettschmierung, Tauch- oder Druckschmierung), Ölzähigkeit und Ölmenge wird bei der konstruktiven Auslegung festgelegt.

ACHTUNG

Sachschaden

Schäden am Getriebe durch Betrieb ohne Ölschmierung

Achten Sie auf planmäßige und richtige Schmierung. Wenden Sie geeignete Schmierstoffe an. Hierdurch wird ein Höchstmaß an Betriebssicherheit und eine lange Lebensdauer der Getriebe erzielt

- Bringen Sie die ggf. gesondert gelieferten oder für den Transport entfernten Bauteile wie Manometer, Thermometer, Rohrleitungen usw. an.
- **Füllen Sie in jedem Falle Öl in das Getriebe ein.**
  (Ausnahme: bei mit Fett gefüllten Getrieben kontrollieren Sie den Füllstand)
- Gehen Sie zur Inbetriebnahme vor wie in **Kapitel 8** beschrieben.

Tauchschmierung

Ist in den mitgelieferten technischen Unterlagen keine besondere Schmierung vorgegeben, erfolgt eine ausreichende Ölversorgung der Zahnradpaare und Lager mit Hilfe der Verzahnung durch Tauchschmierung. Hierdurch sind die Getriebe besonders wartungsarm.

Druckschmierung

Eine Druckschmierung durch Ölpumpen wird vorgesehen bei:

a) Schmierstoffversorgung der Verzahnung und Lager bei hoher Umfangsgeschwindigkeit.

b) Kühlung durch Ölkühler

c) Wälzlagerschmierung für höhere Drehzahlen großer Lager.

d) Gleitlagerschmierung

e) Besondere Einbaulagen und bei Getrieben, bei denen keine Tauchschmierung möglich ist.

Die Druckschmierung erfolgt durch z.B.

- eine angeflanschte Ölpumpe direkt an eine Getriebewelle

oder

- eine am Getriebegehäuse befestigte Motorölpumpe.
- eine separat aufgestellte ÖVA
- eine zentrale kundenseitige Ölversorgung

Die Rohrleitungen bzw. Verbindungsleitungen sind fest am und im Getriebe verlegt.

Überwachung der Schmieranlage

Überwachen Sie folgende Betriebszustände für die einwandfreie Funktion des Ölkreislaufes:

a) Öldruck => Manometer / Druckschalter etc.

b) Öltemperatur => Zeigerthermometer / Widerstandsthermometer etc.

c) Öldurchflussmenge => Strömungsanzeiger / Strömungswächter etc.

ACHTUNG

Sachschaden

Schäden am Getriebe durch Betrieb ohne Ölschmierung

Schließen Sie bei Getrieben mit angebauter Ölversorgungsanlage vor Inbetriebnahme die vorgesehene Instrumentierung funktionstüchtig an.

HINWEIS

Beachten Sie für den Betrieb und die Wartung der Pumpe, der Filter sowie der Überwachungsinstrumente die im auftragsabhängig beigestellten Anhang angegeben Betriebsanleitungen.

4.1.5 Abdichtung

Radialwellendichtringe oder Labyrinthdichtungen (je nach Anwendung) verhindern an den herausgeführten Wellenenden, dass Öl aus den Getrieben austreten kann oder dass Verunreinigungen ins Getriebe eindringen können.

4.2 Funktionelle Beschreibung

Pekrun-Getriebe bestehen aus einem oder mehreren Zahnradpaaren (Verzahnungspaaren bzw. Schneckenradpaaren), die vollständig vom Gehäuse umschlossen sind. Ausgenommen hiervon sind die Wellenenden der An- bzw. Abtriebswellen. Diese sind zum Anschluss in der weiteren Maschine bestimmt und aus dem Gehäuse herausgeführt.

Die Zahnräder bzw. Schnecken dienen der unmittelbaren Übertragung von kleinsten bis größten Leistungen und Drehzahlen zwischen parallelen, sich kreuzenden oder sich schneidenden Wellen.

5 Anlieferung, innerbetrieblicher Transport

5.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

HINWEIS

Beachten Sie die Sicherheitshinweise in **Kapitel 2**: Sicherheit

GEFAHR

Lebensgefahr, Quetsch- und Schergefahr

Schwere Verletzungen durch schwebende Last!

Beim Transport und Auf-/Abladen des Getriebes kann es zum Verrutschen, Absturz und Herabfallen auf Personen durch unsachgemäßes Anschlagen der Last bzw. Auswahl nicht geeigneter Lastaufnahmemittel kommen. Es besteht die Gefahr des Quetschens und Scherens von Gliedmaßen, wenn Bediener zwischen Hindernisse und die Last kommen.

Halten Sie folgende Schutzmaßnahmen ein:

-Unterrichten Sie alle mit dem Transport und Aufstellen des Getriebes beauftragten Personen über die vorhandenen Restrisiken, insbesondere über die Auswahl von Lastaufnahmeeinrichtungen sowie das Anschlagen von Lasten.

-Vermeiden Sie jede Gefährdung des Personals:
Achten Sie darauf, dass keine Personen zwischen Hindernisse und die Last kommen. Halten Sie Sicherheitsabstände ein. Tragen Sie PSA.
Transportieren Sie das Getriebe langsam und vorsichtig, besonders in angehobenem Zustand.

-Achten Sie auf ordnungsgemäßes Anschlagen des Getriebes:
Halten Sie die Belastungsgrenzen der Anschlagmittel ein.
Verteilen Sie die Last gleichmäßig beim Anschlagen mit mehreren Strängen (Achtung: Schwerpunkt eventuell außermittig). Beachten Sie Hinweise zur Lastverteilung auf der Verpackung bzw. Maßzeichnung.

-Beauftragen Sie nur gründlich geschultes Personal mit dem Transport und Auf-/Abladen des Getriebes:
Halten Sie die Verfahrgeschwindigkeit möglichst gering.
Vermeiden Sie schnelles Wechseln zwischen Bewegen und Stoppen der Last und hieraus resultierendes Pendeln.

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch die Verwendung falscher Anschlagpunkte.

Heben Sie das Getriebe keinesfalls an den Wellenzapfen an. Auch nicht an den stirnseitigen Gewinden!

Ein Transportieren an den Rohrleitungen ist nicht zulässig.

Das Anschlagen darf nur an den hierfür vorgesehenen Transportnocken oder Transportösen am Gehäuse erfolgen.

Diese sind mit dem entsprechenden Symbol am Getriebe gekennzeichnet.

5.2 Anlieferung

	ACHTUNG
	Sachschaden **Beschädigung des Getriebes durch Korrosion möglich.** Öffnen Sie keinesfalls die Verpackung. Hierdurch verringert sich die Haltbarkeit der Getriebekonservierung. Wurde die Verpackung doch geöffnet lesen Sie bitte **Kapitel 6** dieser BA. *Im Zweifel halten Sie Rücksprache mit Pekrun.*

Der Inhalt der Lieferung ist in den Versandpapieren aufgeführt. Überprüfen Sie beim Empfang der Lieferung die Ware auf Transportschäden und Vollständigkeit.

Melden Sie uns Abweichungen von den Versandpapieren und/oder Transportschäden sofort schriftlich.

Das Getriebe wird im zusammengebauten Zustand betriebsfertig, jedoch ohne Ölfüllung, ausgeliefert. Zusätzliche Ausstattungen (wie z.B. Rohrleitungen, Ölkühler, Armaturen und Überwachungsinstrumente) werden gegebenenfalls getrennt verpackt ausgeliefert.

5.3 Innerbetrieblicher Transport

Der Transport des Getriebes hat so zu erfolgen, dass Personenschäden und Schäden am Getriebe vermieden werden.

Der Transport der Getriebeeinheit ist abhängig von den Gegebenheiten des Einsatzortes.

Beim Transport auf Paletten mit einem Gabelstapler ist besonders auf die Tragfähigkeit des Staplers zu achten. Für den sicheren Transport sorgen Sie für Standsicherheit auf den Gabeln.

	HINWEIS
	Für den Krantransport des Getriebes nutzen Sie unbedingt die vorgesehenen Anschlagpunkte am Getriebegehäuse. Diese sind mit dem entsprechenden Symbol am Getriebe gekennzeichnet.
	Für den Transport des Getriebes dürfen nur Lastaufnahmeeinrichtungen und Anschlagmittel gemäß EG- Richtlinie 2006/42/EG verwendet werden**.**
	Das Gewicht des Getriebes entnehmen Sie dem technischen Datenblatt im Anhang oder dem Typenschild des Getriebes. Achten Sie, für den sicheren Transport, auf den eventuell außermittigen Schwerpunkt und die Abmessungen des Getriebes. Siehe Maßzeichnung im Anhang dieser BA.

[pekrun]

	HINWEIS
!	Achten Sie beim Anschlagen der Last auf ausreichende Tragfähigkeit der Anschlagmittel. Die Tragfähigkeit der verwendeten Anschlagmittel darf nicht überschritten werden. Beim Anschlagen mit mehreren Strängen dürfen nur 2 Stränge als tragend angenommen werden. Bei Seilen, Ketten und Hebebänder darf der Neigungswinkel ß=60° nicht überschritten werden.

Falsch –
Der Neigungswinkel ist >60°

Richtig –
Der Neigungswinkel ist <60°

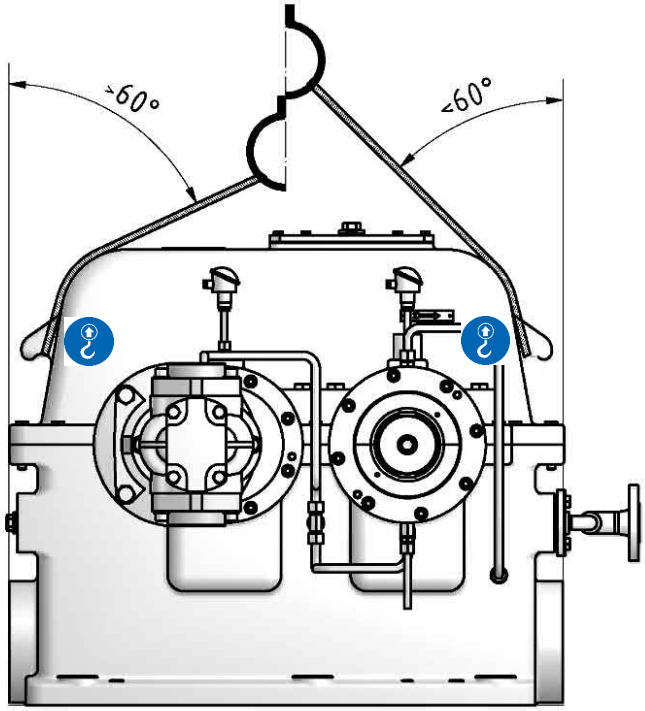


Abbildung 5-1

	ACHTUNG
!	**Sachschaden** **Beschädigung des Getriebes durch harte Stöße.** Vermeiden Sie harte Stöße beim Auf- oder Absetzen des Getriebes. Es können Bauteile oder Lager beschädigt werden.
	Beschädigung der angebauten Rohrleitungen bzw. Instrumente. Achten Sie beim Transport des Getriebes darauf angebaute Instrumente und Rohrleitungen nicht zu beschädigen.
	Umweltschäden **Der Transport des Getriebes sollte ohne Ölfüllung erfolgen.**

6 Lagerbedingungen

6.1 Sicherheit

GEFAHR

Lebensgefahr durch um- oder herabfallende Getriebe

Gefahr von einem um- oder herabfallenden Getriebe erschlagen oder eingequetscht zu werden. Gefahr der Abscherung von Gliedmaßen, wenn Personen zwischen Hindernisse und die Last kommen.

Stapeln Sie Getriebe nicht übereinander.

HINWEIS

Beachten Sie die Sicherheitshinweise in **Kapitel 2**: Sicherheit

6.2 Ablieferungszustand

Vor Auslieferung des Getriebes wird nach Möglichkeit in unserem Hause ein Probelauf durchgeführt. Hierfür wird ein Einlauf- und Korrosionsschutzöl eingesetzt.

Die Getriebe werden betriebsfertig geliefert:

Ablieferungszustand:

- ohne Ölfüllung (aus Sicherheitsgründen für den Transport)
- Fettschmierstellen sind mit Fett gefüllt (wenn anwendbar / Kontrolle vor Inbetriebnahme).
- Wellenenden, Hohlwellenbohrungen sind mit einer Schutzkonservierung versehen.
- Der Außenanstrich ist beständig gegen schwache Säuren und Alkalien, Öle und Lösungsmittel, Witterungseinflüsse. Er ist seewasserbeständig und tropenfest sowie temperaturbeständig bis 120°C (kurzzeitig bis 140°C).

6.3 Getriebelagerung

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch Vibration am Lagerort möglich.

Setzen Sie das Getriebe während der Lagerung keinen Vibrationen aus.

Wenn dies nicht möglich ist, sollten alle Wellen gelegentlich (monatlich) verdreht werden um Stillstandsmarkierungen zu vermeiden. Die Vorgehensweise ist abhängig vom Aufbau des Getriebes und den Gegebenheiten am Einsatzort.

Bei Getrieben mit Labyrinthdichtungen an den Wellenaustritten verschließen Sie die Spalte zum Gehäuse sofort wieder luftdicht.

(Halten Sie Rücksprache mit Pekrun.)

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch Korrosion möglich.

Öffnen Sie keinesfalls die Verpackung. Hierdurch verringert sich die Haltbarkeit der Getriebekonservierung.

Der aufgebrachte Korrosionsschutz muss während der Lagerung erhalten bleiben. Er darf nicht beschädigt werden, sonst besteht Korrosionsgefahr.

- Achten Sie darauf, dass der Anstrich nicht beschädigt wird. Beschädigungen am Lack führen zu Korrosion und zum Versagen des äußeren Schutzes.

- Das Getriebe muss während der gesamten Lagerung luftdicht verschlossen sein um lange Lagerzeiten durch eine Innenkonservierung mit einem VCI-Konzentrat ohne Verlust des Korrosionsschutzes zu erhalten.

- Überprüfen Sie die Innen- und Außenkonservierung bei längeren Zwischenlagerungen und erneuern Sie diese gegebenenfalls. (siehe **Kapitel 6.4** „Konservierung“)

Lagern Sie das Getriebe auf einem trockenen weichen Unterbau (z.B. Holz) waagerecht. Schützen Sie das Getriebe mit einer geeigneten Abdeckung.

Stapeln Sie Getriebe nicht übereinander.

Decken Sie das Getriebe bei einer Lagerung im Freien besonders sorgfältig ab. Achten Sie dabei darauf, dass sich weder Feuchtigkeit noch Fremdstoffe auf dem Getriebe ablagern können.

Die Temperatur in unmittelbarer Umgebung des Getriebes darf nicht unter 0°C und nicht über +20°C betragen. Ist dieser Temperaturbereich aus umgebungsbedingten Umständen nicht einzuhalten, halten Sie Rücksprache mit Pekrun.

6.4 Konservierung

Für lange Einlagerungen oder den Export einschließlich Abstellzeiten müssen Getriebe einer besonderen *Innenkonservierung* unterworfen werden. Es ist für extreme Bedingungen unzureichend, *nur eine Außenkonservierung* der besonders korrosionsempfindlichen blanken Außenflächen, wie z. B. Wellen-Stummel, Flansche oder dergl. allein vorzunehmen.

Grundsätzlich erfolgt die Innenkonservierung des Getriebes in unserem Werk durch das Einlauf- bzw. Korrosionsschutzöl beim Probelauf. Diesem Öl ist ein VCI-Konzentrat zugesetzt.

Der Korrosionsschutz erfolgt hierbei durch die Dampfphase des Inhibitors. Bei dieser Form der Innenkonservierung besteht der große Vorteil darin, das durch den Probelauf das Öl auch in schlecht zugänglichen Hohlräumen bzw. an versteckte Bauteilen gelangt und hier wirksam wird.

Durch den hohen Anteil an VCI-Konzentrat im verbleibenden Restöl und die vor dem Versand erfolgte luftdichte Verpackung ist ein Korrosionsschutz für normale Transportbedingungen und übliche Fracht- bzw. Lagerzeiten gewährleistet. In der Regel kann eine Reinigung / Spülung vor Inbetriebnahme entfallen. (siehe auch **Kapitel 6.4.1**)

In Sonderfällen, in denen die Hauptkomponenten nicht komplett vom Gehäuse umschlossen sind und hierdurch eine luftdichte Verpackung nicht sinnvoll bzw. möglich ist, besteht eine verkürzte Lagerdauer (siehe **Tabelle 6-1**). Ist in diesem Fall eine längere

[pekrun]

Lagerbedingungen

Lagerdauer erforderlich muss dies im Liefervertrag festgelegt werden und hier Sonderlösungen gefunden werden. (*Halten Sie Rücksprache mit Pekrun).*

VORSICHT

Der Umgang mit einem Korrosionsschutzinhibitor unterliegt den Vorschriften der Gefahrenstoff-Verordnung, der EG-Verordnung 1907/2006 sowie den EG-Richtlinien 2010/75/EU und 89/656/EWG.

-Tragen Sie bei Konservierungsarbeiten geeignete persönliche Schutzausrüstung (Schutzbrille, Schutzhandschuhe, Atemschutz).

- Lassen Sie Konservierungsarbeiten durch geeignete Fachkräfte durchführen.

- Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).

HINWEIS

Wenden Sie sich bei Fragen rund um die Konservierung an unsere Serviceadresse unter **Kapitel 1.6** dieser BA.

6.4.1 Innenkonservierung mit VCI-Konzentrat

WARNUNG

Verletzungsgefahr, Umweltschaden

Verletzungen durch austretende Dämpfe

Beim Öffnen des mit Korrosionsschutzinhibitor (VCI) konservierten Getriebes können leicht entzündliche Dämpfe entweichen.

-Vermeiden Sie in der Umgebung heiße Gegenstände, offene Flamme, Feuer und Funken.

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

Vermeiden Sie Unverträglichkeiten mit dem später verwendeten Betriebsöl:

Setzen Sie ausschließlich Mineralöle und Öle auf PAO- oder Esterbasis ein. Hierbei kann meist ein Spülen vor der Inbetriebnahme entfallen. (siehe **Kapitel 6.6**)

Bei Einsatz von Getriebeöl auf Polyglykolbasis (wenn zulässig):

Das Korrosionsschutzöl ist mit dem Betriebsöl nicht mischbar!

-Lassen sie das Korrosionsschutzöl komplett ab.

-Spülen Sie das Getriebe gründlich mit dem späteren Betriebsöl. (**Kapitel 6.6)**

-Füllen Sie das Betriebsöl ein (siehe **Kapitel 8**)

(Halten Sie Rücksprache mit Pekrun.)

[pekrun]

Lagerbedingungen

Vor Auslieferung des Getriebes wird in unserem Hause ein Probelauf durchgeführt.

Hierfür wird, wenn nicht anders vereinbart, ein Einlauf- und Korrosionsschutzöl

ISO VG 220 bzw. ISO VG 320 mit zugesetztem VCI- Konzentrat eingesetzt.

Angaben zu Haltbarkeit der Konservierung und Lagerzeiten siehe **Kapitel 6.5**.

Um die Haltbarkeit der Innenkonservierung zu verlängern gehen Sie wie folgt vor:

- Das im Getriebe verbliebene Öl muss nicht abgelassen werden.
- Kontrollieren Sie die Getriebetemperatur. Sie sollte ≥ 5°C sein.
- Mischen Sie außerhalb des Getriebes das VCI-Konzentrat mit Getriebeöl (späteres Betriebsöl) in empfohlener Menge. (wenn vom Hersteller vorgeschrieben)

	HINWEIS
!	Beachten Sie die Anwendungshinweise des Herstellers. (siehe aktuelles Datenblatt) Eine Pekrun- Empfehlung für die richtige Auswahl des Konzentrats entnehmen Sie der Schmierstofftabelle die dieser BA beigefügt ist. (siehe **Kapitel 8.4**). Je nach Hersteller kann das VCI-Konzentrat gemischt mit Getriebeöl (möglichst das spätere Betriebsöl) eingesetzt werden muss es aber nicht. Das Mischungsverhältnis entnehmen Sie bitte dem Datenblatt des VCI-Konzentrats. **Das freie Innenraumvolumen des Getriebes können Sie anhand der Getriebeabmessungen (LxBxH) näherungsweise errechnen.**

- Säubern Sie den Bereich um den Öl- Einfüllstutzen, Schaulochdeckel, Belüftungsfilter und alle vorhanden Öffnungen, die zum Einfüllen benutzt werden sollen.
- Öffnen Sie das Getriebe nach Möglichkeit an mehreren Stellen (z.B. am Öl-Einfüllstutzen, Belüftungsfilter, Schaulochdeckel), die über das Getriebe verteilt sind.
- Kontrollieren Sie den Getriebeinnenraum auf Feuchtigkeit und Korrosion. Sind Spuren von Feuchtigkeit zu erkennen, entfernen Sie diese und stellen sie die Ursachen fest. Bei beginnende Korrosion muss diese entfernt werden bevor eine Nachkonservierung erfolgt. *(Halten Sie Rücksprache mit Pekrun)*
- Füllen Sie das VCI-Konzentrat bzw. das VCI-Konzentrat-Getriebeöl-Gemisch an verschiedenen Stellen ein, um eine gleichmäßige Verteilung im Innenraum zu erreichen.
- Verschließen Sie den Öl- Einfüllstutzen und alle vorhandenen Öffnungen. und dichten Sie diese ab.
- Ersetzen Sie alle Belüftungsfilter durch Verschlussschrauben. (Bewahren Sie die Bauteile zur späteren Verwendung sicher auf)
- Dichten Sie alle Luftspalte (z.B. von Labyrinthdichtungen) mit geeigneten Mitteln (z. B. Klebeband) ab.

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch Korrosion möglich.

Da sich der Korrosionsschutz aus der Dampfphase ableitet, kann er nur voll wirksam werden, wenn das Getriebe luftdicht verschlossen ist.

Der Zeitraum zwischen dem Öffnen des Getriebes und dem erneuten luftdichten Verschließen sollte 1 Stunde nicht überschreiten.

Die Haltbarkeit der Innenkonservierung des Getriebes ist nun verlängert.

Sie beträgt bis zu 24 Monate. (siehe **Kapitel 6.5**. Lagerzeiten)

Dieser Prozess kann beliebig wiederholt werden.

Vor der Inbetriebnahme müssen folgende Punkte zusätzlich beachtet werden:

- Montieren Sie die vor der Konservierung entfernten Belüftungsfilter an die vorgesehenen Stellen. (siehe Schnitt- bzw. Dispositionszeichnung)

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

Verwenden Sie das Korrosionschutzöl nicht als Betriebsöl wenn
- der Anteil vom VCI-Konzentrat im Öl mehr als 5% beträgt.
- Pumpen, Filter oder elektronische Ausrüstung eingesetzt werden.
  (Halten Sie Rücksprache mit dem Hersteller der Bauteile)
- Betriebsöle auf Polyglykolbasis verwendet werden.

In diesem Fall muss das Getriebe vor Inbetriebnahme gespült werden. (siehe **Kapitel 6.6)**

6.4.2 Außenkonservierung

Sind zusätzliche Verpackungsmaßnahmen nicht erforderlich oder vorgesehen, führen Sie eine Außenkonservierung am Getriebe wie folgt durch:

blanke Außenflächen:

- Versehen Sie z.B. Getriebestummel, Flanschflächen, Wellenenden und dergl. mit einem grifffesten Wachsfilm. (bei Innenlagerung genügt auch ein weichfilmiges Konservierungsmittel) z.B. Tectyl 846, Tectyl 502 C oder ähnlich

Bei nicht vorgesehener zusätzliche Außenverpackung und für eine längere Lagerzeit führen Sie zusätzlich folgende Maßnahmen durch:

- Dichten Sie das Getriebe außen zusätzlich ab (Wellenaustritte, Ölanschlüsse, Belüftungsfilter und dergl.).

Zusätzlich empfehlen wir folgende Maßnahmen:

- Führen Sie eine Innenkonservierung mit einem VCI-Konzentrat durch. (siehe **Kapitel 6.4.1**)

6.5 Lagerzeiten

6.5.1 Ohne zusätzliche Verpackung

Die Lagerzeiten gelten für eine Lagerung draußen und unter Dach ohne zusätzliche Verpackung.

HINWEIS

Maßnahmen zur sicheren Lagerung:

Getriebeinnenraum nicht luftdicht verschlossen:

Die Lagerung soll nur derart erfolgen, dass Belüftungen oder andere Öffnungen so abgedeckt sind, dass kein Wasser in das Getriebeinnere durch Regeneinflüsse eindringen kann.

Getriebeinnenraum luftdicht verschlossen:

-Verschließen Sie alle Öffnungen am Getriebe. (einschließlich Labyrinthdichtungen an den Wellenaustritten)
-Ersetzen Sie alle Luftfilter durch Verschlussschrauben oder kleben Sie diese sorgfältig ab. (Vor Inbetriebnahme muss der Luftfilter wieder angebracht werden)

Standard Innenkonservierung mit VCI-Konzentrat

Tabelle 6-1

Getriebeabdichtung	Zeitpunkt der Konservierung	Lagerzeit Innen	Lagerzeit Außen
Getriebeinnenraum **nicht luftdicht** verschlossen	Auslieferung bis Inbetriebnahme:	4 Monate	2 Monate
Getriebeinnenraum **luftdicht** verschlossen	Auslieferung bis Inbetriebnahme	24 Monate	12 Monate
	Auslieferung bis Nachkonservierung	20 Monate	8 Monate
	Nachkonservierung bis Nachkonservierung	20 Monate	8 Monate
	Nachkonservierung bis Inbetriebnahme	24 Monate	12 Monate

Die Lagerzeit kann durch erneutes Einbringen von VCI-Konzentrat verlängert werden. (siehe **Kapitel 6.4.1**)

6.5.2 Mit zusätzlicher Verpackung

Werden längere Lagerzeiten, als in der Tabelle angegeben, gefordert, sind z.B. folgende Maßnahmen zu treffen:

- Verschließen Sie das innenkonservierte Getriebe an Wellendurchgängen und sonstigen Öffnungen wasserdampfdicht.

HINWEIS

Die Abdichtung des Getriebes ist so gemeint, dass die Wellendurchführungen und alle sonstigen Öffnungen wasserdampfdicht verschlossen sind.

- Bringen Sie eine ausreichende Menge Trockenmittel (möglichst mit Indikator) außerhalb des Getriebes an und Schweißen Sie es mit einer wasserdampfdichte Folie ein.

oder

- Verpacken Sie das innenkonservierte Getriebe exportmäßig (ohne Trockenmittel).

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch falsche Lagerung

Bei hermetisch dichten Verpackung bildet sich bei Temperaturschwankungen Schwitzwasser. Hier besteht die Gefahr von Rostbildung.

- Bringen Sie Trockenmittel innerhalb des Verpackungsraumes ein.

Trockenmittel sollen die relative Luftfeuchtigkeit möglichst geringhalten. Indikatoren oder Feuchtigkeitsanzeiger in Verbindung mit Trockenmitteln, zeigen das Klima bzw. den Feuchtegrad innerhalb der Verpackung an.

Bei längeren Lagerzeiten ist, entsprechend der Gesamtlagerzeit, eine geeignete Konservierung und zusätzliche Verpackung der Blankteile erforderlich.

Beschädigung des Getriebes durch zu lange Lagerzeiten

Die Langzeitlagerung ist auch von anderen Faktoren, wie Materialverformung und ähnlichen Erscheinungsbildern, gekennzeichnet. Sie können die Gesamtlagerzeit beeinflussen. Entsprechende Maßnahmen sind dann anzuordnen.

(Halten Sie Rücksprache mit Pekrun.)

HINWEIS

Konservierungs- und Verpackungsmaßnahmen zusammen bilden eine Einheit. So sind Abdichtmaßnahmen auch als Anteil zusätzlicher Verpackung anzusehen

Lassen Sie sich von Fachfirmen oder vom Amt für Seemäßige Verpackung (Hamburg) beraten welche zusätzlichen Verpackungsmaßnahmen und anzuwendende Verpackungsmaterialien geeignet sind.

6.6 Spülen vor Inbetriebnahme

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

Verwenden Sie das Korrosionschutzöl nicht als Betriebsöl wenn
- der Anteil vom VCI-Konzentrat im Öl mehr als 5% beträgt.
- Pumpen, Filter oder elektronische Ausrüstung eingesetzt werden.
  (Halten Sie Rücksprache mit dem Hersteller)
- Betriebsöle auf Polyglykolbasis verwendet werden.

In diesem Fall muss das Getriebe vor Inbetriebnahme gespült werden.

Zur Verwendung kommt die Ölsorte, die zum normalen Betrieb benutzt wird. Für die richtige Ölauswahl beachten Sie **Kapitel 8.4** dieser BA.

Spülen Sie das Getriebe mit Öl vor Inbetriebnahme (wie in **Kapitel 8** beschrieben) um Rückstände des Konservierungsmittels zu entfernen. Diese könnten zur Ölschaumbildung führen.

Gehen Sie wie folgt vor:

- Füllen Sie das Getriebeöl (75%-100% der normalen Ölmenge) durch die Schaulochdeckelöffnungen bzw. Öleinfüllöffnungen in das Getriebe ein.
- Beseitigen Sie eventuell vorbeifließendes Öl mit einem Ölbindemittel
- a) Bei Getrieben mit Tauchschmierung bzw. direkt angebauter Ölpumpe:

  Spülen Sie das Getriebe durch Drehen bzw. kurzen Betrieb des Getriebes

  Dauer des Spülvorgangs: 15…30 Minuten

  b) Bei Getrieben mit Ölumlaufschmierung durch Ölpumpe

  Spülen Sie das Getriebe durch den Betrieb der Ölpumpe

  Dauer des Spülvorgangs: ca. 1 Stunde
- Lassen Sie das Öl **möglichst unmittelbar nach dem Spülvorgang** sorgfältig aus dem Getriebe ab.

HINWEIS

Achten Sie hierbei auf vollständige Entleerung des Gehäuseunterteils bzw. aller Gehäuseinnenräume und der Geräte der Ölversorgungsanlage (wenn vorhanden).

- Füllen Sie für die Inbetriebnahme **frisches, neues Öl**, der gleichen Sorte und des gleichen Fabrikats, welches zur Spülung verwendet wurde, ein.
- Folgen Sie weiter den Maßnahmen zur Inbetriebnahme unter **Kapitel 8**.

[pekrun]

Lagerbedingungen

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

-Verwenden Sie nur unbenutzte Öle, die frei von Verunreinigungen sind. Verwenden Sie zum Befüllen einen Einfüllfilter. (Filterfeinheit max. 25 µm)

-Füllen Sie Öl nicht direkt aus Fässern in das Getriebe ein. Stellen Sie sicher, dass der Wasseranteil im Öl nicht zu hoch ist. Dies kann zur Schaumbildung im Betrieb führen.

Normal-Wert für frisches Öl <250 ppm H_2O.

Bei Zweifeln halten Sie Rücksprache mit dem Ölhersteller bzw. Pekrun.

Beschädigung des Getriebes durch Schmutz im Öl möglich.

Verwenden Sie nur Öle deren Reinheit mindestens der von Pekrun empfohlenen Reinheitsklasse entspricht. (siehe **Kapitel 8.4**)

Das Spülöl darf keinesfalls als Betriebsöl benutzt werden!

7 Aufstellbedingungen

7.1 Sicherheit

	HINWEIS
	Beachten Sie die Sicherheitshinweise in **Kapitel 2**: Sicherheit

7.2 Aufstellplan

	HINWEIS
	Berücksichtigen Sie bei der Aufstellung die beigefügte auftragsabhängige Maßzeichnung, den Rohrleitungs-, Hydraulik- oder Klemmenbelegungsplan (wenn vorhanden bzw. anwendbar).

7.3 Gesamtplatzbedarf

Achten Sie darauf, dass um das Getriebe herum ausreichend Raum für die Montage und für spätere Wartungs- und Pflegearbeiten vorhanden ist.

Achten Sie darauf, dass das Öl abgelassen werden kann und ausreichend Luftzufuhr besteht.

Halten Sie alle Inspektionsöffnungen frei zugänglich, um die Innenteile kontrollieren zu können.

	HINWEIS
	Beachten Sie den in dieser BA enthaltenen Rohrleitungsplan, wenn Verbindungsrohre für eine Ölversorgungsanlage zum Pekrun- Lieferumfang gehören

7.4 Abmessungen und Gewichte

	HINWEIS
	Die Angaben zum Gewicht sowie weitere technische Daten entnehmen Sie dem **Kapitel 3** (bzw. dem auftragsabhängig erstellten **technischen Datenblatt** bzw. der beigefügten **Maßzeichnung**. (im Anhang)

7.5 Fundament und Boden

Achten Sie darauf, dass die Aufstellfläche waagerecht und eben ist.

Für die maximale Abweichung der Plan- und Ebenheit der Grundplatte (Getriebeauflagefläche) empfehlen wir die Anlehnung an Toleranzklasse IT 7 nach DIN EN ISO 286-1. Die maximale Abweichung darf 0,1 mm pro 1 m nicht übersteigen.

Vermeiden Sie beim Anziehen der Befestigungsschrauben ein Verspannen des Getriebes.

Führen Sie das Fundament so aus, dass keine Resonanzschwingungen entstehen können. Die Festigkeit des Fundaments liegt im Verantwortungsbereich des Anlagenherstellers bzw. Endkunden.

Von benachbarten Fundamenten dürfen keine Erschütterungen bzw. Schwingungen übertragen werden.

Wenn das Getriebe auf einer Stahlkonstruktion montiert wird, muss dieses verwindungssteif sein. Es ist entsprechend der auf das Getriebe einwirkenden Kräfte auszulegen.

Ziehen Sie Befestigungsschrauben und Muttern mit dem vorgeschriebenen Drehmoment an. Verwenden Sie Schrauben mit einer Mindestfestigkeitsklasse 8.8 bzw. der spezifizierten Festigkeit. Die Ausführung der Ankerschrauben liegt in der Verantwortung des Anlagenherstellers.

7.6 Umgebungsbedingungen

Schützen Sie das Getriebe bei einer Aufstellung im Freien vor schädigenden Witterungseinflüssen.

Halten Sie die im Leistungs- bzw. Liefervertrag festgelegten Umgebungsbedingungen ein. Sprechen Sie uns bei Änderung dieser Bedingungen (auch einzelner Parameter wie z.B. Aufstellhöhe und Umgebungstemperatur) an. Wir prüfen die einwandfreie Eignung des gelieferten Getriebes (bzw. der Getriebeeinheit)

Eine Gewähr für den Betrieb in nicht vorgeschriebenen Umgebungsbedingungen kann unsererseits nicht übernommen werden.

7.7 Versorgungsanschlüsse

Folgende Versorgungsanschlüsse müssen Sie berücksichtigen:

(wenn anwendbar oder im Pekrun- Lieferumfang enthalten):

- *für die Schmierölversorgung*: Leitungen zu einer externen Ölversorgungseinheit und Anschlussverbindungen an das Getriebe
- *für die Getriebekühlung*: Leitungen zur Kühlwasserversorgung und Anschlussverbindungen an den Wasser-Ölkühler
- *für die Energieversorgung der Schaltzylinder*: hydraulische Versorgungsleitungen zu einer externen Hydraulikeinheit und Anschlüsse an die Schaltzylindern
- *für die Energieversorgung der elektrischen Komponenten*: Bereitstellung der im Leistungs- bzw. Liefervertrag festgelegten Energieversorgungsparameter und die Anschlüsse an diese.
- *für eine Ölversorgungsanlage*: sämtliche Versorgungsleitungen und Anschlüsse lt. beigelegtem Rohrleitungs-, Klemmbelegungs- bzw. Hydraulikplan.

	HINWEIS
	Beachten Sie die speziellen Betriebsanleitungen, Pläne, Zeichnungen und Layouts der verschiedenen Komponenten und Aggregate. Diese sind dieser BA im Anhang beigefügt (wenn im Lieferumfang enthalten).

7.8 Kundenseitige Sicherheitsvorkehrungen

GEFAHR

Lebensgefahr, Quetsch- und Schergefahr

Schwere Verletzungen durch schwebende Last!

Beim Transport und Auf-/Abladen des Getriebes kann es zum Verrutschen, Absturz und Herabfallen auf Personen durch unsachgemäßes Anschlagen der Last bzw. Auswahl nicht geeigneter Lastaufnahmemittel kommen. Es besteht die Gefahr des Quetschens und Scherens von Gliedmaßen, wenn Bediener zwischen Hindernisse und die Last kommen.

Halten Sie folgende Schutzmaßnahmen ein:

-Unterrichten Sie alle mit dem Transport und Aufstellen des Getriebes beauftragten Personen über die vorhandenen Restrisiken, insbesondere über die Auswahl von Lastaufnahmeeinrichtungen sowie das Anschlagen von Lasten.

-Vermeiden Sie jede Gefährdung des Personals:
Achten Sie darauf, dass keine Personen zwischen Hindernisse und die Last kommen. Halten Sie Sicherheitsabstände ein. Tragen Sie PSA.
Transportieren Sie das Getriebe langsam und vorsichtig, besonders in angehobenem Zustand.

-Achten Sie auf ordnungsgemäßes Anschlagen des Getriebes:
Halten Sie die Belastungsgrenzen der Anschlagmittel ein.
Verteilen Sie die Last gleichmäßig beim Anschlagen mit mehreren Strängen (Achtung: Schwerpunkt eventuell außermittig). Beachten Sie Hinweise zur Lastverteilung auf der Verpackung bzw. Maßzeichnung.

-Beauftragen Sie nur gründlich geschultes Personal mit dem Transport und Auf-/Abladen des Getriebes:
Halten Sie die Verfahrgeschwindigkeit möglichst gering.
Vermeiden Sie schnelles Wechseln zwischen Bewegen und Stoppen der Last und hieraus resultierendes Pendeln.

GEFAHR

Lebensgefahr durch rotierende und/oder bewegliche Teile

Gefahr von rotierenden und/oder sich bewegenden Bauteilen erfasst und eingezogen zu werden.

-Sichern Sie alle rotierenden Antriebsteile wie Kupplungen, Zahn- oder Kettenräder, Riementriebe gegen Berührung.

-Sichern Sie alle außenliegenden beweglichen Teile wie z.B. Schaltzylinder gegen Berührung.

-Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen)

	WARNUNG **Verbrennungsgefahr durch Berühren des Getriebes** **Schwere Verletzungen durch Verbrennungen möglich.** Während des Betriebes und noch einige Zeit nach dem Stillstand kann es zu schwere Verletzungen durch Berührungen von heißen Oberflächen (>55°C) kommen. -Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen) -Lassen Sie das Getriebe auf eine sichere Temperatur abkühlen, bevor Sie es berühren. -Tragen Sie geeignete Schutzhandschuh und Schutzkleidung.

7.9 Lokale Anforderung für die Anlieferung

Stellen Sie einen ausreichend dimensionierten Kran mit ausreichend dimensionierten Lastaufnahmeeinrichtungen für den Transport zur Verfügung.

Lassen Sie den Transport durch geeignete Fachkräfte durchführen.

	HINWEIS Beachten Sie die Hinweise in **Kapitel 5**: Auslieferung, innerbetrieblicher Transport.

8 Montage und Installation, Erstinbetriebnahme

8.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

	HINWEIS
	Beachten Sie die Sicherheitshinweise in **Kapitel 2**: Sicherheit

	WARNUNG
	Verletzungsgefahr bei Montage, Installation, Erstinbetriebnahme Es kann zu Quetschungen und Scheren von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteilen (z.B. Schaulochdeckel) kommen. Es kann durch Eingreifen in das Getriebeinnere oder bei der Montage an sich bewegenden Bauteilen zu Quetschungen und Scherungen von Gliedmaßen kommen. Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen. - Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel. - Tragen Sie PSA. - Lassen Sie die Montage, Installation und in Betrieb nehmen nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen. - Unterrichten Sie alle mit der Montage, Installation und in Betrieb nehmen beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2**: Sicherheit) **Halten Sie Sicherheitsabstände ein!**

	WARNUNG
	Verletzungsgefahr, Umweltschaden **Verletzungen durch austretende Dämpfe** Beim Öffnen des mit Korrosionsschutzinhibitor (VCI) konservierten Getriebes können leicht entzündliche Dämpfe entweichen. -Vermeiden Sie in der Umgebung heiße Gegenstände, offene Flamme, Feuer und Funken.

⚠	**VORSICHT** **Verletzungsgefahr durch schädliche Dämpfe bzw. Flüssigkeiten.** Beim Befüllen mit Öl besteht die Möglichkeit durch das Einatmen und die Berührung mit Schmierstoffen bzw. anderen Medien verletzt zu werden. Beim Öffnen der Schaulochdeckel bzw. den Arbeiten an der ÖVA kann es zu einer Gefährdung durch entweichende schädliche bzw. brennbare Gase und Austreten von Schmierstoffen kommen. Bei Arbeiten an mit Öl gefüllten Bauteilen z.B. den Rohrleitungen und im Getriebeinneren kann es zum Kontakt der Haut mit aggressiven Medien kommen. -Beachten Sie das Sicherheitsdatenblatt der eingesetzten Medien. Tragen Sie bei Ölwechselarbeiten geeignete persönliche Schutzausrüstung (Schutzbrille, Schutzhandschuhe). - Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).

⚠	**VORSICHT** **Verletzungsgefahr durch gefährlichen Dampf bzw. Flüssigkeiten.** Bei der Entfernung der Außenkonservierung besteht die Möglichkeit durch das Einatmen und die Berührung mit Gefahrstoffen verletzt zu werden. Der Umgang mit Lösungsmitteln unterliegt den Vorschriften der Gefahrenstoff-Verordnung, der EG-Verordnung 1907/2006 sowie den EG- Richtlinien 2010/75/EU und 89/656/EWG. -Tragen Sie bei Arbeiten mit Lösungsmitteln geeignete persönliche Schutzausrüstung (Schutzbrille, Schutzhandschuhe, Atemschutz). - Lassen Sie Die Arbeiten durch geeignete Fachkräfte durchführen. - Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).

8.2 Montage und Installation

!	**HINWEIS** Stellen Sie zu Beginn der Montagearbeiten ausreichende Lastaufnahmeeinrichtungen, Anschlagmittel etc. zur Verfügung. Die Tragfähigkeit der Lastaufnahmemittel muss mindestens dem Getriebegewicht entsprechen. Hinweise zum Transport entnehmen Sie bitte dem **Kapitel 5**

Die Montage hat mit großer Sorgfalt durch Fachkräfte zu erfolgen.

1. Entfernen Sie eventuell vorhandenes Verpackungsmaterial, vor Einbau des Getriebes (z.B. Klebebänder und Schutzkappen).
2. Entfernen Sie die Außenkonservierung mit einem geeigneten Lösungsmittel.

!	**ACHTUNG** **Sachschaden** **Beschädigung der Wellenenden bei der Entkonservierung.** **Das Entfernen der Konservierung darf keinesfalls durch Abschmirgeln geschehen.** Durch Abschmiergeln wird die Oberfläche der Wellenenden zerstört und die Verbindung in die weitere Anlage kann zu Problemen führen.

3. Nach längerer Einlagerung des Getriebes vor Inbetriebnahme entfernen Sie die Schaulochdeckel und Dichtungen durch lösen der Befestigungsschauben und bewahren Sie diese zur Wiederverwendung sicher auf.
4. Führen Sie eine Sichtkontrolle der Innenteile auf Korrosion durch.

!	**ACHTUNG** **Sachschaden** Bei bestehenden Korrosionsschäden wenden Sie sich unbedingt an die Pekrun-Serviceadresse **Kapitel 1.6** dieser BA. Um weitere Schäden zu vermeiden, darf das Getriebe nicht in Betrieb genommen werden.

5. Verschließen Sie die Schaulochöffnungen wieder mit den vorhandenen Deckeln, Dichtungen und Schrauben. Die Dichtflächen müssen sauber und unbeschädigt sein.
6. Entfernen Sie die Innenkonservierung (wenn vorhanden).

HINWEIS

Grundsätzlich erfolgt die Innenkonservierung durch den Einsatz eines Korrosionsschutzöls mit VCI-Konzentrat beim Probelauf in unserem Haus.

In der Regel kann eine Reinigung / Spülung vor Inbetriebnahme entfallen. (Beachte **Kapitel 6.4.1**)

Prüfen Sie, ob das Getriebe vor Inbetriebnahme gespült werden muss:
- welches Konservierungsmittel wurde benutzt
- sind Konservierungsmittel- Restmengen im inneren des Getriebes vorhanden.
Beachten Sie **Kapitel 6.6**.

Im Zweifel halten Sie Rücksprache mit. Pekrun.
*(Serviceadresse **Kapitel 1.6**)*

8.2.1 Aufstellung des Getriebes

HINWEIS

Stellen Sie das Getriebes auf einem ebenen, sicheren, möglichst starren Fundament auf.

Für die maximale Abweichung der Plan- und Ebenheit der Grundplatte (Getriebeauflagefläche) empfehlen wir die Anlehnung an Toleranzklasse IT 7 nach DIN EN ISO 286-1. Die maximale Abweichung darf 0,1 mm pro 1 m nicht übersteigen. Dies verhindert eine Verformung im Wellenstrang.

Verwenden Sie zur sicheren Befestigung nur Schrauben, die der Anzahl und Größe der in der Maßzeichnung angegebenen Schraubenlöcher entsprechen.

Beachten Sie die Aufstellbedingungen unter **Kapitel 7**.

ACHTUNG

Sachschaden

Beschädigungen durch ungenaues Ausrichten möglich.

Eine Fehlausrichtung kann z.B. folgende Getriebeproblemen verursachen:

- Verklemmung der Lager
- nicht ausreichender Zahnflankenkontakt
- verringerte Lebensdauer
- große Schwingungen

Achten Sie darauf, dass die Wellen des Getriebes und der Arbeitsmaschine bei Betriebsbedingungen genau zueinander fluchten.

Die Verwendung von elastischen Kupplungen macht das Ausrichten nicht überflüssig

Bei starrer Getriebemontage müssen die Anschlussflansche der Rund- und Planlaufgenauigkeit der DIN SPEC 42955 entsprechen.

Die Ausrichtung von An- und Abtrieb hat je nach der Ausgleichsqualität der Übertragungselemente bezogen auf den Fluchtfehler zu erfolgen.

Gehen Sie wie folgt vor:

- Reinigen Sie vor dem Aufstellen des Getriebes die Auflageflächen am Getriebe und Fundament.
- Gleichen Sie Unebenheiten des Fundaments durch Blechzwischenlagen sorgfältig aus, um eine Verspannung des Gehäuses mit Sicherheit zu vermeiden.
- Nach Ausrichtung des Getriebes mit einer Wasserwage o.ä., montieren Sie die in der Maßzeichnung angegebenen Stifte.
- Bringen Sie, wenn nötig, seitliche Anschläge gegen Verschiebung des Getriebes an.

8.2.2 Montage von Kupplungen und weiteres Zubehör

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch starke Schläge und Stöße möglich.

Das Auftreiben durch starke Schläge oder Stöße ist unzulässig, da hierdurch die Lager, Sicherungsringe und dergleichen beschädigt würden.

-Beim Aufsetzten von Kupplungen, Scheiben, Zahnräder, Kettenräder o.ä., ziehen sie diese mit Hilfe der Gewindezentrierungen an den Wellenenden auf.

-Halten Sie die bei der Bestellung getroffenen Vereinbarungen für andere Befestigungsarten wie z.B. wie das Fügen durch Erwärmen der Kupplung ein.

Kupplung:

Reinigen Sie die Wellenenden sowie die Kupplungsteile vor Beginn der Montage sorgfältig.

Sichern Sie Kupplungen gegen axiales Verschieben.

HINWEIS

Beachten Sie bei Montage von Kupplungen die speziellen Betriebsanleitungen des Herstellers.

Getriebe mit Hohlwellenausführung:

Für *Getriebe mit Hohlwellenausführung* gelten die gleichen Fügebedingungen wie für das Aufsetzen von Kupplungen.

Ausrichten von Antriebsaggregaten bzw. -motoren:

Richten Sie das *Antriebsaggregat* möglichst exakt zur Mittelachse der Eingangswelle des Getriebes aus und setzen Sie diesen fest. Die Lebensdauer der Wellen, Lager und Kupplungen hängt von der Ausrichtgenauigkeit der Wellen zueinander ab.

	HINWEIS
	Die für das Ausrichten max. zulässigen Werte für Axial-, Radial- und Winkelversatz sind abhängig von der Kupplungsgröße, des Kupplungstyps und der Drehzahl. Entnehmen Sie diese der BA des Kupplungsherstellers.
	Beachten Sie bei der Montage des Antriebsaggregates bzw. des Motors die spezielle Betriebsanleitung des Herstellers.
	Wenn in der Maßzeichnung zulässige Querkräfte eingetragen sind, müssen sie innerhalb der zulässigen Grenzen bleiben.

8.2.3 Montage von Verrohrung

Bei Getrieben mit vorgesehener Ölversorgungsanlage müssen eventuell demontierte Rohrleitungen anhand des beigefügten Rohrleitungsplans montiert werden.

Gehen Sie wie folgt vor:

- Entfernen Sie alle Stopfen und Blindflansche. (wenn vorhanden)
- Kontrollieren Sie die Rohrleitung innen auf Sauberkeit. Wenn nötig reinigen Sie diese vor der Montage sorgfältig.
- Montieren Sie die Rohrleitung entsprechend dem beiliegenden Rohrleitungsplan.
- Ziehen Sie bei der Aufstellung der Getriebe die Flanschverschraubungen mit dem entsprechenden Drehmoment an.
- Gleichen Sie geringe Ausrichtfehler in den Ölleitungen mit einem Gummikompensator aus.
- **Rohrleitungen dürfen bei der Montage nicht verspannt werden.**
- Stützen Sie gegebenenfalls die Rohrleitungen mit geeigneten Rohrstützen ab.

	ACHTUNG
	Sachschaden **Beschädigung durch Verschmutzung in den Rohrleitungen möglich.** Lager und Verzahnungen können durch Verschmutzungen in den Rohrleitungen beschädigt werden. Beizen Sie sorgfältig alle Rohrleitungen die auf der Baustelle durch Schweißen angepasst wurden. **Bei der Montage der Anschlussverrohrung darf kein Schmutz in das Getriebe gelangen.**

8.2.4 Abschließende Arbeiten

Gehen Sie wie folgt vor:

- Nachdem Sie das Getriebe aufgestellt haben, kontrollieren Sie alle Schraubenverbindungen auf festen Sitz.
- Stellen Sie sicher, dass sich die Ausrichtung durch das Anziehen der Befestigungselemente nicht verändert hat.
- Überprüfen Sie anhand der Geräteliste und Zeichnungen, ob alle für den Transport entfernten Instrumente wieder angebaut sind.
- Überprüfen Sie die korrekte und sichere Montage von externen Versorgungsleitungen (z.B. Hydraulikleitungen zum Schaltzylinder / Wasserleitungen zum Kühler / Anschlussleitungen einer Ölversorgungsanlage) (wenn anwendbar). (vom Betreiber vorzusehen).
- Überprüfen Sie die Installation der Überwachungseinrichtungen. (Verriegelungen) (wenn vorhanden)
- Kontrollieren Sie die Schutzeinrichtung auf richtigen und festen Sitz.

8.3 Erstinbetriebnahme

8.3.1 Maßnahmen vor Erstinbetriebnahme

	ACHTUNG
	Sachschaden, Umweltschäden **Schäden durch auslaufendes Öl möglich.** In Fällen abnormer Einbaulagen, bei denen die Ölfüllung über der Schaulochöffnung steht, können Deckel und Schrauben mit einem Dichtungsmittel abgedichtet sein. Ein Abnehmen des Schaulochdeckels ist in diesem Falle erst nach Absenken des Ölpegels unter die Schaulochöffnung gestattet, da sonst das Öl ausfließt. **Jedes Lösen des Schaulochdeckels macht die Abdichtung mit neuem Dichtungsmittel notwendig**. (Beim Einsatz von Dichtungen bzw. O-Ringen ist dies nicht erforderlich)
	Sachschaden **Beschädigung des Getriebes durch ungeeignetes Betriebsöl möglich.** Die Ölviskosität entnehmen Sie dem Typenschild oder der beigefügten Maßzeichnung. Dieser BA ist eine Schmierstofftabelle beigefügt, die eine Pekrun- Empfehlung für die richtige Schmierstoffauswahl enthält (siehe auch **Kapitel 8.4**). -Zur Schmierung der Getriebe dürfen nur nachweislich gleichwertige Schmierstoffe verwendet werden. -Verwenden Sie nur unbenutzte Öle, die frei von Verunreinigungen sind. -Füllen Sie Öl nicht direkt aus Fässern in das Getriebe ein. -Stellen Sie sicher, dass der Wasseranteil im Öl nicht zu hoch ist. Dies kann zur Schaumbildung im Betrieb führen. Normal-Wert für frisches Öl <250 ppm H_2O. *Bei Zweifeln halten Sie Rücksprache mit dem Ölhersteller bzw. Pekrun*. **Beschädigung des Getriebes durch Schmutz im Öl möglich.** Verwenden Sie nur Öle deren Reinheit mindestens der von Pekrun empfohlene Reinheitsklasse entspricht. (siehe **Kapitel 8.4**) Beim Einfüllen bzw. bei der Montage der Anschlussverrohrung darf kein Schmutz in das Getriebe gelangen. Verwenden Sie zum Befüllen einen Einfüllfilter. (Filterfeinheit max. 25 µm)
	Sachschaden **Beschädigung des Getriebes durch internen Überdruck möglich.** Beim Betreiben des Getriebes ohne montierte Belüftungsfilter kann es zu Schäden an den Wellendichtringen kommen. Achten Sie bei Inbetriebnahme auf korrekt montierte Belüftungsfilter. Beachten Sie die mitgelieferte Maßzeichnung.

Gehen Sie wie folgt vor:

1. Schrauben Sie die Ölablassschraube heraus bzw. öffnen Sie den Ölablasshahn, um Reste des Einlauföls aus dem Getriebe in ein geeignetes Gefäß abzulassen und zu entsorgen. (wenn anwendbar)
2. Beseitigen Sie eventuell vorbeifließendes Öl mit einem Ölbindemittel. Beachten Sie bei der Entsorgung die jeweils gültigen Rechtsvorschriften.

Bei Getrieben mit Tauchschmierung bzw. integrierter ÖVA:

3. a)

- Lösen und entfernen Sie den Belüftungsfilter bzw. die Verschlußschraube an der Öleinfüllöffnung oder die Schaulochdeckelöffnung.(wenn anwendbar)
- Legen Sie die Schrauben bzw. Deckel und Dichtungen ab und legen Sie diese zur Wiederverwendung bereit.
- Füllen Sie Öl, entsprechend der vorgeschriebenen Viskosität, durch die Schaulochöffnung oder Öleinfüllbohrungen am Getriebe und an den Rohrleitungen in das Getriebe ein. Beachten Sie hierbei die Angaben in der auftragsabhängig erstellten Maßzeichnung.(wenn anwendbar)

HINWEIS

Ausstattung mit Ölpeilstab: Der angebrachte Ölpeilstab hat 2 Markierungen, zwischen denen sich der Ölstand stets halten soll. Füllen Sie das Öl bis zur oberen Markierung ein.

Ausstattung mit Ölschauglas bzw. Ölauge: Füllen Sie Öl bis zur Mitte des Schauglases ein.

Warten Sie beim Einfüllen des Öles genügend lang.

Das Öl sollte sich gleichmäßig verteilen und der endgültige Ölstand soll erkennbar sein.

Achten Sie hier besonders bei mehrstufigen Getrieben mit untereinander verbundenen Ölräumen auf eine gleichmäßige Verteilung, da sonst eventuell zu wenig Öl eingefüllt würde.

ACHTUNG

Sachschaden

Beschädigung des Getriebes oder der Ölpumpe durch Trockenlaufen möglich

Bei der Erstinbetriebnahme und bei Wieder-Inbetriebnahme nach längerem Stillstand kann es zu Sachschäden durch Trockenlaufen kommen, wenn sich die Ölpumpe oberhalb des Ölstands des Getriebes befindet oder die Beaufschlagung mit Schmieröl noch nicht ausreichend vorhanden ist.

Befüllen Sie die Ölpumpe mit Betriebsöl. Überwachen Sie den Öldruck. Beachten Sie die mitgelieferte Betriebsanleitung der Ölpumpe.

Befüllen Sie auch alle Öleinfüllöffnungen in der Rohrleitung. (wenn vorhanden) (Siehe Maßzeichnung)

	ACHTUNG
!	**Sachschaden** **Beschädigung des Getriebes durch falschen Ölstand möglich.** Der Ölstand (wenn anwendbar) ist mittels der Ölstandsüberwachung zu kontrollieren. *Ausstattung mit Ölpeilstab:* Der Ölstand soll mindestens die untere Markierung des Ölmessstabes oder Ölschauglases erreichen *Ausstattung mit Ölschauglas bzw. Ölauge:* Der Ölstand soll mindestens an der unteren Kante des Ölschauglases sichtbar sein. Die auf dem Typenschild, der Maßzeichnung, den technische Daten bzw. in anderen Druckschriften angegebene Ölmenge gilt als **Anhaltswert.** **Maßgebend für die einzufüllende Ölmenge ist nur die Ölstandsmarkierung am Ölschauglas bzw. am Ölpeilstab oder die Ölüberlauföffnung des Getriebes.** Bei Verwendung eines Zusatz- Ölbehälters ist das daran befindliche Ölschauglas bzw. der Ölpeilstab maßgebend. Der Ölstand ist von Zeit zu Zeit bei Stillstand des Getriebes und abgekühltem Öl zu kontrollieren. **Er darf niemals unter die untere Markierung am Ölpeilstab bzw. untere Kante des Ölschauglases absinken.**

Oder

Bei Getrieben mit Anschluss an eine externe ÖVA:

3. b)

- Lösen und entfernen Sie die Blindflansche samt Dichtungen bzw. entfernen Sie die für den Versand angebrachten Verschlussstopfen von den Getriebe- Rohranschlüssen.
- Montieren Sie die Anschlussverrohrung zur externen Ölversorgungsanlage und stellen Sie vor Inbetriebnahme sicher, dass die vorhandene externe Ölversorgungsanlage funktionstüchtig angeschlossen ist und in Betrieb ist. (wenn anwendbar)

4. Beseitigen Sie eventuell vorbei fließendes Öl mit einem Ölbindemittel.

8.3.2 Getriebe mit angebauter Rücklaufsperre bzw. geflanschter Ölpumpe

HINWEIS

Beachten Sie die speziellen Betriebsanleitungen, Pläne, Zeichnungen und Layouts der verschiedenen Komponenten und Aggregate. Diese sind dieser BA im Anhang beigefügt (wenn im Lieferumfang enthalten).

Für im Bauraum verbundene Rücklaufsperren und Ölpumpen erfolgt die Schmierung über das Getriebe.

Für Rücklaufsperren deren Bauraum vom Getriebe getrennt ist, füllen Sie vor Inbetriebnahme Öl bis Mitte Ölschauglas ein. Beachten Sie hierbei die Schmierstoffvorgaben des Herstellers.

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl oder falschen Ölstand möglich.

Die Schmierung der Rücklaufsperre erfolgt mit Öl gemäß den Angaben des Herstellers.

Der Ölstand ist von Zeit zu Zeit bei Stillstand des Getriebes und abgekühltem Öl zu kontrollieren.

Er darf niemals unter die untere Markierung absinken.

ACHTUNG

Sachschaden

Zerstörung des Getriebes oder von Bauteilen durch falsche Drehrichtung möglich.

An das Getriebe angebaute Rücklaufsperre und angeflanschte Ölpumpen (außer Universalpumpen) lassen nur eine Drehrichtung zu. Durch falsche Drehrichtung können diese zerstört werden.

Prüfen Sie bei der Aufstellung des Getriebes vor dem Ankuppeln des Antriebsaggregates und der Rücklaufsperre bzw. Ölpumpe die Übereinstimmung der Drehrichtung.

Die Drehrichtung entnehmen Sie im **Kapitel 3** den technischen Daten, dem Drehrichtungspfeil am Getriebe oder der beiliegenden verbindlichen Maßzeichnung.

Ist in den mitgelieferten technischen Unterlagen keine Drehrichtung vorgegeben, kann das Getriebe grundsätzlich in beiden Drehrichtungen betrieben werden.

Der Drehrichtungspfeil an der Getriebeeingangswelle muss mit der Drehrichtung des Antriebsaggregates bzw. des Motors übereinstimmen

8.3.3 Getriebe mit Kühlschlange/Wasser-Ölkühler

HINWEIS

Beachten Sie die speziellen Betriebsanleitungen, Pläne, Zeichnungen und Layouts der verschiedenen Komponenten und Aggregate. Diese sind dieser BA im Anhang beigefügt (wenn im Lieferumfang enthalten).

HINWEIS

Bei Getrieben mit eingebauter Kühlschlange und solchen mit Ölkühler sind vom Betreiber die erforderlichen Wasseranschlüsse herzustellen.

Verwenden Sie möglichst kalkarmes Wasser bzw. beachten Sie die Spezifikation zum Auftrag.

Die Durchlaufrichtung des Wassers ist bei Kühlschlangen beliebig.

ACHTUNG

Sachschaden

Bruchgefahr durch Überdruck möglich.

Durch zu hohen Wasserdruck in den Leitungen kann es zum Bruch am Wasserkühler kommen.

Der Wasserüberdruck darf max. 10 bar betragen (bzw. wie in den Auftragsunterlagen spezifiziert).

Gehen Sie wie folgt vor:

- Entfernen Sie vor Anschluss der Kühlschlange die Anschlussmuffen der Kühlschlange.
- Spülen Sie eventuelle Verunreinigungen aus.
- Installieren Sie eine Kühlwasserzufluss- und –abflussleitung.

HINWEIS

Die Lage der Anschlüsse entnehmen Sie der beigefügten Maßzeichnung und dem Rohrleitungsplan.

- Öffnen Sie für die Inbetriebnahme die Absperrventile für den Kühlmittelzufluss- und -abfluss vollständig.

HINWEIS

Die Wasser-Durchflussrichtung für separat aufgestellte Ölkühler ist entsprechend den Angaben auf den Kühlern vorzusehen.

ACHTUNG

Sachschaden

Beschädigung durch gefrorenes Kühlwasser möglich.

Bei Frostgefahr und längerem Stillstand des Getriebes ist das Kühlwasser abzulassen, Wasserreste sind mittels Druckluft auszublasen.

8.3.4 Getriebe mit Ventilation durch einen Kühlflügel

Kühlflügel samt Schutzhaube sind auf Dauer am Getriebe montiert. Die Schutzhaube verhindert eine unbeabsichtigte Berührung des Kühlflügels und hat außerdem die Aufgabe, die Kühlluft entlang der Oberfläche des Getriebes zu leiten.

GEFAHR

Lebensgefahr durch rotierende und/oder bewegliche Teile

Gefahr von rotierenden Bauteilen erfasst und eingezogen zu werden.

-Sichern Sie alle rotierenden Antriebsteile wie Kühlflügel gegen Berührung.

-Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen)

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch übermäßige Erwärmung möglich.

Bei Betrieb ist darauf zu achten, dass sowohl die Lufteintrittsöffnungen sowie Austrittsöffnungen ständig frei sind, andernfalls ist eine Kühlung nicht gewährleistet.

8.3.5 Getriebe mit Ölheizung

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch zu kaltes Betriebsöl möglich.

Eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang ist bei zu kaltem Getriebeöl (Abkühlen des Öles in der Stillstandsperiode auf Temperaturen nahe dem Stockpunkt) nicht gewährleistet.

Das Getriebeöl ggf. auch das Öl im Zusatzbehälter muss vor Inbetriebnahme auf ca. + 10°C aufgeheizt werden.

Sehen Sie eine Ölaufheizung durch elektrische Heizgeräte vor.

Ölheizung mit elektrischem Heizelement:

Um die Ölfüllung auf einer bestimmten Temperatur zu halten, überwachen Sie die Heiztemperatur wie folgt durch:

- Kontaktthermometer

  Über die "Min und Max Kontakte" wird die Heizung über ein Relais zu- und abgeschaltet.

oder

- Widerstandsthermometer (Pt100)
- Thermostate
- Heizkörper mit direkter thermostatischer Regelmöglichkeit

GEFAHR

Lebensgefahr beim Betrieb in explosionsfähiger Atmosphäre!

Die normale Ausführung der Geräte ist nicht für explosionsgefährdete Anlagen verwendbar.

Beim Einsatz in explosionsfähiger Atmosphäre ist eine Umrüstung nach Rücksprache mit dem Hersteller erforderlich.

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch Überhitzung des Heizkörpers möglich.

Stellen Sie sicher das das Heizelement im Betrieb vollständig vom Öl abgedeckt ist, weil es sonst zu einer Überhitzung kommen kann.

Sehen Sie eine Temperaturbegrenzung durch ein Thermostat, Widerstands- oder Kontaktthermometer vor:

Abschaltung der Heizung bei >40°C

HINWEIS

Alle Elektrogeräte haben mindestens eine Schutzklasse IP 54 nach DIN EN 60529:2000-09

	HINWEIS
	Die elektrische Verdrahtung der Heizung und Temperaturüberwachung führen Sie nach den Angaben der speziellen Betriebsanleitung für diese Instrumente durch. Diese sind dieser BA im Anhang beigefügt (wenn im Lieferumfang enthalten).

8.3.6 Getriebe mit weiteren Aufbaukomponenten

Die technischen Daten der Aufbaukomponenten entnehmen Sie der auftragsabhängig erstellten Geräteliste/Datenblätter.

	HINWEIS
	Die elektrischen Geräte zur Regelung und Steuerung verdrahten Sie entsprechend den Vorschriften der Gerätelieferanten. Für den Betrieb und die Wartung dieser Komponenten beachten Sie die beigefügten Betriebsanleitungen der Zulieferer.

8.3.7 Getriebe mit Schaltung

GEFAHR

Lebensgefahr durch rotierende und/oder bewegliche Teile

Gefahr von sich bewegenden Bauteilen erfasst und eingezogen zu werden.

-Sichern Sie alle außenliegenden beweglichen Teile wie z.B. Schaltzylinder gegen Berührung. Anschlussleitungen müssen sicher verlegt sein und dürfen nicht in den Gefahrenbereich von rotierenden und/oder beweglichen Teilen reichen.

-Bringen Sie eine entsprechende Schutzeinrichtung an (z.B. trennende Schutzeinrichtung nach DIN EN ISO 12100) oder stellen Sie sicher, dass diese Bereiche für Personal unzugänglich sind. (z.B. in nicht begehbaren Bereichen)

WARNUNG

Verletzung der Augen durch Herausspritzen von unter Druck stehenden Flüssigkeiten

Beim Betrieb eines Getriebes mit hydraulisch betätigter Schaltung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen.

-Tragen Sie geeignete Schutzkleidung und Augenschutz.

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch Schaltvorgang im Betrieb möglich.

Das Getriebe darf nur im Stillstand geschaltet werden.

Gleichzeitig muss das Getriebe lastfrei sein. An- und Abtrieb müssen frei drehbar sein.

Eine Betätigung der Schaltzylinder darf nur möglich sein wenn keine Rotation der Wellen vorhanden ist und kein Drehmoment an den Wellen anliegt.

Es ist eine Verriegelung vorzusehen.

Der Zylinderdruck muss während des gesamten Schaltvorgangs bis zum Erreichen der jeweiligen Schaltposition aufrechterhalten bleiben.

Wenn erforderlich verändern Sie die Position der Schaltverzahnung durch Tippbetrieb des Antriebsaggregates, um das Einfädeln der Schaltverzahnung zu erleichtern.

Erst nachdem das vollständige Einlegen des Ganges in seine endgültige Stellung erfolgt ist darf das Antriebsaggregat freigegeben werden.

[pekrun]

Montage und Installation, Erstinbetriebnahme

Für die einwandfreie und sichere Funktion des Schaltvorgangs müssen vor Inbetriebnahme folgende Maßnahmen erfolgen:

Für alle schaltbaren Pekrun Getriebe:

- Stellen Sie sicher, dass eine Verriegelung vorgesehen ist, die gegen unbeabsichtigtes Anfahren während des Schaltvorgangs schützt.

Für Pekrun Getriebe mit Handschaltung:

Getriebe mit Handschaltung verfügen über einen Schalthebel, der mit einem Arretierknopf verriegelt ist.

Beim Schaltvorgang gehen Sie wie folgt vor:

- Entriegeln Sie den Arretierknopf.
- Bringen Sie den Schalthebel in die neue Position.
- Rasten Sie den Arretierknopf wieder vollständig in die vorgesehene Bohrung ein.

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch übermäßige Kräfte beim Schaltvorgang möglich

Nach dem Stillstand des Getriebes können die Zähne genau übereinanderstehen und kein Schaltvorgang möglich sein.

Üben Sie auf keinen Fall übermäßige Kräfte auf den Schalthebel aus, hierdurch kann es zu Beschädigungen der Schaltung und der Verzahnung kommen.

Verändern Sie die Zahnstellung durch Drehen der Antriebswelle von Hand. Hierdurch wird das Einrasten in den nächsten Gang erleichtert.

Für Pekrun Schaltgetriebe mit Schaltzylindern:

- Montieren sie die benötigten Hydraulik- bzw. Pneumatikleitungen zu den Schaltzylindern und stellen Sie sicher, dass diese sicher verlegt sind. (Verantwortung des Betreibers)

Die Endlagenüberwachung der Schaltzylinder erfolgt in der Regel kontaktlos durch Endschalter. Diese werden (wenn im Lieferumfang enthalten) von Pekrun am Getriebe montiert.

- Schließen Sie die Endschalter elektrisch an und integrieren Sie diese in die Steuerung.

HINWEIS

Die elektrischen Geräte zur Regelung und Steuerung verdrahten Sie entsprechend den Vorschriften der Gerätelieferanten.

Für den Betrieb und die Wartung dieser Komponenten beachten Sie die beigefügten Betriebsanleitungen der Zulieferer.

8.3.8 Hinweise zur Startphase von Antriebsmotoren für Getriebe

HINWEIS

Beachten Sie die spezielle Betriebsanleitung des Motor- Herstellers.

Antrieb durch drehzahlgeregelte Motoren:

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch ungleichmäßigen Anlauf oder Resonanzen möglich.

Durch stoßartigen Drehmomentanstieg kann es zum Aufschlagen von Zahnflanken im Getriebe kommen.

Die Drehzahlregelung zieht als Konsequenz nach sich, dass ganze Frequenzbereiche (im Hinblick auf Resonanzen) kritisch sein können. Hieraus können systembedingte unliebsame Resonanzeffekte resultieren.

Daher ist eine sehr gute Anpassung der Parameter, z.B. im Frequenzumformer, an den Prozess erforderlich.

Gleichzeitiger Antrieb durch 2 Motoren:

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch asynchron laufende Antriebsmotoren möglich.

Bei gleichzeitigem Antrieb eines Getriebes durch 2 oder mehr Motoren kann es zu Schäden an der Verzahnung kommen, wenn die Motoren asynchron laufen.

Stellen Sie den synchronen Lauf der Antriebsmotoren durch geeignete Maßnahmen sicher.

8.3.9 Erstanlauf bei Getrieben mit Fettschmierung

Für besondere Betriebsverhältnisse werden die Getriebe mit Fettschmierung vorgesehen. Vom Abnahmeprüfstand erhalten die Getriebe ihre Fettfüllung und gelangen auch mit dieser zur Auslieferung.

Die Inbetriebnahme eines solchen Getriebes kann erfolgen, sobald sich die Fettfüllung durch Nachprüfung an der Füllstand-Kontrollschraube bestätigt hat.

In Sonderfällen kann die Auslieferung auch ohne Fettfüllung erfolgen. Hier muss die Fettfüllung vor dem Erstanlauf vom Betreiber erfolgen.

Das Antriebsaggregat kann direkt gestartet werden, wenn alle Maßnahmen ab Pkt. 8.3.1 durchgeführt und beachtet wurden.(wenn anwendbar)

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch ungeeignetes Schmierfett möglich.

Bereits bei der konstruktiven Auslegung werden Art der Schmierung (Öl- oder Fettschmierung, Tauch- oder Druckschmierung), Ölzähigkeit und Ölmenge festgelegt.

Wird das Getriebe für einen anderen Einsatzfall verwendet, müssen ggf. Anpassungen getroffen werden z.B. Änderung der Fettqualität.

Halten Sie Rücksprache mit dem Schmierfett- Hersteller oder Pekrun wenn der Betrieb von den zwischen Besteller und Pekrun festgelegten Temperaturbereichen (wie im Leistungs- und Liefervertrag vereinbart) abweicht.

Die Fettschmierung ist für die Lebensdauer des Getriebes bestimmt.

Bei vorzeitigem Wechsel ist Rücksprache mit dem Hersteller erforderlich

HINWEIS

Wichtige technische Daten finden Sie auf den Typenschild, in der Maßzeichnung und dem technischen Datenblatt, welchen auftragsabhängig erstellt wird. (siehe Anhang)

8.3.10 Erstanlauf bei Getrieben mit Tauchschmierung

Das Antriebsaggregat kann direkt gestartet werden, wenn alle Maßnahmen ab Pkt. 8.3.1 durchgeführt und beachtet wurden.

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch zu kaltes Betriebsöl möglich.

Starten Sie das Antriebsaggregat nicht bei zu kaltem Getriebeöl.

Eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang ist bei zu kaltem Getriebeöl nicht gewährleistet.

Das Getriebeöl soll im Normalfall eine Mindesttemperatur von 10°C (50°F) haben.

Das Getriebeöl ggf. auch das Öl im Zusatzbehälter muss vor Inbetriebnahme auf ca. + 10°C (50°F) aufgeheizt werden.

Für andere Einsatzfälle müssen ggf. Anpassungen getroffen werden z.B. Änderung der Ölviskosität. Der Betrieb darf nur in den zwischen Besteller und Pekrun festgelegten Temperaturbereichen, wie im Leistungs- und Liefervertrag vereinbart wurde, erfolgen.

8.3.11 Erstanlauf bei Getriebe mit Öldruckschmierung

Dies gilt sowohl für Getriebe mit einer angebauten Motorölpumpe als auch für Getriebe, die an eine externe Ölversorgungsanlage (vom Endkunden bereitgestellt) angeschlossen sind.

WARNUNG

Verletzung der Augen von unter Druck stehenden Flüssigkeiten

Beim Betrieb eines Getriebes mit einer Öldruckschmierung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen.

-Beachten Sie die Montagehinweise unter **Pkt. 8.2.3**.
-Tragen Sie geeignete Schutzkleidung und Augenschutz.

HINWEIS

Die erforderlichen Betriebsparameter (Mindestschmieröldruck, erforderliche Öldurchflussmenge) entnehmen Sie bitte dem **Kapitel 3** dieser BA, der Maßzeichnung oder dem auftragsabhängig erstellten technischen Datenblatt (im Anhang).

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch zu kaltes Betriebsöl möglich.

Starten Sie das Antriebsaggregat nicht bei zu kaltem Getriebeöl.

Eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang ist bei zu kaltem Getriebeöl nicht gewährleistet.

Das Getriebeöl muss eine Mindesttemperatur von 10°C (50°F) haben.

Für andere Einsatzfälle müssen ggf. Anpassungen getroffen werden z.B. Änderung der Ölviskosität. Der Betrieb darf nur in den zwischen Besteller und Pekrun festgelegten Temperaturbereichen, wie im Leistungs- und Liefervertrag vereinbart wurde, erfolgen.

Öltemperatur ≥10°C (50°F)

Gehen Sie wie folgt vor:

- Führen Sie alle Maßnahmen ab Pkt. 8.3.1 durch.
- Beaufschlagen Sie das Getriebe über die Ölzulaufanschlüsse durch die externe ÖVA mit Schmieröl.

  oder

  Starten Sie die Motorölpumpe. (Beachten Sie die BA des Pumpenherstellers im Anhang)
- Überprüfen Sie ob die erforderlichen Betriebsparameter eingehalten werden.
- Nach mindestens 10 Minuten Vorlaufzeit starten Sie das Antriebsaggregat.

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch unzureichende Schmierung möglich.

Starten Sie das Antriebsaggregat erst wenn alle vorgegebenen Betriebsparameter (Schmieröldruck, Ölzulaufmenge, Öltemperatur) eingehalten werden. Dies gewährleistet eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang.

Der Mindestschmieröldruck beträgt P min = 0,5 bar.

Die Vorschmierphase bewirkt, dass alle Lager und Verzahnungen sicher mit Öl versorgt werden.

Für andere Einsatzfälle müssen ggf. Anpassungen getroffen werden z.B. Änderung der Ölviskosität. Der Betrieb darf nur in den zwischen Besteller und Pekrun festgelegten Betriebsparametern, wie im Leistungs- und Liefervertrag vereinbart wurde, erfolgen.

HINWEIS

Für den Betrieb und die Wartung der Pumpe, der Filter sowie der Überwachungsinstrumente sind die im auftragsabhängig beigestellten Anhang angegeben Betriebsanleitungen zu beachten.

8.3.12 Erstanlauf bei Getriebe mit Ölversorgungsanlage

Dies gilt für Getriebe die eine separat aufgestellte ÖVA besitzen. Durch Aufstellung der ÖVA auch außerhalb von Gebäuden kann es zu extremen Umgebungstemperaturen kommen.

WARNUNG

Verletzung der Augen von unter Druck stehenden Flüssigkeiten

Beim Betrieb eines Getriebes mit einer Öldruckschmierung kann es zu Undichtigkeiten an Verbindungsstellen und hierdurch zum Herausspritzen von Öl kommen.

-Beachten Sie die Montagehinweise unter **Pkt. 8.2.3**.

-Tragen Sie geeignete Schutzkleidung und Augenschutz.

HINWEIS

Die erforderlichen Betriebsparameter (Mindestschmieröldruck, erforderliche Öldurchflussmenge) entnehmen Sie bitte dem **Kapitel 3** dieser BA, der Maßzeichnung oder dem auftragsabhängig erstellten technischen Datenblatt (im Anhang).

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch zu kaltes Betriebsöl möglich.

Starten Sie das Antriebsaggregat nicht bei zu kaltem Getriebeöl.

Eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang ist bei zu kaltem Getriebeöl nicht gewährleistet.

Das Getriebeöl muss eine Mindesttemperatur von 15°C (59°F) haben.

Für andere Einsatzfälle müssen ggf. Anpassungen getroffen werden z.B. Änderung der Ölviskosität. Der Betrieb darf nur in den zwischen Besteller und Pekrun festgelegten Temperaturbereichen, wie im Leistungs- und Liefervertrag vereinbart wurde, erfolgen.

Öltemperatur <5°C (<41°F)

ACHTUNG

Sachschaden

Beschädigung an der Pumpe durch zu kaltes Betriebsöl möglich.

Starten Sie das Motorpumpenaggregat nicht bei zu kaltem Getriebeöl.

Das Getriebeöl muss eine Mindesttemperatur von 5°C (41°F) haben.

Bei Temperaturen unter 5°C (<41°F) müssen vor dem Start der Ölpumpe sekundäre Heizmaßnahmen erfolgen, da die Ölpumpen in diesen Temperaturbereichen nicht mehr zuverlässig fördern kann und eine Beschädigung nicht auszuschließen ist.

Es ist eine Verriegelung vorzusehen, wonach die Ölpumpe erst bei Öltemperaturen von mehr als 5°C (>41°F) eingeschaltet werden kann.

- Wärmen Sie das Getriebe, die öführenden Bauteile und ggf. den Ölvorratsbehälter mit sekundären Heizmaßnahmen (z.B. Heizlüftern) gleichmäßig auf.
- Überprüfen Sie die Öltemperaturen an verschiedenen Stellen.

Öltemperatur ≥5°C (41°F) <15°C (59°F)

- Nach Erreichen der Mindesttemperatur von ≥5°C (≥41°F) starten Sie die Ölpumpe.
- Schalten Sie, wie unter Pkt. 8.3.5 beschrieben, die vorgesehene Heizung ein.

HINWEIS

Das Umwälzen des Öls bewirkt ein gleichmäßiges Aufheizen.

Öltemperatur ≥15°C (59°F)

Gehen Sie wie folgt vor:

- Starten Sie zunächst die Ölpumpe und lassen Sie diese mindestens 30 Minuten laufen bevor Sie das Antriebsaggregat starten.
- Überprüfen Sie ob die erforderlichen Betriebsparameter eingehalten werden.
- Danach kann das Antriebsaggregat gestartet werden.

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch unzureichende Schmierung möglich.

Starten Sie das Antriebsaggregat erst wenn alle vorgegebenen Betriebsparameter (Schmieröldruck, Ölzulaufmenge, Öltemperatur) eingehalten werden. Dies gewährleistet eine einwandfreie Schmierstoffversorgung speziell im Anlaufvorgang.

Der Mindestschmieröldruck beträgt P min = 0,5 bar.

Die Vorschmierphase bewirkt, dass alle Lager und Verzahnungen sicher mit Öl versorgt werden.

Für andere Einsatzfälle müssen ggf. Anpassungen getroffen werden z.B. Änderung der Ölviskosität. Der Betrieb darf nur in den zwischen Besteller und Pekrun festgelegten Betriebsparametern, wie im Leistungs- und Liefervertrag vereinbart wurde, erfolgen.

8.3.13 Maßnahmen nach Erstanlauf

	ACHTUNG
!	**Sachschaden** **Beschädigung am Getriebe möglich.** Setzen Sie das Getriebe sofort außer Betrieb, wenn die Lagertemperatur über den zulässigen Grenzwert steigt und Sie übermäßige Vibrationen oder unnormale Geräusche bemerken, um Getriebeschäden zu vermeiden. Wir empfehlen, in den ersten 12h bei Betrieb unter Last die Lagertemperaturen jede Stunde zu überprüfen. Dabei sollen die Lagertemperaturen im Leerlauf 75°C nicht überschreiten, unter Belastung max. 85°C.(wenn nicht anders im Leistung- und Liefervertrag festgelegt)

In der Anlaufphase soll das Getriebe möglichst für 12 Stunden **nicht** mit voller Belastung laufen. Ist der Lauf störungsfrei, kann die Belastung auf Volllast gesteigert werden. Dabei ist eine ständige Überwachung des Getriebes unerlässlich.

Gehen Sie wie folgt vor:

1. **in den ersten 6 Stunden: 50% der Last**
2. **von 6 bis 12 Stunden: 75% der Last**

Nach dem Erstanlauf des Getriebes nach ca. 12 Betriebsstunden führen Sie erste visuelle Kontrollen durch:

- Überprüfen Sie den Ölstand. (wenn anwendbar)
- Prüfen Sie das Getriebe und evtl. vorhandene Ölversorgungsanlage auf Dichtheit.
- Prüfen Sie alle Versorgungsleitungen (Hydraulik bzw. Wasser) und Anschlüsse auf Dichtheit.
- Prüfen Sie die Dichtheit der Wellenabdichtung.
- Prüfen Sie die Berührungsfreiheit der rotierenden Teile (Wellen, Kupplungen)
- Prüfen Sie die Berührungsfreiheit der beweglichen Teile (z.B. Schaltzylinder)
- Prüfen Sie alle Schutzeinrichtungen auf Funktionalität.

3. **nach 12 Stunden und nach Durchführung der Kontrollen: 100%, Volllast**

8.4 Schmierstoffempfehlung für Pekrun Getriebe

8.4.1 Anwendungsbereich

Diese Empfehlungen gelten nur für Pekrun- Getriebe der nachfolgend aufgeführten Typenreihen:

Stirnradgetriebe (außer Turbogetriebe),

Kegelradgetriebe (außer Mühlengetriebe),

Schneckengetriebe,

Planetengetriebe oder Kombinationen hieraus.

8.4.2 Schmierstoffempfehlung

In der Schmierstoffauswahltabelle sind eine Anzahl verschiedener Schmierstoffe entsprechend den Empfehlungen der Ölfirmen angegeben.

Die empfohlenen Öle durchlaufen die 12. Kraftstufe in der Verspannungsprüfmaschine nach DIN ISO 14635-1 ohne Umsprung in die Verschleißhochlage. Sie müssen der Anforderung der DIN 51517 Teil 3 (Schmieröle CLP) entsprechen.

Die angegebenen Öle sind legierte Mineralöle mit Wirkstoffzusätzen zur Erhöhung der Alterungsbeständigkeit und des Korrosionsschutzes, sowie zur Verbesserung des Verhaltens im Mischreibungsgebiet entsprechend der Kennzeichnung CLP nach DIN 51502.

Verwenden Sie für Pekrun- Getriebe nur Öle die, die oben genannten Qualitätsanforderungen erfüllen.

HINWEIS

Die Hinweise zur Ölgruppe und Ölviskosität auf Typenschildern, der Maßzeichnung und dem auftragsabhängigen technischen Datenblatt sind unbedingt einzuhalten.

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl möglich.

Maßgebend für die Ölauswahl ist stets die auf dem Typenschild des Getriebes angegebene Ölzähigkeit.

-Verwenden Sie zur Schmierung der Getriebe nur nachweislich gleichwertige Schmierstoffe. Verwenden Sie nur unbenutzte Öle, die frei von Verunreinigungen sind.

-Füllen Sie Öl nicht direkt aus Fässern in das Getriebe ein. Stellen Sie sicher, dass der Wasseranteil im Öl nicht zu hoch ist. Dies kann zur Schaumbildung im Betrieb führen.

Normal-Wert für frisches Öl <250 ppm H_2O.

(Bei Zweifeln halten Sie Rücksprache mit dem Schmierstoff-Hersteller/Lieferanten bzw. Pekrun.)

Sollen andere Öle als die vorgenannten zum Einsatz kommen, ist eine schriftliche Freigabe von Pekrun Getriebebau GmbH erforderlich. Eine Gewähr für die einwandfreie Eignung ausgewählter Ölsorten kann unsererseits nicht übernommen werden.

HINWEIS

Es ist Rücksprache mit Pekrun erforderlich, wenn bei der Bestellung der Hinweis unterlassen wurde, dass Umgebungstemperaturen unter 10°C (50°F), über 50°C (122°F) oder extreme Temperaturschwankungen oder Fremderwärmung des Getriebes auftreten.

In diesen Fällen müssen andere Ölzähigkeiten bzw. besondere Maßnahmen, wie Ölheizung der Ölkühlung vorgesehen werden.

Bei nachträglich veränderten Einsatzbedingungen ist eine schriftliche Freigabe, des zur Verwendung kommenden Schmierstoffes durch Pekrun, erforderlich.

8.4.3 Reinheitsklasse von Schmieröl

Für den Betrieb von Pekrun- Getrieben empfehlen wir Reinheitsklassen von -/18/14 nach ISO 4406/1999 (entspricht SAE-AS4059 Reinheitsklasse 9)

8.4.4 Schmierstofftabelle

Die Pekrun- Schmierstofftabelle wird ihnen zusammen mit dieser Betriebsanleitung zur Verfügung gestellt.

HINWEIS

Die neueste Revision der Pekrun- Schmierstofftabelle kann jederzeit unter der unter **Pkt.1.6** angegebenen Serviceadresse angefordert werden.

8.4.5 Wichtige Anwendungshinweise zur Schmierstofftabelle

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

Um optimale Schmiersicherheit zu gewährleisten, sollen Öle gleicher Art und Viskosität jedoch von unterschiedlichen Herstellern nicht gemischt werden.

Halten Sie Rücksprache mit dem Schmierstoff-Hersteller/Lieferanten.

Bei Grundölen der hier aufgeführten Wälzlagerfette handelt es sich um Mineralöle. Werden Polyglykolöle verwendet, muss auch das Fett auf das Polyglykolöl abgestimmt sein.

Öle auf Polyglykolbasis sind nicht mit Ölen auf Kohlenwasserstoffbasis – das heißt mit Mineralölen oder Polyalphaolefinen mischbar.

9 Bedienung

9.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

	HINWEIS
	Beachten Sie die Sicherheitshinweise in **Kapitel 2**: Sicherheit

9.2 Betriebsarten

- Leerlaufbetrieb

  Zum Einrichten und Probelauf.
- Produktionsbetrieb

  Betrieb der bestimmungsgemäßen Verwendung.

9.3 Spezielle Werkzeuge, Betriebsmittel, Materialien

Für den *Transport* benötigen Sie Lastaufnahmeeinrichtungen wie z.B. Ketten, Seile oder Hebebänder mit einer Mindesttragfähigkeit die dem Getriebegewicht entsprechen. Alle Lastaufnahmemittel müssen der Maschinenrichtlinie 2006/42/EG entsprechen.

Für die *Montage* benötigen Sie Handwerkzeuge wie z.B. Ringschlüssel, Drehmomentschlüssel usw. die der Größenordnung der eingesetzten Schrauben entsprechen.

Zum *Ausrichten und Messen* benötigen Sie Lineale, Wasserwaage, Messuhr, Fühlerlehre.

Für die *Getriebeschmierung* benötigen Sie geeignetes Öl entsprechend der beigefügten Pekrun- Schmierstofftabelle. Die Ölmenge entnehmen Sie dem Typenschild auf dem Getriebe.

Fundamentschrauben oder Ankerschrauben entsprechend der Größe der Ankerlöcher im Getriebefuß.

9.4 Inbetriebnahme

9.4.1 Inbetriebnahme nach einer planmäßigen Abschaltung

Getriebe mit Tauchschmierung:

Wenn das Getriebe nur kurzzeitig abgeschaltet war **(<1 Woche)** kann das Antriebsaggregat direkt wieder gestartet werden.

Getriebe mit Ölversorgungsanlage:

Bei kurzzeitig abgeschaltetem Getriebe **(<30 min)** gehen Sie wie folgt vor:

- Starten sie zunächst die Ölpumpe, um alle Lager und Zahnräder zu schmieren.
- Nach **ca. 10 min** Laufzeit der Pumpe kann das Antriebsaggregat gestartet werden.

9.4.2 Inbetriebnahme nach einem planmäßigen Stillstand

ACHTUNG

Sachschaden

Getriebeschaden durch Abschaltung der ÖVA.

Lassen Sie bei **kurzen Unterbrechungen** die Ölversorgungsanlage weiterlaufen.

Lassen Sie bei **längerem Stillstand** ebenfalls die Ölversorgungsanlage zunächst ca. 60 Minuten weiterlaufen. Damit vermeiden Sie einen Wärmestau.

Getriebeschaden durch Korrosion möglich.

Nehmen Sie das Getriebe bei **längeren Unterbrechungen (>1 Woche bis <6 Monate)** wöchentlich kurzzeitig in Betrieb um alle Innenteile mit Öl zu benetzen. Damit erhält das Getriebe für einen kurzen Zeitraum Korrosionsschutz.

Konservieren Sie das Getriebe bei einer **Außerbetriebsetzung** von mehr als **6 Monaten** wie in **Kapitel 6, Lagerbedingungen** beschrieben**.**

Getriebe mit Tauchschmierung:

Nach einem planmäßigen Stillstand **(>1 Woche bis <6 Monate)** des Getriebes gehen Sie wie folgt vor:

- Nehmen Sie das Getriebe wöchentlich kurzzeitig in Betrieb um alle Innenteile mit Öl zu benetzen.

- Das Antriebsaggregat kann direkt wieder gestartet werden.

Getriebe mit Ölversorgungsanlage:

Nach einem planmäßigen Stillstand **(>30 min bis <6 Monate)** des Getriebes gehen Sie wie folgt vor:

- Starten sie zunächst die Ölpumpe, um alle Lager und Zahnräder zu schmieren.
- Nach **ca. 10 min** Laufzeit der Pumpe kann das Antriebsaggregat gestartet werden.
- Bei einem Stillstand von **<6 Monate** ist wie unter **Pkt. 9.6** zu verfahren.

9.4.3 Wiederinbetriebnahme nach einem Not-Aus

ACHTUNG

Sachschaden

Stellen Sie sicher, dass am Getriebe, der Ölversorgungsanlage und weiterer angebauten Komponenten kein Schaden vorhanden ist.

Schäden sind vor Wiederinbetriebnahme zu beseitigen.

Prüfen Sie vor Wiederinbetriebnahme:

- Die Ausrichtung des Getriebes und des Antriebsaggregates (siehe **Kapitel 8**)
- Zustand der Kupplungen
- Ölstand
- Dichtheit der Rohrleitungen
- Dichtheit der Wellenabdichtung
- Auf festen Sitz der Schutzeinrichtungen
- Beachten Sie auch die Hinweise im **Kapitel 8** (Erstinbetriebnahme)

9.4.4 Wiederinbetriebnahme nach einem längeren Stillstand (Einlagerung)

Nach einem längeren Stillstand (Einlagerung) von **mehr als 6 Monaten** gehen Sie bei der Wiederinbetriebnahme wie folgt vor:

- Prüfen sie wie unter **Pkt. 9.4.3** beschrieben.
- Entfernen Sie Korrosionsschutzmittel wie in **Kapitel 8** beschrieben.
- Gehen Sie bei der Wiederinbetriebnahme vor, wie in **Kapitel 8** (Erstinbetriebnahme).

	HINWEIS
	Beachten Sie die Lagerbedingungen in **Kapitel 6**.

9.5 Inspektion und Wartung

Eine regelmäßige Inspektion und Wartung unserer Pekrun- Getriebe gibt Ihnen eine größtmögliche Betriebssicherheit.

Die Inspektion und Wartung des Getriebes darf nur im Stillstand erfolgen.

Gehen Sie wie folgt vor:

- Führen Sie einen Wartungsnachweis oder Wartungsplan. Es wird Ihnen helfen die vorgegebenen Wartungsintervalle einzuhalten.
- Lassen Sie eine regelmäßige Inspektion und Wartung der Getriebe nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.
- Unterrichten Sie alle mit der Inspektion und Wartung des Getriebes beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2: Sicherheit**)

	HINWEIS
	Beachten Sie den Inspektions- und Wartungsplan in **Kapitel 11**.

9.6 Außerbetriebnahme

Um das Getriebe außer Betrieb zu setzen, gehen Sie wie folgt vor:

- Schalten Sie das Antriebsaggregat ab.
- Lassen Sie die Außerbetriebnahme nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen
- Unterrichten Sie alle mit der Außerbetriebnahme des Getriebes beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2: Sicherheit**)
- Schließen Sie den Kühlwasserzufluss bei Getrieben mit Wasser– Ölkühler oder Kühlschlangen. Wenn Frostgefahr besteht, lassen Sie das Wasser aus dem Kühler oder der Kühlschlange ab. (siehe **Kapitel 8.3.3**)

ACHTUNG

Sachschaden

Getriebeschaden durch Abschaltung der ÖVA.

Lassen Sie bei **kurzen Unterbrechungen** die Ölversorgungsanlage weiterlaufen.

Lassen Sie bei **längerem Stillstand** ebenfalls die Ölversorgungsanlage zunächst ca. 60 Minuten weiterlaufen. Damit vermeiden Sie einen Wärmestau.

Nehmen Sie das Getriebe bei **längeren Unterbrechungen (>1 Woche bis <6 Monate)** wöchentlich kurzzeitig in Betrieb um alle Innenteile mit Öl zu benetzen. Damit erhält das Getriebe für einen kurzen Zeitraum Korrosionsschutz.

Konservieren Sie das Getriebe bei einer **Außerbetriebsetzung** von mehr als **6 Monaten** wie in **Kapitel 6, Lagerbedingungen** beschrieben**.**

10 Fehlersuche und -beseitigung

	HINWEIS
	Wenden Sie sich bitte mit allen technischen Fragen an unser Werk Unsere Serviceadresse finden Sie in **Kapitel 1.6** dieser BA.

10.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

	HINWEIS
	Beachten Sie die Sicherheitshinweise in **Kapitel 2: Sicherheit**

	WARNUNG
	Verletzungsgefahr bei der Fehlersuche und -beseitigung Es kann zu Quetschungen und Scheren von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteilen (z.B. Schaulochdeckel) kommen. Es kann durch Eingreifen in das Getriebeinnere oder bei der Fehlersuche an sich bewegenden Bauteilen zu Quetschungen und Scherungen von Gliedmaßen kommen. Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen. - Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel. - Tragen Sie PSA. - Lassen Sie die Fehlersuche und –beseitigung nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen. - Unterrichten Sie alle mit der Fehlersuche und –beseitigung beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2**: Sicherheit) **Besondere Vorsicht gilt bei der Fehlersuche im laufenden Betrieb!** **Halten Sie Sicherheitsabstände ein!** **Bei der Beseitigung von Störungen nehmen Sie grundsätzlich das Getriebe außer Betrieb!**

10.2 Fehlerzustandserkennung

	HINWEIS
	Beachten Sie auch die Hinweise in **Kapitel 11: Instandhaltung**

Melden Sie während der Gewährleistungszeit auftretende Störungen umgehend an unsere Serviceadresse.

Bei nicht bestimmungsgemäßem Einsatz des Getriebes kann Pekrun keine Gewährleistung

übernehmen. Das gleiche gilt für nicht mit Pekrun abgestimmten Modifikationen am Getriebe und Verwendung von nicht Original Pekrun- Ersatzteilen.

Für Störungen, die nicht eindeutig zu ermitteln sind, empfehlen wir, unseren Kundendienst über unsere Serviceadresse in Anspruch zu nehmen.

Beachten Sie folgendes:

- Lassen Sie die Fehlersuche und –beseitigung nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.
- Unterrichten Sie alle mit der Fehlersuche und –beseitigung beauftragten Personen über die vorhandenen Restrisiken (siehe Kapitel 2: **Sicherheit**)
- **Bei der Beseitigung von Störungen nehmen Sie grundsätzlich das Getriebe außer Betrieb.**
- Schalten Sie bei Arbeiten am Getriebe das Antriebsaggregat ab.
- Sichern Sie das Antriebsaggregat gegen unbeabsichtigtes in Betrieb nehmen und bringen Sie ein Hinweisschild an der Einschaltstelle an.

10.3 Erste Maßnahmen zur Störungsbeseitigung

Tabelle 10-1

Störung / Fehlermeldung	Mögliche Ursache(n)	Abhilfe
Veränderte Getriebegeräusche	Schäden an der Verzahnung	- Kundendienst einschalten. =>Verzahnung kontrollieren, ggf. beschädigte Bauteile auswechseln
	Defekte Lager	- Kundendienst einschalten. =>defekte Lager auswechseln
	Vergrößertes Lagerspiel	- Kundendienst einschalten. =>Lagerspiel einstellen
Betriebstemperatur zu hoch	Zu hoher Ölstand im Getriebe	- Ölstand korrigieren
	Kühler defekt	- Kühler kontrollieren =>ggf. auswechseln (BA des Kühlers beachten)
	Kühlwasserzufuhr defekt (bei Kühlschlangen - Ablagerungen)	- Kühlwasserzufuhr kontrollieren => Kühlschlangen reinigen, ggf. auswechseln BA Kühler beachten
	Kühlluftzufuhr defekt oder verunreinigt	- Kühlluftzufuhr kontrollieren, =>reinigen, BA Kühler beachten
	Leitungsfilter verschmutzt	- Leitungsfilter reinigen, BA Filter beachten
	Öl ist stark verschmutzt	- Kundendienst einschalten. =>Öl wechseln
	Überaltertes Öl	- Kundendienst einschalten. =>Öl wechseln

[pekrun]

Fehlersuche und -beseitigung

Störung / Fehlermeldung	Mögliche Ursache(n)	Abhilfe
	Ölleitung undicht Ölpumpe defekt	=>Ölführende Leitungen kontrollieren. ggf. abdichten - Ölpumpe kontrollieren => BA Ölpumpe beachten ggf. Ölpumpe Instand setzen bzw. auswechseln
Erhöhte Temperatur an den Lagerstellen	Defektes Lager Ölpumpe defekt Ölleitung undicht Überaltertes Öl Zu hoher oder zu niedriger Ölstand im Getriebe	- Kundendienst einschalten. =>defekte Lager auswechseln - Ölpumpe kontrollieren => ggf. auswechseln, BA Ölpumpe beachten - Kundendienst einschalten. =>Ölführende Leitungen kontrollieren, ggf. abdichten =>Öl wechseln - Ölstand korrigieren - Kundendienst einschalten.
Ölverlust aus dem Getriebe	Mangelhafte Abdichtung der Gehäusedeckel bzw. der Gehäuseteilfugen Radialwellendichtringe defekt	=>Gehäusedeckel bzw. Gehäuseteilfugen abdichten =>Wellendichtringe auswechseln
Öl schäumt im Ölsumpf Wasser im Öl	Ungeeignetes Öl bzw. kontaminiertes Öl (Wasser im Öl) Ölkühler bzw. Kühlschlange defekt Falsche Aufstellbedingungen (z.B. hohe Luftfeuchtigkeit)	- Kundendienst einschalten. =>Ölzustand untersuchen lassen - Kundendienst einschalten. =>Ölkühler bzw. Kühlschlange auf Leckagen kontrollieren, ggf. Leck beseitigen, Kühler bzw. Kühlschlange auswechseln. BA des Kühlers beachten. - Kundendienst einschalten.
Drucküberwachung löst Alarm aus	Der Öldruck ist unter den Mindestschmieröldruck (Standard 0,5 bar) abgefallen	- Ölstand bei Raumtemperatur kontrollieren =>ggf. Ölstand korrigieren - Ölfilter kontrollieren =>ggf. reinigen oder auswechseln - Kundendienst einschalten. - Ölpumpe kontrollieren => BA Ölpumpe beachten ggf. Ölpumpe Instand setzen bzw. auswechseln
Verschmutzungsanzeige des Ölfilters löst Alarm aus	Leitungsfilter ist verschmutzt	=>Bei umschaltbaren Leitungsfilter entsprechend BA umschalten,

[pekrun]

Fehlersuche und -beseitigung

Störung / Fehlermeldung	Mögliche Ursache(n)	Abhilfe
		=>verschmutzten Filtereinsatz reinigen
Schaltvorgang macht Geräusche bzw. funktioniert nicht	Es liegt ein Drehmoment an den Wellen an.	- Überprüfen ob an allen im Eingriff befindlichen Wellen kein Drehmoment anliegt, ggf. entlasten der Wellen.
	Die Wellen rotieren noch.	- Überprüfen ob alle Wellen still stehen ggf. Stillstand der Wellen herbeiführen
	Schäden an der Verzahnung der Schalträder	- Kundendienst einschalten. - Verzahnung kontrollieren, =>ggf. beschädigte Bauteile auswechseln
	Überwachungsinstrumente bzw. Endschalter sind defekt oder falsch ausgerichtet	- Kundendienst einschalten, - Endschalter kontrollieren und Installation überprüfen, => ggf. Endschalter Instand setzen oder auswechseln, BA des Endschalters beachten
	Schaltzylinder funktionieren nicht. Schaltzylinder sind defekt	-Schaltzylindereinheit auf Freigängigkeit bzw. behindernde Fremdkörper kontrollieren =>ggf. Beeinträchtigungen der Freigängigkeit beseitigen. - Kontrolle der Druckbeaufschlagung des Hydraulik- bzw. Pneumatikzylinders, => ggf Leitungen mit Druck beaufschlagen bzw. Leckagen beseitigen - Hydraulik- bzw. Pneumatikleitungen auf Leckagen kontrollieren, => ggf. Leck beseitigen bzw. Leitungen auswechseln - Kundendienst einschalten, - Schaltzylinder kontrollieren => ggf. defekte Bauteile auswechseln

11 Instandhaltung und Wartung

	HINWEIS
	Wenden Sie sich mit allen technischen Fragen an unser Werk Unsere Serviceadresse finden Sie in **Kapitel 1.6** dieser BA.

11.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

	HINWEIS
	Beachten Sie die Sicherheitshinweise in **Kapitel 2: Sicherheit**

	WARNUNG
	Verletzungsgefahr bei der Instandhaltung und Wartung Es kann zu Quetschungen und Scheren von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteilen (z.B. Schaulochdeckel) kommen. Es kann durch Eingreifen in das Getriebeinnere oder bei der Fehlersuche an sich bewegenden Bauteilen zu Quetschungen und Scherungen von Gliedmaßen kommen. Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen. - Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel. - Tragen Sie PSA. - Lassen Sie die Instandhaltung und Wartung nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen. - Unterrichten Sie alle mit der Instandhaltung und Wartung beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2**: Sicherheit) **Besondere Vorsicht gilt bei der Fehlersuche im laufenden Betrieb!** **Halten Sie Sicherheitsabstände ein!** **Bei der Beseitigung von Störungen nehmen Sie grundsätzlich das Getriebe außer Betrieb!**

11.2 Wartungsnachweis

Führen Sie einen Wartungsnachweis oder Wartungsplan. Es wird Ihnen helfen die vorgegebenen Wartungsintervalle einzuhalten.

11.3 Kontrollverfahren und Prüfvorrichtungen

Lassen Sie eine regelmäßige Inspektion und Wartung der Getriebe nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.

Regelmäßige Kontrollen aller Betriebsdaten wie z.B. Druck, Temperatur, Stromaufnahme, Verschmutzungsgrad der Leitungsfilter und weitere visuelle Prüfungen tragen dazu bei, Störungen frühzeitig zu erkennen und zu beseitigen.

Zur vorbeugenden Instandhaltung kann es sinnvoll sein ein Maschinendiagnosesystem einzusetzen, um einen Maschinenzustand festzustellen.

Mit Hilfe eines Schwingungsmesssystems lässt sich bei regelmäßiger Messdatenerfassung, eine Trendanalyse erstellen.

Mit weiteren Analysewerkzeugen lassen sich Schädigungen an Lager und Verzahnungen vor einem Totalausfall feststellen und nachweisen.

Die Schwingungsmessung und Auswertung kann durch Pekrun- Techniker erfolgen.

Bei der Auswertung durch Pekrun- Techniker, werden auch Ergebnisse vergleichbarer Pekrun- Getriebe mit einfließen und berücksichtigt.

11.4 Spezielle Werkzeuge, Betriebsmittel, Materialien

Kontaktthermometer zur Messung von Temperaturen.

Endoskop für die visuelle Innenraumkontrolle von Getrieben.

Stethoskop für die Überwachung von Laufgeräuschen im Getriebe.

Handelsübliche Handwerkzeuge wie z.B. Maulschlüssel, Ringschlüssel, Inbusschlüssel etc.

11.5 Inspektions- und Wartungsplan

HINWEIS

Die folgenden Angaben beziehen sich auf den Betrieb mit Mineralöl.

Tabelle 11-1

t = täglich, w = wöchentlich, m = monatlich, j = jährlich, 1/2= halbjährlich

Auszuführende Arbeiten	t	w	m	j
Kontrolle der Öltemperaturen	X*	X*		
Getriebe auf veränderte Geräusche kontrollieren		X		
Kontrolle der Überwachungsinstrumente am Getriebe und der ÖVA			X	
Ölstand kontrollieren			X	
Ölfilter reinigen bei Warnung der Verschmutzungsanzeige, spätestens			X	
Getriebe auf Dichtheit kontrollieren			X	
Rohrleitungen auf Dichtheit kontrollieren			X	
Ölversorgungsanlage auf Dichtheit und Funktionalität kontrollieren			X	
Zustand des Luft-Ölkühler kontrollieren				X
Zustand des Wasser-Ölkühler kontrollieren				X
Öl auf Wassergehalt kontrollieren				X
Kontrolle der Schutzeinrichtungen				X
Entlüftungsfilter reinigen				1/2
Kontrolle der Befestigungsschrauben auf festen Sitz				1/2
Kühlschlange auf Ablagerungen kontrollieren	zeitgleich mit Ölwechsel			
Ölfilter wechseln	zeitgleich mit Ölwechsel			
Ölwechsel	nach Tabelle 11-2 + 11-3			
Fettnachschmierung von Lagerstellen bzw. Dichtungen	nach 3000 Betriebsstunden oder spätestens nach 6 Monaten			
Komplette Getriebeinspektion				X

* Je nach Einsatzfall sollte die Öltemperatur auch täglich geprüft werden.

11.6 Schmierplan

11.6.1 Ölschmierung

Wichtige Informationen vor dem Ölwechsel:

VORSICHT

Verletzungsgefahr durch schädliche Dämpfe bzw. Flüssigkeiten.

Beim Ölwechsel besteht die Möglichkeit durch das Einatmen und die Berührung mit Schmierstoffen bzw. anderen Medien verletzt zu werden.

- Beachten Sie das Sicherheitsdatenblatt der eingesetzten Medien.

-Tragen Sie bei Ölwechselarbeiten geeignete persönliche Schutzausrüstung (Schutzbrille, Schutzhandschuhe).

- Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen.

- Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).

ACHTUNG

Sachschaden

Beschädigung des Getriebes durch ungeeignetes Betriebsöl.

Vermeiden Sie Unverträglichkeiten mit dem später verwendeten Betriebsöl.

Um optimale Schmiersicherheit zu gewährleisten, sollen Öle gleicher Art und Viskosität jedoch von unterschiedlichen Herstellern nicht gemischt werden.

Ein Mischen von Ölen verschiedener Sorten oder Hersteller ist nicht statthaft. Insbesondere dürfen synthetische Öle nicht mit Mineralölen oder anderen synthetischen Ölen vermischt werden.

Bei einer Umstellung von Mineralöl auf Synthetiköl oder umgekehrt oder einer Umstellung von synthetischen Ölen einer bestimmten Basis auf ein synthetisches Öl einer anderen Basis:

-Lassen Sie das alte Betriebsöl vollständig ab.

- Spülen Sie das Getriebe gründlich mit dem späteren Betriebsöl.

(siehe **Kapitel 6.6, Spülen vor Inbetriebnahme**)

-Füllen Sie das neue Betriebsöl ein (siehe **Kapitel 8**)

Halten Sie Rücksprache mit dem Schmierstoff-Hersteller/Lieferanten.

Verwenden Sie beim Ölwechsel grundsätzlich die vorher verwendete Ölsorte.

Bei einem Ölwechsel spülen Sie das Gehäuse und reinigen es gründlich.

Ölschlamm Abrieb und alte Ölreste müssen vor dem Befüllen mit frischem Öl restlos entfernt sein.

Bei besonderen Betriebsbedingungen, wie z.B. hoher Staub- oder Feuchtigkeitsgehalt der Umgebungsluft oder chemische Dämpfe kann ein häufigerer Ölwechsel erforderlich sein. Ebenso können günstigere Betriebsbedingungen die Standzeit des Öles verlängern. Beratung in Sonderfällen kann vom technischen Dienst der Ölfirmen in Anspruch genommen werden.

[pekrun]

Ölwechselintervall:

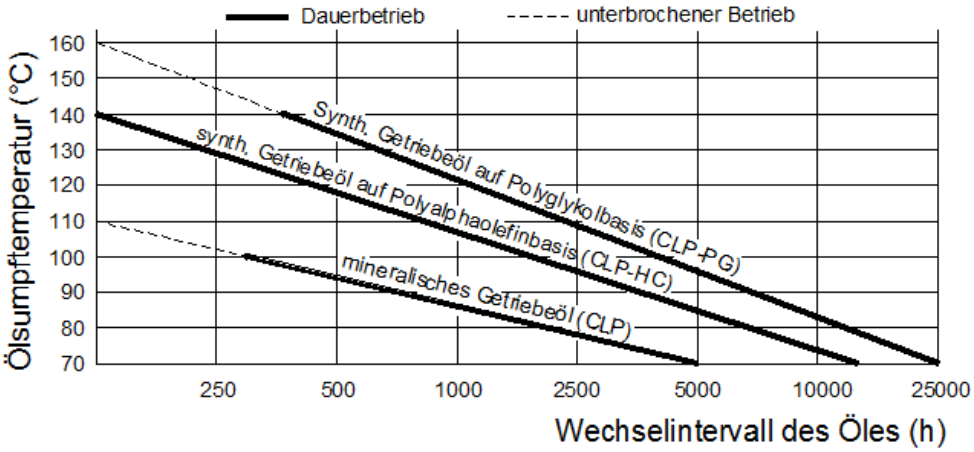
Richtwerte für Ölwechselintervalle können der Tabelle 11-2 entnommen werden. Diese gilt für normale Betriebsbedingungen und für eine Ölsumpftemperatur unter 70°C.

Tabelle 11-2

		SCHMIERSTOFFART			
		Mineralölbasis CLP	**synthetisch Polyalphaolefinbasis CLP - HC**	**synthetisch Polyglykolbasis CLP - PG**	**Fett**
1. Ölwechsel	**Schneckengetriebe**	500 h	100 bis 500 h	250 bis 1000 h	
	Stirnradgetriebe Kegelradgetriebe	1000 h	2000 h	5000 h	
folgende Ölwechsel	**Schneckengetriebe**	3000 bis 4000 h	5000 bis 7500 h	8000 bis 10000 h	5000 h
	Stirnradgetriebe Kegelradgetriebe	5000 h	12000 h	25000 h	8000 h
zeitliche Begrenzung	**Schneckengetriebe**	12 bis 18 Monate	2 bis 3 Jahre	4 bis 5 Jahre	2 Jahre
	Stirnradgetriebe Kegelradgetriebe				

Bei höheren Ölsumpftemperaturen können die Ölwechselintervalle nach Diagramm 11-3 bestimmt werden.

Diagramm 11-3



Beschreibung der Ölwechselarbeiten:

	WARNUNG
	Verbrühungsgefahr durch austretendes heißes Betriebsmedium **Schwere Verletzungen durch Verbrühungen möglich.** Während Ölwechselarbeiten direkt nach dem Betrieb und noch einige Zeit nach dem Stillstand kann es zu schwere Verletzungen durch Austreten von heißem Betriebsmedium (>55°C) kommen. - Lassen Sie Instandhaltungsarbeiten nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen. - Unterrichten Sie alle mit Instandhaltungsarbeiten beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2**: Sicherheit). - Tragen Sie beim Ölwechsel geeignete PSA (Schutzhandschuh/-brille).

	HINWEIS
	Das Ablassen des Öles soll unmittelbar nach dem Stillstand erfolgen, da dann das Öl noch warm und somit dünnflüssig ist. Fangen Sie das Altöl in geeigneten Gefäßen auf. Beseitigen Sie sofort eventuell entstandene Öllachen. Entsorgen Sie abgelassenes Altöl und Ölbindemittel sowie ölgetränkte Reinigungstücher gemäß den jeweiligen nationalen Umweltschutzbestimmungen.

- Benutzen Sie zum Ablassen des Öls ein geeignetes Auffanggefäß
- Bei Getrieben mit Kühlschlangen oder Wasser- Ölkühler, schließen Sie die Kühlmittelzufuhr.
- Wenn das Öl durch die Ölablassbohrung abgelassen wird, stellen Sie einen geeigneten Auffangbehälter unter den Ölablass.
- Stellen Sie sicher, dass beim Ablassen des Öls genügend Luft über den Belüftungsfilter ins Gehäuse dringen kann. Wenn nötig schrauben Sie den Belüftungsfilter heraus.
- Entsorgen sie sofort eventuell vorbeifließendes Öl mit einem geeigneten Ölbindemittel
- Schrauben Sie die Ölablassschraube wieder ein.
- Füllen Sie den Schmierstoff gemäß **Kapitel 8.4** in das Getriebe ein.

11.6.2 Fettschmierung:

Für besondere Betriebsverhältnisse werden die Getriebe mit Fettschmierung vorgesehen. Vom Abnahmeprüfstand erhalten die Getriebe ihre Fettfüllung und gelangen auch mit dieser zur Auslieferung.

	HINWEIS
	Die Fettschmierung ist für die Lebensdauer des Getriebes bestimmt. Bei vorzeitigem Wechsel ist Rücksprache mit dem Hersteller erforderlich.

HINWEIS

Getriebefett-Empfehlungen siehe Schmierstofftabelle für Pekrun Getriebe (Hinweise in **Kapitel 8.4.).**

11.6.3 Fettschmierung der Lager oder Abdichtungen:

An manchen Getrieben ist für die Lager oder die Abdichtungen herausgeführter Wellenenden Fettschmierung vorgesehen. Solche Stellen sind mit Druckschmiernippel versehen und bei Auslieferung der Getriebe mit Fett gefüllt.

ACHTUNG

Sachschaden

Beschädigung am Getriebe durch ungeeignetes Schmierfett möglich.

Ein Mischen von Fetten verschiedener Seifengrundlagen ist nicht statthaft.

Halten Sie Rücksprache mit dem Schmierstoff-Hersteller/Lieferanten.

HINWEIS

Verwenden Sie zum Nachschmieren bzw. Erneuern des Fettes nur einwandfreie Marken-Wälzlagerfette. Hinweise hierzu finden Sie unter **Kapitel 8.4**.und in der Schmierstofftabelle für Pekrun- Getriebe.

Nach jeweils **3000 Betriebsstunden** ist eine Nachschmierung der Lagerstellen erforderlich, wobei die Zeitabstände nicht größer als **6 Monate** sein sollen.

HINWEIS

Abdichtungen an herausgeführten Wellenenden sind je nach Betriebsverhältnis ggf. häufiger nachzuschmieren.

Bei Erneuerung der gesamten Fettfüllung eines Lagers gehen Sie wie folgt vor:

- Waschen Sie dieses sorgfältig mit Waschbenzin o.ä. aus.
- Streichen Sie die Hohlräume des Wälzlagers mit Fett glatt aus.
- Füllen Sie den Lagergehäuseraum darüber hinaus zu 1/3 mit Fett, um eine übermäßige Erwärmung zu vermeiden.

HINWEIS

Bei langsam laufenden Wellen (n< 60 min-1) ist es zweckmäßig, den ganzen Lagergehäuseraum mit Fett zu füllen.

11.7 Beschreibung der Inspektions- und Wartungsarbeiten

HINWEIS

Für den Betrieb und die Wartung der nachfolgend aufgeführten Komponenten sind ebenfalls die im auftragsabhängig beigestellten Anhang angegeben Betriebsanleitungen zu beachten.

HINWEIS

Ersetzen Sie die bei der Montage- oder Demontage unbrauchbar gewordenen Schrauben. Achten Sie dabei auf gleiche Festigkeitsklasse und Ausführung.

Beachten Sie folgendes:

- Lassen Sie die Inspektion und Wartung nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.
- Unterrichten Sie alle mit der Inspektion und Wartung beauftragten Personen über die vorhandenen Restrisiken (siehe Kapitel 2: **Sicherheit**)
- **Während der Arbeiten nehmen Sie grundsätzlich das Getriebe außer Betrieb.**
- Schalten Sie bei Arbeiten am Getriebe das Antriebsaggregat ab.
- Sichern Sie das Antriebsaggregat gegen unbeabsichtigtes in Betrieb nehmen und bringen Sie ein Hinweisschild an der Einschaltstelle an.

11.7.1 Lüfter und Getriebereinigung

Durch starke Verunreinigung des Lüfters bzw. der Getriebeoberfläche, wird die Kühlwirkung erheblich herabgesetzt. Eine regelmäßige Reinigung der Lüfter und Getriebe ist deshalb erforderlich.

Achtung: Das Getriebe muss während der Reinigungsarbeiten außer Betrieb sein.

- Befreien Sie das Lüfterrad, die Lüfterhaube und das Schutzgitter z.B. mit einem harten Pinsel, von anhaftendem Schmutz.
- Reinigen Sie auf die gleiche Art und Weise die Gehäuseoberfläche des Getriebes mit z.B. einem Handfeger oder ähnlichem.

ACHTUNG

Sachschaden

Beschädigungen durch eindringende Feuchtigkeit

Die Reinigung des Getriebes mit einem Hochdruckreinigungsgerät ist **nicht zulässig**, da Feuchtigkeit in das Getriebe eindringen und zu Beschädigungen führen kann.

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch falsche Montage

Achten Sie bei der Remontage des Lüfters darauf, dass der Lüfter die Lüfterhaube nicht berührt.

11.7.2 Kühlschlange kontrollieren (wenn vorhanden)

Gehen Sie wie folgt vor:

- Trennen Sie die Kühlwasserzufluss- und –abflussleitungen
- Überprüfen Sie die Innenwand der Kühlschlange auf Ablagerungen.
- Bei Verschmutzung, reinigen Sie die Kühlschlange mit einem geeigneten Reinigungsmittel oder tauschen Sie ggf. die Kühlschlange gegen eine Neue aus.
- Schließen Sie die Kühlwasserzufluss- und -abflussleitung wieder an.

11.7.3 Luft- Ölkühler kontrollieren (wenn vorhanden)

- Entfernen Sie Verschmutzungen am Kühlaggregat.
- Kontrollieren Sie den Zustand der Verschraubungen und wechseln Sie diese ggf. aus.

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch falsche Montage

Achten Sie auf eine freie Luftzirkulation um den Kühler. Entfernen Sie ggf. störende Teile.

11.7.4 Wasser- Ölkühler kontrollieren (wenn vorhanden)

- Prüfen Sie die wasserführenden Leitungen auf Undichtigkeiten.
- Kontrollieren Sie den Zustand der Verschraubungen und wechseln Sie diese ggf. aus.

11.7.5 Leitungsfilter kontrollieren (wenn vorhanden)

- Prüfen Sie die optische Verschmutzungsanzeige.
- Reinigen Sie ggf. den Leitungsfilter mit einem geeigneten Reinigungsmittel.

11.7.6 Befestigungsschrauben kontrollieren

- Prüfen Sie alle Befestigungsschrauben mit einem Drehmomentschlüssel auf festen Sitz.
- Prüfen Sie die Schrauben auf das Anziehmoment gemäß Tabelle 11-4
- Unbrauchbar gewordene Schrauben sind durch neue mit gleicher Festigkeitsklasse zu ersetzen.

[pekrun]

Tabelle 11-4 Anziehmomente für Schaftschrauben aus Stahl

ANZUGSTABELLE FÜR SCHAFTSCHRAUBEN				
	ANZIEHDREHMOMENT M_a [Nm] @ μ=0,14			
	GRÖSSE	8.8	10.9	12.9
REGELGEWINDE	M6	10	15	18
	M8	25	37	43
	M10	51	75	87
	M12	87	130	150
	M16	215	310	370
	M20	430	620	720
	M24	740	1060	1240
	M30	1500	2100	2500
	M36	2450	3450	4150
	M42	3950	5550	6650
	M48	5950	8400	10100
FEINGEWINDE	M8x1	27	40	47
	M10x1,25	54	79	93
	M12x1,25	96	140	165
	M12x1,5	92	135	155
	M16x1,5	230	340	390
	M20x1,5	480	690	800
	M24x2	810	1160	1350
	M30x2	1670	2370	2780

In den Tabellenwerten für Ma sind berücksichtigt:

-Reibungswert μges.= 0,14

-Ausnutzung der Mindeststreckgrenze = 90%

-Torsionsmoment beim Anziehen der Reibungsbeiwert von μges= 0,14 gilt für Schrauben und Muttern ohne Überzug und leicht geölt.

ACHTUNG

Sachschaden

Beschädigungen am Getriebe durch falsche Montage

Zusätzliche Schmierung der Gewinde verändert die Reibungszahl erheblich und führt zu unbestimmten Anziehverhältnissen!

11.7.7 Komplette Getriebeinspektion

Die komplette Getriebeinspektion sollten Sie dem Pekrun- Kundendienst übertragen. Unsere Techniker und Richtmeister können am zuverlässigsten beurteilen, ob und welche Bauteile des Getriebes ausgetauscht werden müssen.

12 Demontage und Entsorgung

12.1 Sicherheit

Alle Arbeiten haben unter dem Aspekt **Sicherheit** zu erfolgen!

Beachten Sie die jeweils geltenden Sicherheitsbestimmungen des Anwenderlandes. Umweltschutzbestimmungen zur Entsorgung.

HINWEIS

Beachten Sie die Sicherheitshinweise in **Kapitel 2: Sicherheit**

WARNUNG

Verletzungsgefahr bei der Demontage

Es kann zu Quetschungen und Scheren von Gliedmaßen durch Herabfallen bzw. Wegrutschen von mit Öl benetzten Bauteilen (z.B. Schaulochdeckel) kommen.

Es kann durch Eingreifen in das Getriebeinnere an sich bewegenden Bauteilen zu Quetschungen und Scherungen von Gliedmaßen kommen.

Es kann zum Ausrutschen und Stürzen durch ausgelaufenes Öl bzw. vorhandene Öllachen kommen.

- Beseitigen Sie eventuell vorbeifließendem Öl bzw. herausgelaufenem Öl mit einem Ölbindemittel.

- Tragen Sie PSA.

- Lassen Sie die Demontage und Entsorgung nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.

- Unterrichten Sie alle mit der Demontage und Entsorgung beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2**: Sicherheit)

Halten Sie Sicherheitsabstände ein!

VORSICHT

Verletzungsgefahr durch schädliche Dämpfe bzw. Flüssigkeiten.

Beim Ölablassen und Entsorgen besteht die Möglichkeit durch das Einatmen und die Berührung mit Schmierstoffen bzw. anderen Medien verletzt zu werden.

Beim Öffnen der Schaulochdeckel bzw. den Arbeiten an der ÖVA kann es zu einer Gefährdung durch entweichende schädliche bzw. brennbare Gase und Austreten von Schmierstoffen kommen.

Bei Arbeiten an mit Öl gefüllten Bauteilen z.B. den Rohrleitungen und im Getriebeinneren kann es zum Kontakt der Haut mit aggressiven Medien kommen.

-Beachten Sie das Sicherheitsdatenblatt der eingesetzten Medien.

Tragen Sie bei Ölwechselarbeiten geeignete persönliche Schutzausrüstung (Schutzbrille, Schutzhandschuhe).

- Lassen Sie die Arbeiten durch geeignete Fachkräfte durchführen.

- Beseitigen Sie sofort eventuell entstandenen Öllachen (z.B. mit Ölbindemittel).

12.2 Demontage

Beschreibung der Demontagearbeiten:

- Lassen Sie die Demontagearbeiten nur von Fachkräften bzw. qualifiziertem Personal, möglichst mit entsprechender Berufsausbildung durchführen.
- Unterrichten Sie alle mit der Demontage beauftragten Personen über die vorhandenen Restrisiken (siehe **Kapitel 2: Sicherheit**)
- Nehmen Sie das Getriebe außer Betrieb. Beachten Sie auch **Kapitel 9**, **Außerbetriebnahme**.

  Um das Getriebe außer Betrieb zu setzen, schalten Sie das Antriebsaggregat ab.
- Schalten Sie die elektrische Versorgung für die Zubehöraggregate ab.
- Sichern Sie das Antriebsaggregat gegen unbeabsichtigte Inbetriebnahmen. Bringen Sie ein Hinweisschild an der Einschaltstelle an.
- Lassen sie zunächst das Öl in einen geeigneten Auffangbehälter ab. Beachten Sie hierzu die Hinweise in **Kapitel 11, Instandhaltung.**
- Trennen Sie die Antriebswelle vom Antriebsaggregat (z.B. Motor). Beachten Sie die BA des Anlagenherstellers.
- Trennen Sie die Abtriebswelle(n) von der Anlage. Beachten Sie die BA des Anlagenherstellers.
- Entfernen Sie die evtl. vorhandenen Rohrleitungen. Entsorgen Sie evtl. vorbeifließendes Öl mit einem geeigneten Ölbindungsmittel gemäß den geltenden Umweltschutzbestimmungen.
- Entfernen Sie alle vorhandenen Anschlussleitungen.
- Entfernen Sie alle Befestigungsschrauben.
- Reinigen und Entfetten Sie das Getriebe vor der Entsorgung.
- Das Getriebe kann nun mit geeigneten Lastaufnahmeeinrichtungen entfernt werden. Beachten Sie in **Kapitel 5** die Sicherheitshinweise und Innerbetrieblicher Transport.

12.3 Entsorgung

Beschreibung der Entsorgungsarbeiten:

Das Getriebe kann bei fachgerechter Entsorgung einer Wiederverwertung zugeführt werden.

Elektronikbaugruppen führen Sie einer Sonderdeponie, entsprechend den behördlichen Vorschriften, zu.

Wir empfehlen das Altöl von örtlichen Fachfirmen, gemäß den jeweils gültigen Umweltvorschriften des Anwenderlandes, entsorgen zu lassen.

[pekrun]

13 Ergänzende Unterlagen

13.1 Einbauerklärung

Inhalt und Aufbau der Einbauerklärung:

EG-Einbauerklärung

Im Sinne der EG- Richtlinie 2006/42/EG über Maschinen (Anhang II B)

Name und Anschrift des Herstellers:

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn

Hiermit erklären wir, dass die nachstehend beschriebene unvollständige Maschine

PRODUKTBEZEICHNUNG:	GETRIEBE
Serien- / Typenbezeichnung:	ASR… / BSR… / CSR… / ALG... / AGZ… / *AG* / *CH* / *GV* / *HS* / *KR* / *KS* / *KZ* / *LG* / *MK* / *PG* / *PL* / *SH* / *SO* / *SV* / *VG* / *VH* / *VN* / SN*../ SNU*../ SNO*../ SNV*../ SNC*../ SNA*../ SNAF*../ SW*../SHS*../ SDA*../ SVA*../.SZA*../ ZVA*../ SEO*.. / K*../KN*../ KNV*../ KNA*../ KS*../ / KW*../KZV*../ VKZ*../ SKV*.. / SSN *../ SSNV*../ SSW*../ KSN
Maschinen- / Seriennummer:	1**** / 1000****
Baujahr:	20**

den folgenden grundlegenden Anforderungen der Maschinenrichtlinie 2006/42/EG - einschließlich deren zum Zeitpunkt der Erklärung geltenden Änderungen - entspricht.

Vollständig erfüllte grundlegende Sicherheits- und Gesundheitsschutzanforderungen:

1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.4, 1.4.2.1, 1.5.1, 1.5.13, 1.5.15, 1.5.2, 1.5.3, 1.5.4, 1.5.6, 1.5.7, 1.5.9, 1.6.1, 1.6.2, 1.7.1.1, 1.7.2, 1.7.3, 1.7.4

Teilweise erfüllte grundlegende Sicherheits- und Gesundheitsschutzanforderungen:

1.2.6, 1.3.2, 1.3.3, 1.3.7, 1.3.8.1, 1.3.9, 1.4.1, 1.5.5, 1.5.8, 1.6.3

Folgende Rechtsvorschriften wurden angewandt:

Maschinenrichtlinie 2006/42/EG

Die Inbetriebnahme dieses Produkts ist so lange untersagt, bis die Maschine oder die Anlage, in welche dieses Produkt eingebaut werden soll oder von welcher es eine Komponente darstellt, den Bestimmungen aller relevanten Rechtsvorschriften entspricht.

Für das Produkt wurden die speziellen technischen Unterlagen gemäß Anhang VII Teil B erstellt, auf begründetes Verlangen können diese Unterlagen einer einzelstaatlichen Stelle übermittelt werden.

Bevollmächtigter für die Zusammenstellung der relevanten technischen Unterlagen (EU-Adresse):

Standort:	Iserlohn	Wuppertal
	Beate Schröder Köbbingser Mühle 14 58640 Iserlohn Deutschland	Annette Lindemann Köbbingser Mühle 14 58640 Iserlohn Deutschland

HINWEIS

Die Lieferung der Original- Einbauerklärung erfolgt gesondert. Diese erhalten Sie zusammen mit der Lieferung. Sie wird (wenn möglich) außen am Getriebe angebracht.

13.2 Zeichnungen und auftragsabhängige Unterlagen

Je nach Anforderungen und Einsatzfall variieren die mitgelieferten Unterlagen.

Diese legen die bestimmungsgemäße Verwendung fest und weisen auf auftragsbezogene Besonderheiten hin.

Folgende Unterlagen gehören zu dieser BA:

- Technisches Datenblatt (auftragsabhängig erstellt)
- Pekrun Schmierstoffempfehlungstabelle (SET)
- Original- Einbauerklärung

Folgende weitere Unterlagen werden im Einzelfall mitgeliefert:

- Maß- bzw. Schnittzeichnung / Maßblatt bzw. Dispositionszeichnung
- Ersatzteilliste
- Unterlagen zu Zubehörteilen
  (Betriebsanleitungen / sicherheitsrelevante Datenblätter)

Alle mitgelieferten Unterlagen sind Bestandteil dieser BA (siehe Pkt. 1.5.2)

[pekrun]

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany

Technisches Datenblatt

Technical datasheet

zur Betriebsanleitung
to the Operating Instructions

DEUTSCH / ENGLISCH

Geltungsbereich / *Scope*:			
Pekrun – Auftrags Nr. *Pekrun – order no.*	19396-30		
Kunden – Referenz *Customers - Reference*	4500494756; 2000064793 4001310648, 4001308822		
Getriebe / Typ *Gearbox / type*	ASR 413-R-CCW		
Pekrun - Teile Nr. / Serial Nr. *Pekrun - Part no. / serial no.*	PART-060563 / 10002294		
Dokument-Nr. / *Document no*:	OFF-039794	Rev.:	-
erstellt am / *created by*:	23.05.2022	erstellt von / *created by*:	B. Schröder
Anhang zur *Annex to the*	**WERKNORM N9100** ***COMPANY STANDARD N9100***		

[pekrun]

Erstellt am/*created at*: 23.05.2022
Erstellt von/*created by*: B. Schröder

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Lubrication 3
4. Grenz- und Einstellwerte zur Überwachung des Getriebes: 4
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5. Wichtige zusätzliche Informationen: 4
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Assembly instruction wear sleeve (inner ring) 5

[pekrun]

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Erstellt von/*created by*: B. Schröder

1. Allgemeine technische Daten
General technical data

Maße: *dimensions:*	ca. L= 2207 mm. B=1490 mm, H=1148 mm
Gewicht: *weight:*	3028 kg
Leistung: *rated power:*	P = 2300 kW
Antriebsdrehzahl: *input speed:*	n_1 = 1493 min^{-1}
Antriebsdrehzahl: *input speed:*	n_2 = 639,9 min^{-1}
Übersetzung: *transmission ratio:*	i = 2,3333 : 1
Service-Faktor: *Service factor:*	K_a = 2, DIN

2. Umgebungsbedingungen
Environmental conditions

Umgebungstemperatur: -16…+45°C
ambient temperature:

3. Schmierung
Lubrication

Typ: *type:*	Ölumlaufschmierung *Oil circulation lubrication*	
Schmierstoff: *lubricant:*	Ölviskosität: *oil viscosity:*	ISO VG 320
Schadenskraftstufe: *Scuffing resistance:*	12 (FZG-Test DIN 51354)	
Ölfüllmenge: *oil filling quantity:*	ca. 280 l	
Ölbedarf: *oil demand:*	ca. 43,5 l/min.	
Öldruck: *oil pressure:*	2 bar(g)	
Ölzulauftemperatur: *oil inlet temperature:*	+38…+47°C	

[pekrun]

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4. Grenz- und Einstellwerte zur Überwachung des Getriebes:
Limit and setting values for gearbox monitoring:

		Warnung *warning*	Abschaltung *shutdown*	Normal *normal*
Gehäuseschwingungen *Housing vibration*		[mm/s]	[mm/s]	[mm/s]
- horizontal *- Horizontal*	:	> 4,5	> 7,1	≤ 4,5
- vertikal *- Vertical*	:	> 4,5	> 7,1	≤ 4,5
Temperaturen *Temperatures*		[°C]	[°C]	[°C]
- Ölzulauf *- Oil inlet*	:	< 15… > 60	< 10…> 80	38 ... 47
Öldruck *Oil pressure*		[bar]	[bar]	[bar]
vor dem Getriebe *in front of the gearbox*	:	< 1,4	< 1,2	1,6…6

5. Wichtige zusätzliche Informationen:
Important additional information:

ACHTUNG / CAUTION

Sachschaden

Beschädigungen am Getriebe durch zu große Wellenverlagerung.

Die kundenseitig zu montierende Kupplung an der Antriebswelle muss im Betrieb eine Wellenverlagerung von bis zu 2 mm ausgleichen können!

Risk of property damage!

Risk of damage to the gearbox due to large shaft misalignment.!

The coupling to be mounted on the drive shaft by the customer must be able to compensate a shaft misalignment of up to 2 mm during operation!

HINWEIS / NOTE

Beachten Sie bei Montage von Kupplungen die speziellen Betriebsanleitungen des Herstellers.

When installing couplings, always follow the specific instructions from the manufacturer.

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[pekrun]

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Erstellt von/*created by*: B. Schröder

6. Montageanleitung Verschleißhülse (Innenring)
Assembly instruction wear sleeve (inner ring)

Abmaße / Dimensions:

- Wellendurchmesser / shaft diameter: ø140m6 (+0,040 / +0,015)
- Verschleißhülse / wear sleeve: ø140 (+0,00 / -0,025)

Vorbereitung / Preparation:

1. Reinigen Sie Welle und O-Ring- Nut mit geeigneten Mitteln von allen Rückständen.
Clean shaft and O-ring groove from all residues using suitable means.
2. Glätten Sie eventuell vorhandene Grate und Riefen.
Smooth out any burrs and grooves that may be present.

Hilfsmittel, Personal / Auxiliary means, personnel

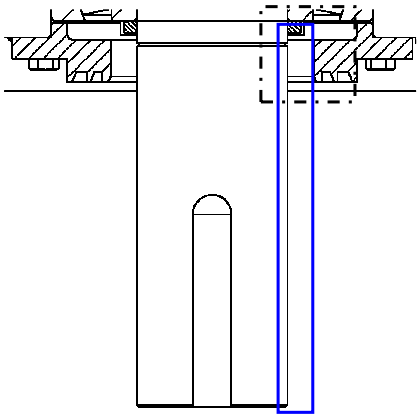
3. Fett / *grease* (z.B./*e.g.* Klüber Staburags NBU 12 K)
4. Induktionserwärmung / *induction heating*
5. Thermometer / *thermometer*
6. Hitzebeständige Handschuhe / *heat-resistant gloves*
7. Innenring / inner ring IR140x160x50 EGS PART-001292
(drallfrei geschliffen / *twist-free ground*)
8. 2x Wellendichtring / *shaft seal ring* DIN 3760-160x190x15-BAUMX7-FKM
9. 2x Schonhammer / *soft-face hammer*
10. 2x Messingdorn / *brass mandrel*
11. 2 Monteure / 2 fitters

Montage / Assembly

12. Die Temperatur der Welle muss kleiner 30°C sein.
Temperature of the shaft must be less than 30°C.

13. Fetten Sie das Wellenende leicht ein. (siehe blauer Bereich in Abbildung 1)
Lightly grease the shaft end. (see blue section in Figure 1)

Abbildung / Figure 1



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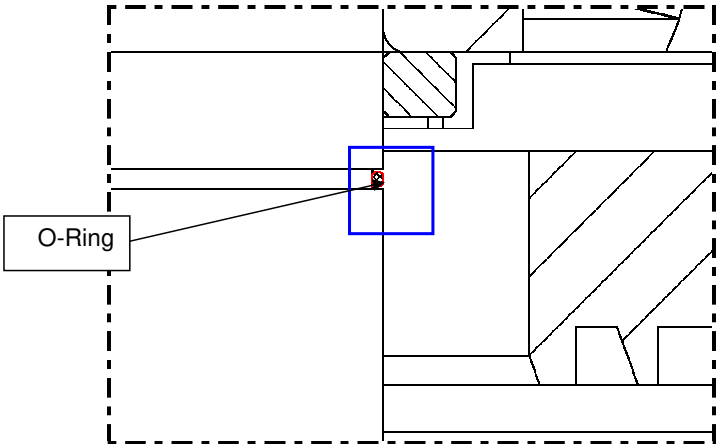
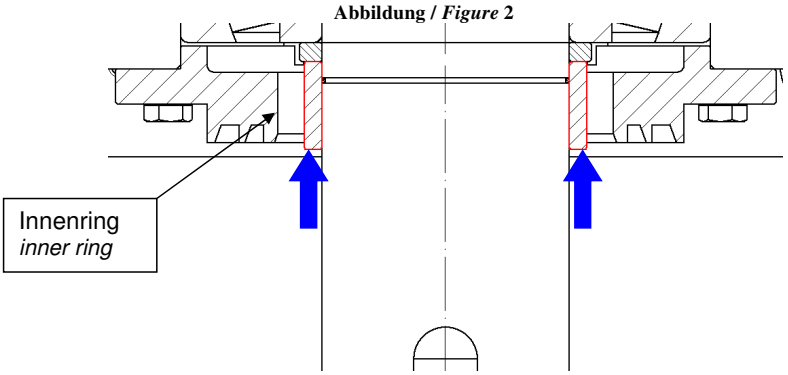
14. Fetten Sie den O-Ring ein.
    Grease the O-ring
15. Schieben Sie den O-Ring vorsichtig über die Welle bis in die Nut.
    Carefully push it over the shaft into the groove
16. Fetten Sie den O-Ring in der Nut noch einmal überall leicht ein.
    Lightly grease the O-ring in the groove once again

Ausschnitt aus Abbildung / Detail from figure 1



17. Erwärmen Sie den Innenring langsam auf 130°C.
    Slowly heat the inner ring to 130°C.
18. Nehmen Sie nun sofort den Innenring vom Erwärmungsgerät und schieben Ihn anschließend schnell über die Welle bis zum O-Ring.
    Immediately remove the inner ring from the heating device and then quickly slide it over the shaft to the O-ring.
19. Treiben Sie nun innerhalb von 15 Sekunden den Innenring gleichzeitig (auf 2 Seiten um 180° versetzt) mit den Messingdornen und Schonhammer axial über den O-Ring bis dieser am Anlagebund anliegt.
    Now, within 15 seconds, drive the inner ring simultaneously (offset by 180° on 2 sides) axially over the O-ring with the brass mandrels and soft-face hammer until the O-ring is in contact with the contact collar.

Abbildung / *Figure* 2



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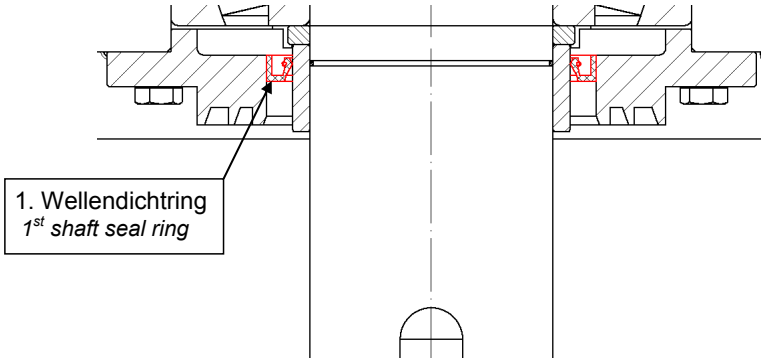
20. Lassen Sie den Innenring abkühlen und montieren anschließend den ersten Wellendichtring.
Allow the inner ring to cool down and subsequently install the first shaft seal ring.

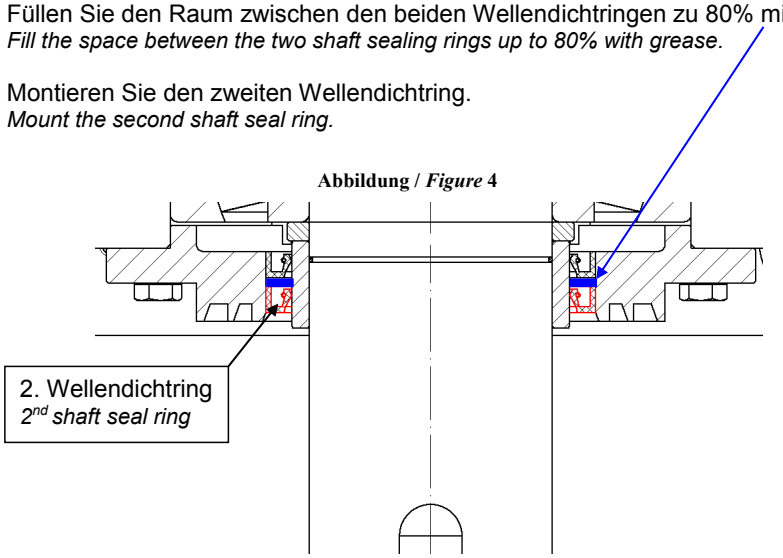
Abbildung / *Figure* 3



21. Füllen Sie den Raum zwischen den beiden Wellendichtringen zu 80% mit Fett.
Fill the space between the two shaft sealing rings up to 80% with grease.

22. Montieren Sie den zweiten Wellendichtring.
Mount the second shaft seal ring.

Abbildung / *Figure* 4



[pekrun]

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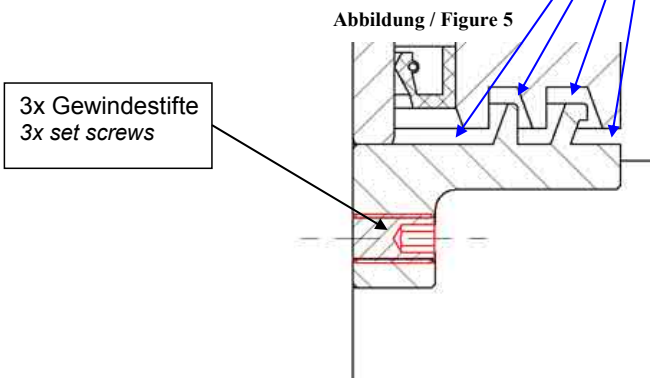
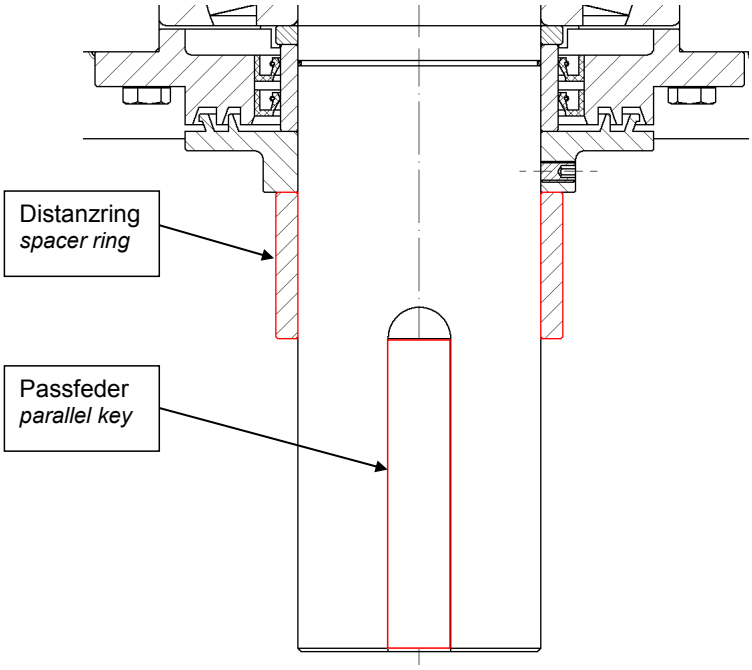
23. Montieren Sie den Labyrinthring.
Mount the labyrinth ring.
Verwenden Sie **kein Fett** zwischen Labyrinthdeckel und Labyrinthring.
***Do not use grease** between labyrinth cover and labyrinth ring.*

24. Ziehen Sie die 3 Gewindestifte am Labyrinthring an.
Tighten the 3 set screws on labyrinth ring.

Abbildung / Figure 5



25. Montieren Sie Distanzring und Passfeder.
Install the spacer ring and parallel key.



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WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

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Getriebeöle auf Mineralölbasis

Gear oil based on mineral oils
Huile à engrenages minérale
Óleos para engrenagens à base de óleos minerais
Aceite de base mineral
Tandwielolie op basis van minerale olie
Редукторные масла на минеральной основе

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	Shell	ADDINOL	Chevron
CLP 32	Degol BG 32	Alpha EP 32 Alpha VT 32 Optigear EP 32	Mobil DTE 24	RENOLIN ZAF B 32 HT	RENOLIN ZAF B 32 HT	–	Shell Tegula V 32	–	GST EP 32
CLP 46	–	Alpha SP 46 Optigear BM 46 Optigear EP 46	Mobil DTE 25	RENOLIN ZAF B 46 HT	RENOLIN ZAF B 46 HT	Klüberoil GEM 1-46 N	Shell Tellus S2 MA 46	–	GST EP 46
CLP 68	Degol BG 68	Alpha EP 68 Alpha SP 68 Optigear BM 68 Optigear EP 68	Mobilgear 600 XP 68	RENOLIN CLP 68 RENOLIN CLP 68 Plus	GEARMASTER CLP 68	Klüberoil GEM 1-68 N	Shell Omala S2 GX 68	Eco Gear 68 M	Meropa 68
CLP100	Degol BG 100	Alpha EP 100 Alpha SP 100 Optigear BM 100 Optigear EP 100	Mobilgear 600 XP 100	RENOLIN CLP 100 RENOLIN CLP 100 Plus	GEARMASTER CLP 100	Klüberoil GEM 1-100 N	Shell Omala S2 GX 100	Eco Gear 100 M Gear Oil 100 F	Meropa 100 Meropa XL 100 Meropa MG 100
CLP 150	Degol BG 150	Alpha EP 150 Alpha SP 150 Optigear BM 150 Optigear EP 150	Mobilgear 600 XP 150	RENOLIN CLP 150 RENOLIN CLP 150 Plus	GEARMASTER CLP 150	Klüberoil GEM 1-150 N	Shell Omala S2 GX 150	Eco Gear 150 M Gear Oil 150 F	Meropa 150 Meropa XL 150 Meropa MG 150
CLP 220	Degol BG 220	Alpha EP 220 Alpha SP 220 Optigear BM 220 Optigear EP 220	Mobilgear 600 XP 220	RENOLIN CLP 220 RENOLIN CLP 220 Plus RENOLIN CLP 220 VCI	GEARMASTER CLP 220	Klüberoil GEM 1-220 N	Shell Omala S2 GX 220	Eco Gear 220 M Gear Oil 220 F	Meropa 220 Meropa XL 220 Meropa MG 220
CLP 320	Degol BG 320	Alpha EP 320 Alpha SP 320 Optigear BM 320 Optigear EP 320	Mobilgear 600 XP 320	RENOLIN CLP 320 RENOLIN CLP 320 Plus RENOLIN CLP 320 VCI	GEARMASTER CLP 320	Klüberoil GEM 1-320 N	Shell Omala S2 GX 320	Eco Gear 320 M Gear Oil 320 F	Meropa 320 Meropa XL 320
CLP 460	–	Alpha EP 460 Alpha SP 460 Optigear BM 460 Optigear EP 460	Mobilgear 600 XP 460	RENOLIN CLP 460 RENOLIN CLP 460 Plus	GEARMASTER CLP 460	Klüberoil GEM 1-460 N	Shell Omala S2 GX 460	Eco Gear 460 M Gear Oil 460 F	Meropa 460 Meropa XL 460
CLP 680	–	Alpha EP 680 Alpha SP 680 Optigear BM 680	Mobilgear 600 XP 680	RENOLIN CLP 680 RENOLIN CLP 680 Plus	GEARMASTER CLP 680	Klüberoil GEM 1-680 N	Shell Omala S2 GX 680	Eco Gear 680 M Gear Oil 680 F	Meropa 680 Meropa XL 680
CLP 1000	–	Alpha SP 1000 Optigear BM 1000	–	–	–	Klüberoil GEM 1-1000 N	–	–	Meropa 1000

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Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

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Synthetisches Getriebeöl auf Polyalphaolefinbasis

Synthetic gear oil based on polyalphaolefines
Huile à engrenages sur base de Poly-Alph-Oléfine
Óleo sintético de engrenagens à base de polialfaolefin
Aceite sintético con base polialfaolefinica
Synthetische reductiekast olie op Polyalpha basis
Синтетические редукторные масла на основе полиальфаолефина

DIN 51502	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION		ADDINOL	Chevron
CLP HC 32	Alphasyn T 32 (CL HC)	Mobil SHC 624	RENOLIN Unisyn OL 32	RENOLIN Unisyn OL 32	Klübersynth GEM 4-32 N	–	Foodproof UNI 32 S	–
CLP HC 46	Alphasyn T 46 (CL HC)	Mobile SHC 625	RENOLIN Unisyn OL 46	RENOLIN Unisyn OL 46	Klübersynth GEM 4-46 N	–	Foodproof UNI 46 S	–
CLP HC 68	Alphasyn HTX 68 Optigear Synthetic PD 68 ES	Mobil SHC 626	RENOLIN Unisyn CLP 68	GEARMASTER SYN 68	Klübersynth GEM 4-68 N	–	Eco Gear 68 S-T	–
CLP HC 100	Alphasyn T 100 (HL HC) Optigear Synthetic PD 100 ES	Mobil SHC 627	RENOLIN Unisyn CLP 100	GEARMASTER SYN 100	Klübersynth GEM 4-100 N	–	Eco Gear 100 S	–
CLP HC 150	Alphasyn EP 150 Alphasyn HTX 150 Optigear Synthetic PD 150 ES	Mobil SHC 629 Mobil SHC Gear 150 Mobil SHC Elite 150	RENOLIN Unisyn CLP 150 RENOLIN UNISYN XT 150	GEARMASTER SYN 150	Klübersynth GEM 4-150 N	Shell Omala S4 GXV 150	Eco Gear 150 S	Meropa Synthetic EP 150
CLP HC 220	Alphasyn EP 220 Alphasyn HTX 220 Optigear Synthetic PD 220 ES	Mobil SHC 630 Mobil SHC Gear 220 Mobil SHC Elite 220	RENOLIN Unisyn CLP 220 RENOLIN UNISYN XT 220	GEARMASTER SYN 220	Klübersynth GEM 4-220 N	Shell Omala S4 GXV 220	Eco Gear 220 S	Meropa Synthetic EP 220
CLP HC 320	Alphasyn EP 320 Alphasyn HTX 320 Optigear Synthetic PD 320 ES	Mobil SHC 632 Mobil SHC Gear 320 Mobil SHC Elite 320	RENOLIN Unisyn CLP 320 RENOLIN UNISYN XT 320	GEARMASTER SYN 320	Klübersynth GEM 4-320 N	Shell Omala S4 GXV 320	Eco Gear 320 S	Meropa Synthetic EP 320 Meropa EliteSyn WL 320
CLP HC 460	Alphasyn EP 460 Alphasyn HTX 460 Optigear Synthetic PD 460 ES	Mobil SHC 634 Mobil SHC Gear 460	RENOLIN Unisyn CLP 460 RENOLIN UNISYN XT 460	GEARMASTER SYN 460	Klübersynth GEM 4-460 N	Shell Omala S4 GXV 460	Eco Gear 460 S	Meropa Synthetic EP 460
CLP HC 680	Alphasyn EP 680 Optigear Synthetic PD 680 ES	Mobil SHC 636 Mobil SHC Gear 680	RENOLIN Unisyn CLP 680 RENOLIN UNISYN XT 680	GEARMASTER SYN 680	Klübersynth GEM 4-680 N	–	Eco Gear 680 S	Meropa Synthetic EP 680 Meropa EliteSyn WL 680
CLP HC 1000	Alphasyn HTX 1000	Mobil SHC 639	RENOLIN UNISYN XT 1000	GEARMASTER SYN 1000	Klübersynth GEM 4-1000 N	–	–	–

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Biologisch abbaubare vollsynthetische Getriebeöle auf Esterbasis

Biological degradeable fully synthetic gear oils based on ester
Aceite de reductores, sintético biológicamente desintegrable, con base de Ester
Huiles à engrenages synthétiques biodégradables base ester
Biologisch afbreekbare volsynthetische reductiekastolie op Ester basis
Óleos de engrenagens totalmente sintéticos e biodegradáveis à base de éster
Биологически расщепляемые синтетические редукторные масла на основе эфира

DIN 51502	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	
CLP E 32	-	-	PLANTOHYD 32 S PLANTOSYN 32 HVI	ECO-HYD 32 S	-	
CLP E 46	-	-	PLANTOHYD 46 S PLANTOSYN 46 HVI	ECO-HYD 46 S	-	
CLP E 68	-	Mobil SHC Aware 68	PLANTOSYN 68 HVI	GEARMASTER ECO 68	Klüberbio EG 2-68	
CLP E 100	-	Mobil SHC Aware 100	PLANTOGEAR 100 HVI	GEARMASTER ECO 100	Klüberbio EG 2-100	
CLP E 150	-	Mobil SHC Aware 150	PLANTOGEAR 150 HVI	GEARMASTER ECO 150	Klüberbio EG 2-150	
CLP E 220	Performance Bio GE 220 ESS	-	PLANTOGEAR 220 S	GEARMASTER ECO 220	Klübersynth GEM 2-220	
CLP E 320	Performance Bio GE 320 ESS	-	PLANTOGEAR 320 S	GEARMASTER ECO 320	Klüberbio EG 2-320	
CLP E 460	-	-	PLANTOGEAR 460 S	GEARMASTER ECO 460	Klüberbio CA 2-460	
CLP E 680	-	-	PLANTOGEAR 680 S	GEARMASTER ECO 680	-	
CLP E 1000	-	-	-	-	-	

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Synthetisches Getriebeöl auf Polyglykolbasis

Synthetic gear oil based on polyglycols
Huile à engrenages sur base de Poly-Glycolle
Óleo sintético de engrenagens à base de poliglicol
Aceite sintético con base poliglicol
Synthetische reductiekast olie op Polyglycol basis
Синтетические редукторные масла на основе полиальфаолефина

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	Shell	ADDINOL	Chevron
CLP PG 32	-	-	-	RENOLIN PG 32	GEARMASTER PGP 32	Klübersynth GH 6-32	–	–	-
CLP PG 46	–	-	-	RENOLIN PG 46	RENOLIN PG 46	Klübersynth GH 6-46	–	–	-
CLP PG 68	-	-	-	RENOLIN PG 68	GEARMASTER PGP 68	Klübersynth GH 6-80	–	–	-
CLP PG 100	-	Optigear Synthetic 800/100	-	RENOLIN PG 100	GEARMASTER PGP 100	Klübersynth GH 6-100	–	Poly Gear PG 100	-
CLP PG 150	Degol GS 150	Alphasyn PG 150 Optigear Synthetic 800/150	Mobil Glygoyle 150	RENOLIN PG 150	GEARMASTER PGP 150	Klübersynth GH 6-150	Shell Omala S4 WE 150	Poly Gear PG 150	Meropa Synlube WS 150 Meropa EliteSyn WS 150
CLP PG 220	Degol GS 220	Alphasyn GS 220 Alphasyn PG 220 Optigear Synthetic 800/220 Optigear Synthetic 1300/220	Mobil Glygoyle 220	RENOLIN PG 220	GEARMASTER PGP 220	Klübersynth GH 6-220	Shell Omala S4 WE 220	Poly Gear PG 220	Meropa Synlube WS 220 Meropa EliteSyn WS 220
CLP PG 320	Degol GS 320	Alphasyn GS 320 Alphasyn PG 320 Optigear Synthetic 800/320	Mobil Glygoyle 320	RENOLIN PG 320	GEARMASTER PGP 320	Klübersynth GH 6-320	Shell Omala S4 WE 320	Poly Gear PG 320	Meropa Synlube WS 320 Meropa EliteSyn WS 320
CLP PG 460	Degol GS 460	Alphasyn GS 460 Alphasyn PG 460 Optigear Synthetic 800/460 Optigear Synthetic 1300/460	Mobil Glygoyle 460	RENOLIN PG 460	GEARMASTER PGP 460	Klübersynth GH 6-460	Shell Omala S4 WE 460	Poly Gear PG 460	Meropa Synlube WS 460 Meropa EliteSyn WS 460
CLP PG 680	Degol GS 680	Alphasyn GS 680 Optigear Synthetic 800/680 Optigear Synthetic 1300/680	Mobil Glygoyle 680	RENOLIN PG 680	GEARMASTER PGP 680	Klübersynth GH 6-680	Shell Omala S4 WE 680	Poly Gear PG 680	Meropa Synlube WS 680 Meropa EliteSyn WS 680
CLP PG 1000	–	Optigear Synthetic 800/1000	Mobil Glygoyle 1000	RENOLIN PG 1000	GEARMASTER PGP 1000	Klübersynth GH 6-1000	–	–	–

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Getriebeöle für die Nahrungsmittelindustrie

Gear oils for the food industry
Huiles à engrenages pour industrie alimentaire
Óleo de engrenagens para a indústria alimentar
Aceite de reductores para industria alimenticia
Reductiekastolie voor de levensmiddelen industrie
Редукторные масла для пищевой промышленности

DIN 51502	Castrol	Mobil	bremer & leguil	FUCHS LUBRITECH	KLÜBER LUBRICATION	ADDINOL
CLP E 32	CASSIDA FLUID GL 150	-	Rivolta F.L. 50	CASSIDA FLUID HFS 32	-	Foodproof UNI 32 S
CLP E 46	Optileb HY 46 (HLP HC 46)	-	Rivolta F.L. 75	CASSIDA FLUID HFS 46	-	Foodproof UNI 46 S
CLP E 68	Optileb HY 68 (HLP HC 68)	-	Rivolta F.L. 100	CASSIDA FLUID HFS 68	Klüberoil 4 UH1-68 N	Foodproof UNI 68 S
CLP E 100	Optileb GT 100	Mobil SHC Cibus 100	Rivolta F.L. 125	CASSIDA FLUID HFS 100	Klüberoil 4 UH1-100 N Klübersynth UH1 6-100	Foodproof UNI 100 S
CLP E 150	Optileb GT 150	Mobil SHC Cibus150 Mobil Glygoyle 150	Rivolta F.L. 170	CASSIDA FLUID GL 150	Klüberoil 4 UH1-150 N Klübersynth UH1 6-150	Foodproof UNI 150 S
CLP E 220	Optileb GT 220 (HC) Optileb GT 1800/220 (PG)	Mobil SHC Cibus 220 Mobil Glygoyle 220	Rivolta F.L. 250	CASSIDA FLUID GL 220	Klüberoil 4 UH1-220 N Klübersynth UH1 6-220	Foodproof UNI 220 S (HC), Foodproof CLP 220 WX (min)
CLP E 320	Optileb GT 320 (HC)	Mobil SHC Cibus 320 Mobil Glygoyle 320	Rivolta F.L. 400	CASSIDA FLUID GL 320	Klüberoil 4 UH1-320 N Klübersynth UH1 6-320	Foodproof UNI 320 S (HC), Foodproof CLP 320 WX (min)
CLP E 460	Optileb GT 460 (HC) Optileb GT 1800/460 (PG)	Mobil SHC Cibus 460 Mobil Glygoyle 460	Rivolta F.L. 500	CASSIDA FLUID GL 460	Klüberoil 4 UH1-460 N Klübersynth UH1 6-460	Foodproof UNI 460 S
CLP E 680	Optileb GT 680 (HC) Optileb GT 1800/680 (PG)	Mobil Glygoyle 680	CASSIDA FLUID GL 680	CASSIDA FLUID GL 680	Klüberoil 4 UH1-680 N Klübersynth UH1 6-680	Foodproof UNI 680 S
CLP E 1000	-	Mobil Glygoyle 1000	-	-	Klübersynth UH1 6-1000	Foodproof UNI 1000 S

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Sonstige Schmierstoffe

Other lubricants
D'autres lubrifiants
Otros lubricantes

Outros lubrificantes
Andere smeermiddelen
Другие смазочные материалы

DIN 51502	ARAL	Castrol	Mobil	FUCHS	FUCHS LUBRITECH	KLÜBER LUBRICATION	Shell	ADDINOL	Chevron
Lithiumverseifte Wälzlagerfette Lithiumgrease; Lithium saponifiés huiles pour roulements; Grasa de base lítica para rodamientos, Wentellagervetten verzeept met lithium; Massas de sabão de lítio para rolamentos de esferas de rolos; Литий мыльная основа смазки для подшипников									
KPSK-20	Aralub HLP 2	Spheerol EPL 2 Tribol GR 100-2 PD Optileb GR UF 1 (H1, NLGI 1)	Mobilux EP 2	RENOLIT LZR 2	LAGERMEISTER LP 2	CENTOPLEX 2 EP	Shell Gadus S2 V220 2	EP Mehrbereichsfett LM 2 EP	Multifak EP 2
Öl für Rücklaufsperren Oils for return flow safety device; Huiles pour cliquets de retour; Aceite para antiretornos; Olie voor terugloop-blokkades; Óleo para bloqueios de retorno; Масла для предохранительного устройства обратный поток									
HLP 32	Vitam GF 32	Hyspin AWS 32 Hyspin ZZ 32 Optileb HY 32 (H1)	Mobil DTE 24	RENOLIN B 10 VG 32 RENOLIN ZAF B 32 HT RENOLIN ZAF D 32 HT RENOLIN MR 32 MC	RENOLIN B 10 VG 32 RENOLIN ZAF B 32 HT RENOLIN ZAF D 32 HT RENOLIN MR 32 MC	LAMORA HLP 32	Shell Tellus S2 MX 32 Shell Tellus S3 M 32	Hydrauliköl HLP 32	Rando HD 32 Clarity Hydraulic Oil AW 32 (ashless)
Fließfette für fettgeschmierte Getriebe Fluid grease for grease lubricated gear units; Graisses pour réducteurs graissés; Grasa fluída para reductores lubricados con grasa; Vloiebare vetten voor met vet gesmeerde tandwielkasten; Massas lubrificantes fluídas para engrenagens lubrificadas por massa lubrificante; Смазка Жидкость для консистентной смазкой редукторов									
GP00K-20	–	Spheerol EPL 00 Tribol GR 100-00 PD Optileb GR UF 00 (H1)	Mobil Chassis Grease LBZ	RENOLIT GFW 00	GEARMASTER LXG 00	MICROLUBE GB 00 Klübersynth BEM 44-4600	–	Fliessfett SGR 4-00-9 P	Multifak EP 00

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Korrosionsschutzinhibitor (VCI- Konzentrat)

Anti-corrosion inhibitor (VCI- concentrate)
Inhibiteur de corrosion (concentré de VCI)
Inhibidor de la corrosión (concentrado de VCI)
Inibidor anti-corrosão (concentrado de VCI)
Anti-corrosie remmer (VCI- concentraat)
антикоррозийный ингибитор (концентрат VCI)

	Castrol	FUCHS	
	CORROSION INHIBITOR N 213	ANTICORID VCI UNI O 40	
!	Anwendung nach Pekrun- Vorschrift: Konservierung mit VCI- Konzentrat + Hersteller: Produkt Information Application according to Pekrun instruction : Preservation with VCI- concentrate + Manufacturer: Product Information Application: Selon la réglementation Pekrun: Conservation avec concentrado de VCI + Fabricant: Informations sur le produit Aplicación: Según normativa Pekrun: Conservación con concentrado de VCI + Fabricante: Información del producto Aplicação: De acordo com o regulamento Pekrun: Preservação com concentrado de VCI + Fabricante: Informações do produto Toepassing volgens Pekrun-regelgeving: conservering met VCI-concentraat + Fabrikant: Productinformatie Применение: Согласно правилам Pekrun: Консервация ингибитором с концентратом VCI + Производитель: Информация о продукте		

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Anhang zur Schmierstofftabelle für Pekrun Getriebe
Annex to the List of lubricants for Pekrun gears

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Mischbarkeit von Ölen / Miscibility of oils:

DE Öle auf Polyglykolbasis sind nicht mit Ölen auf Kohlenwasserstoffbasis - d.h. mit Mineralölen oder Polyalphaolefinen mischbar.

EN Oils based on polyglycols are not mixable with oils based on hydrocarbons, that means with mineral oils or polyalphaolefine oils!

FR Des huiles sur base de Poly-Glycolle ne peuvent pas être mèlangées avec des huiles sur base de carbone, c.-à-d. des huiles minérales ou des huiles sur base de Poly-Alpha-Oléfine.

ES Los aceites con base poliglicol no se mezclaran con aceites de base hidrocarburo, es decir aceites minerales o polialfaolefinicos

NI Olien op basis polyglycol kunnen niet worden vermengd met olien op basis van koolwaterstof - dat will zeggen met minerale olien of olien op basis van polyalfaolefine!

RU Масла на основе полигликоля нельзя смешивать с маслами на основе углерода - т.е. с минеральными маслами или полиальфаолефинами

PT Óleos à base de poliglicol não são misturáveis com óleos à base de hidrocarboneto, isto é, com óleos minerais ou com óleos à base de polialfaolefin.

Schmiersicherheit / Lubrication safety:

DE Um optimale Schmiersicherheit zu gewährleisten, sollen Öle gleicher Art und Viskosität jedoch von unterschiedlichen Herstellern nicht gemischt werden. Gegebenenfalls ist mit den Lieferanten Rücksprache zu halten.
Bei Grundölen der hier aufgeführten Wälzlagerfette handelt es sich um Mineralöle. Werden Polyglykolöle verwendet, muss auch das Fett auf das Polyglykolöl abgestimmt sein.

EN In order to guarantee an optimal performance, oils of the same kind and viscosity, but of different manufacturers should not be mixed. When necessary please consult the supplier.
The base oils of the mentioned rolling bearing greases are mineral oils. If polyglycol oils are used, the grease has to correspond with the polyglycol oil.

FR Pour garantir une securité de graissage optimale on ne doit pas mélanger les huiles de la même sorte et de la même viscosité, mais de fabricants différents. Le cas échéant il faut consulter le fournisseur.
Les huiles de base des graisses de roulement ici mentionnées sont des huiles minérales. Quand on emploie des huiles sur base de Poly-Glycolle, l'huile de base de la graisse doit être accordée à l'huile sur base de Poly-Glycolle.

ES Con el fin de garantizar una correcta lubricación, se utilizarán siempre aceites del mismo tipo y viscosidad, no mezclando nunca aceites de distintos fabricantes. En caso de duda, consultar con el proveedor.
La grasa pra rodamientos tiene un aceite de base mineral. Si se utiliza aceite poliglicol, la grasa deberá se compatible con el aceite.

NI Om opitmale smeerveiligheid te kunnen garanderen mogen oliën van het gelijke type en met een gelijke viscositeit, die echter van verschillende producenten stammen, niet worden gemengd. Zo nodig dient contact op te worden genomen met de leverancier.
Bij de basisoliën van de hier genoemde wentellagervetten gaat het om minerale oliën. Wanneer oliën op basis van poliglycol worden gebruikt, moet ook het vet zijn afgestemd op olie op basis van poliglycol.

RU Для обеспечения оптимальной надежности смазки следует не мешать масла одного и того же типа и вязкости разных производителей. При необходимости, следует проконсультироваться с поставщиками. Масляными основами приведенных здесь смазок для подшипников качения являются минеральные масла.
Если будут использоваться масла на полигликольной основе, то необходимо будет подобрать консистентную смазку, подходящую к таким маслам.

PT De modo a garantir a maior segurança de lubrificação, os óleos do mesmo tipo e viscosidade mas de fabricantes diferentes não devem ser misturados. Eventualmente deverá consultar o fornecedor. Os óleos base para as massas dos rolamentos de esferas de rolos aqui mencionados são óleos minerais. Se forem utilizados óleos à base de poliglicol, a massa lubrificante deverá ser igualmente compatível com o óleo à base de poliglicol.

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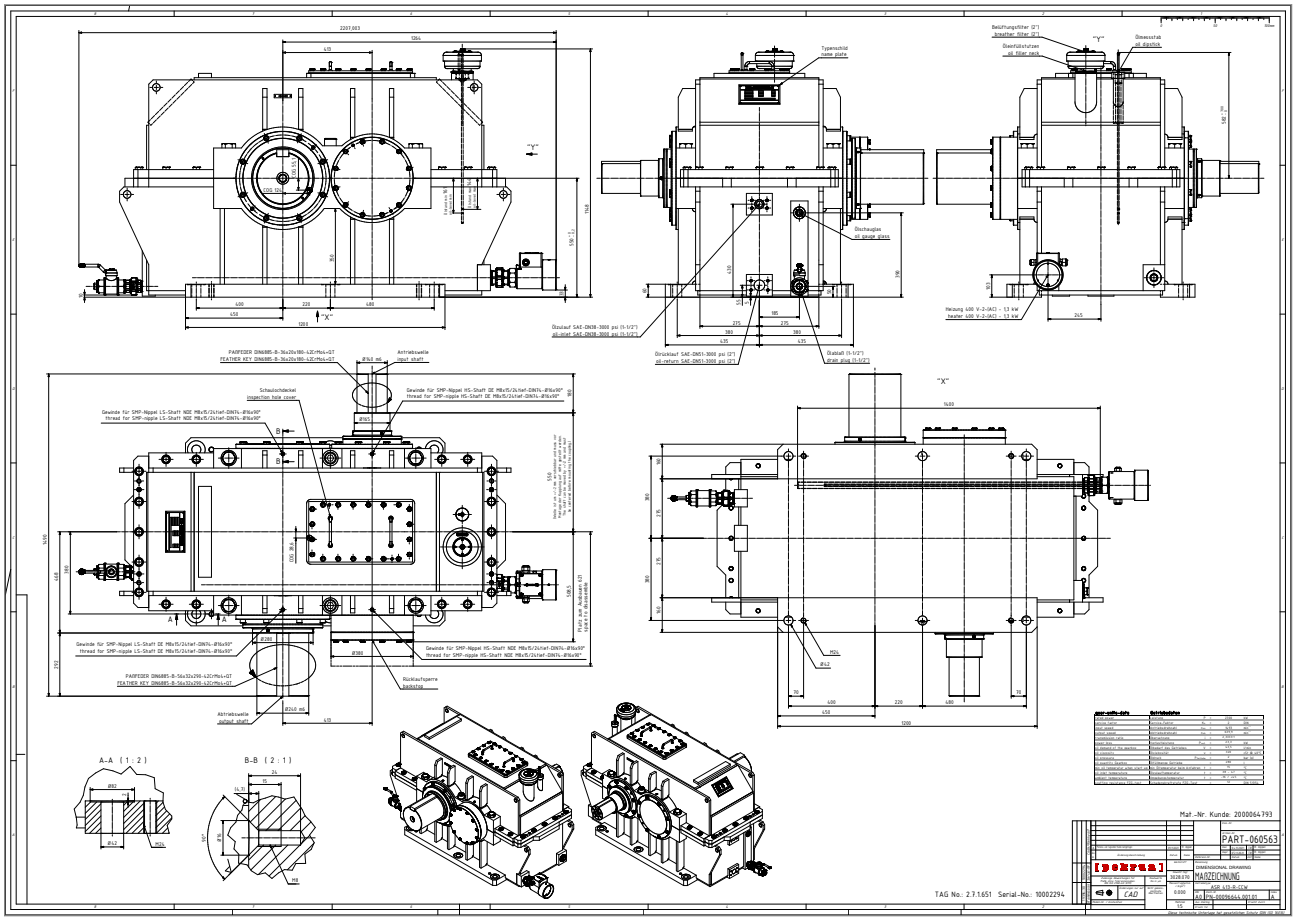
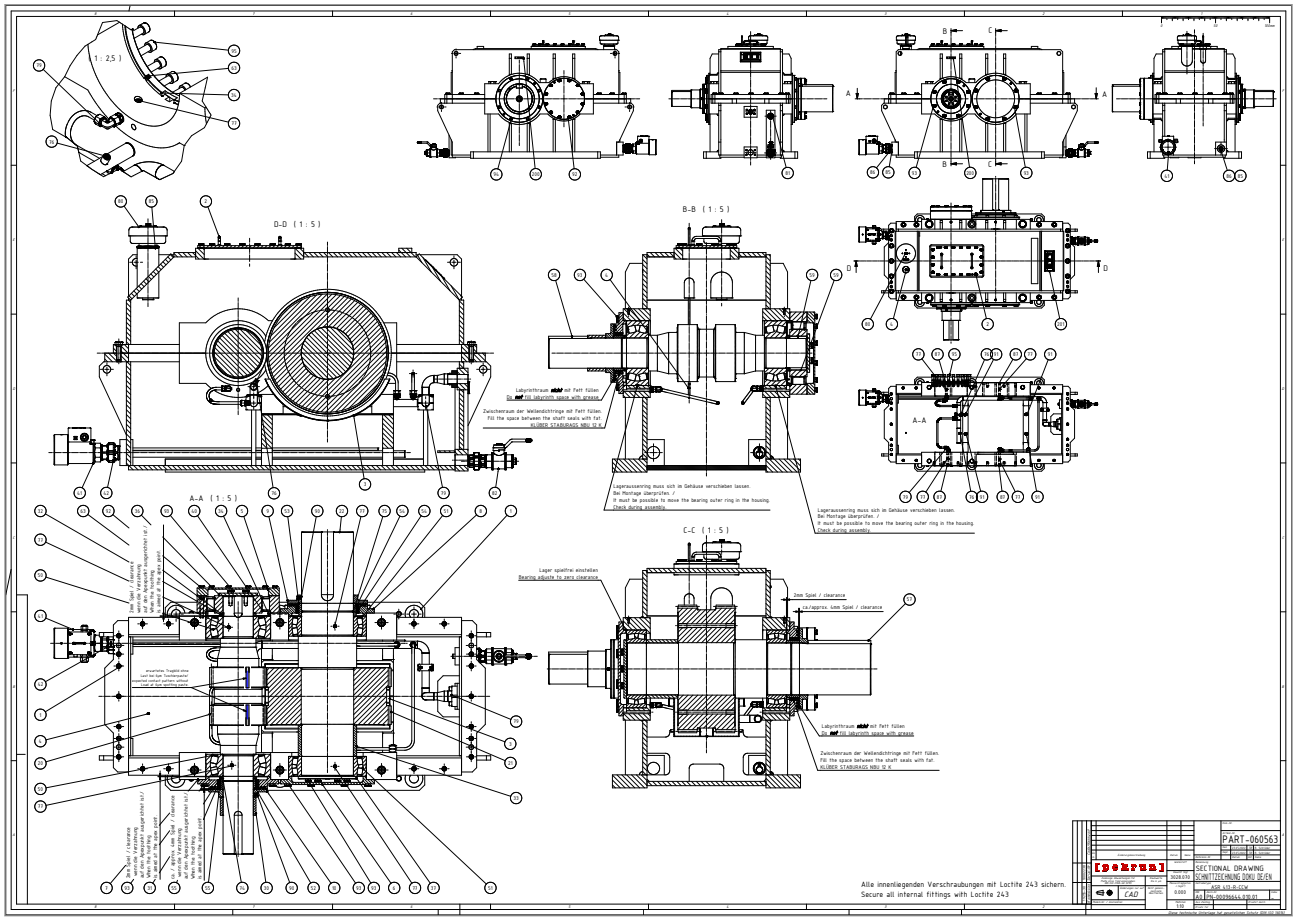

Typenschild
name plate
Belüftungsfilter (2")
breather filter (2")
Ölentfüllstutzen
oil filter neck
Ölmessstab
oil dipstick
Ölschauglas
oil gauge glass
Ölzulauf SAE-DN38-3000 psi (1-1/2")
oil-inlet SAE-DN38-3000 psi (1-1/2")
Ölrücklauf SAE-DN51-3000 psi (2")
oil-return SAE-DN51-3000 psi (2")
Ölablaß (1-1/2")
drain plug (1-1/2")
Heizung 400 V-2-(AC) - 13 kW
heater 400 V-2-(AC) - 13 kW
Schauloch-deckel
inspection hole cover
Antriebswelle
input shaft
Abtriebswelle
output shaft
Rücklaufsperre
backstop
A-A (1 : 2)
B-B (2 : 1)
Mat.-Nr. Kunde: 2000064793
PART-060563
MARZEICHNUNG
TAG No.: 2.7.1.651 Serial-No.: 10002294


D-D (1:5)
B-B (1:5)
A-A (1:5)
C-C (1:5)
Labyrinthraum mit Fett füllen.
Fill the space between the shaft seals with fat.
KLÜBER STABURAGS NBU 12 K
Lagerausserring muss sich im Gehäuse verschieben lassen.
Bei Montage überprüfen. /
It must be possible to move the bearing outer ring in the housing.
Check during assembly.
Lager spielfrei einstellen
Bearing adjuste to zero clearance
2mm Spiel / clearance
ca./approx. 1mm Spiel / clearance
Alle innenliegenden Verschraubungen mit Loctite 243 sichern.
Secure all internal fittings with Loctite 243
PART-060563
SECTIONAL DRAWING
ZEICHNUNGSNUMMER DRW DE/EN
AGS 413-R-CCW
CAD
2024.170
0.000
A3
1:10

[pekrun]	Kommission: **2.0.19396-30.1**	Stücklisten-Nr.: PART-060563	**GETRIEBE ASR 413-R-CCW**	Blatt: 1
	GetriebeTyp: ASR 413 -R-CCW	Maßzeichnung-Nr.: PN-00096644.001.01		
	Übersetzung: 2,333:1	Schnittzeichnung-Nr.: PN-00096644.010.01	Revision (Name/Datum)	von: 3
	Name/Datum: Appel/04.11.2021		***A*** R. Appel/05.11.2021	

Pos.	Stk.		Bezeichnung Beschreibung	Artikel Nr. Dokument Nr.
1	1		GEHÄUSE	PART-057560 PN-00077205.005.01 -
2	1		SCHAULOCHDECKEL MIT GRIFF	PART-054719 PN-00074215.005.01 -
3	1		ÖLWANNE 70/30	PART-069598 PN-00096657.000.01 -
4	1		ÖLPEILSTAB KOMPLETT	PART-057347 PN-00076785.005.01 -
5	1		DECKEL 290	PART-057243 PN-00076539.000.01 -
6	1		DECKEL 360	PART-057228 PN-00076520.000.01 -
7	1		LABYRINTHDECKEL 300	PART-057239 PN-00076533.000.01 -
8	1		LABYRINTHDECKEL 360	PART-057234 PN-00076524.000.01 -
9	1		LABYRINTHRING	PART-057235 PN-00076526.000.01 -
10	1		LABYRINTHRING	PART-057238 PN-00076532.000.01 -
20	1		RITZELWELLE 30	PART-069593 PN-00096645.000.01 -
21	1		STIRNRAD 70	PART-069596 PN-00096653.000.01 -
22	1		RADWELLE 95	PART-068833 PN-00095298.000.01 -
30	1		DISTANZRING	PART-057236 PN-00076528.000.01 -
31	1		DISTANZRING	PART-057237 PN-00076529.000.01 -
32	1		DISTANZRING	PART-057240 PN-00076535.000.01 -
33	1		DISTANZRING	PART-068836 PN-00095307.000.01 -
34	1		DISTANZRING	PART-057352 PN-00076799.000.01 -

[pekrun]							
	Kommission:	**2.0.19396-30.1**	Stücklisten-Nr.:	PART-060563	**GETRIEBE ASR 413-R-CCW**		Blatt: 2
	GetriebeTyp:	ASR 413 -R-CCW	Maßzeichnung-Nr.:	PN-00096644.001.01			
	Übersetzung:	2,333:1	Schnittzeichnung-Nr.:	PN-00096644.010.01		Revision (Name/Datum)	von: 3
	Name/Datum:	Appel/04.11.2021				***A*** R. Appel/05.11.2021	

Pos.	Stk.		Bezeichnung Beschreibung	Artikel Nr. Dokument Nr.
36	1		ENDSCHEIBE	PART-051274 PN-00068494.000.01 -
37	1		ENDSCHEIBE	PART-057227 PN-00076519.000.01 -
40	1		FREILAUF E-FC5044	PART-057241 SC-00076536.009.01 -
41	1		TAUCHHEIZKÖRPER-CSN EX R2"-EL=1400	PART-057342
42	1		ROHRVERSCHRAUBUNG	PART-057346
50	2		WÄLZLAGER DIN635	PART-057211
51	2		WÄLZLAGER DIN635	PART-057212
52	1		INNENRING	PART-001292
53	1		INNENRING	PART-001300
54	2		RADIALWELLENDICHTRING	PART-019776
55	2		RADIALWELLENDICHTRING	PART-014878
57	1		PAßFEDER	PART-057337
58	1		PAßFEDER	PART-057336
59	2		PAßFEDER	PART-057353
63	1		SPANNSTIFT	PART-028305
74	1		O-RING	PART-057513
75	1		O-RING	PART-018892
76	2		BLENDE	PART-016281 PN-00034552.000.01 -

[pekrun]	Kommission: **2.0.19396-30.1**	Stücklisten-Nr.: PART-060563	**GETRIEBE ASR 413-R-CCW**	Blatt: 3
	GetriebeTyp: ASR 413 -R-CCW	Maßzeichnung-Nr.: PN-00096644.001.01		
	Übersetzung: 2,333:1	Schnittzeichnung-Nr.: PN-00096644.010.01	Revision (Name/Datum)	von: 3
	Name/Datum: Appel/04.11.2021		**A** R. Appel/05.11.2021	

Pos.	Stk.		Bezeichnung Beschreibung	Artikel Nr. Dokument Nr.
77	4		BLENDE	PART-015292 PN-00033574.000.01 -
79	1		ROHRLEITUNG INNEN KOMPLETT	PART-069599 PN-00096663.005.01 -
80	1		BELÜFTUNGSFILTER	PART-033181
81	1		ÖLAUGE	PART-013240
82	1		ÖLABLASS	PART-057341 PN-00076762.005.01 -
85	2		DICHTRING	PART-001230
86	1		VERSCHLUßSCHRAUBE	PART-013869
87	4		VERSCHLUßSCHRAUBE	PART-001366
90	6		GEWINDESTIFT	PART-013278
91	4		SCHRAUBE	PART-013986
92	12		SCHRAUBE	PART-011927
93	26		SCHRAUBE	PART-003989
94	8		SCHRAUBE	PART-003973
200	2		DREHRICHTUNGSPFEIL GROSS	PART-002302 PN-00020759.000.01 -
201	1		PEKRUN STANDARD TYPENSCHILD GROSS	PART-028768 PE-00045948.000.01 C
202	24		SCHRAUBE	PART-005884

Original

Nur für den Betrieb in gewerblicher Umgebung!

Betriebsanleitung

Artikel-Nummer: 2119931402134040605

Ex-Heizkörper

Typ		: 95F/HC-Exdet1,3T3/T200°C/RBE
Leistung	(kW)	: 1,3
Leistungstoleranz	(%)	: +5/-10
Spannung		: 400 V, 2~

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SCHNIEWINDT THE POWER OF ELECTRIFYING IDEAS

Inhaltsverzeichnis

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1 Angaben über das Erzeugnis

Bezeichnung	**: Ex-Heizkörper**
Typ	**: 95F/HC-Exdet1,3T3/T200°C/RBE**
EG-Baumusterprüfbescheinigung	**: BVS 15 ATEX E 143 X**
	: IECEx BVS 15.0117X
Kennzeichnung	**: Ex II 2G Ex db eb IIC T3**
	Ex II 2D Ex tb IIIC T200°C
	Druckfeste Kapselung (d)
	Erhöhte Sicherheit (e)
	Schutz durch Gehäuse (t)
Temperaturklasse	**: T3**
Auslegung / Abnahme	**: …**
Einbaulage	**: waagerecht, Fühlerschutzrohre oben**
Einsatzbereich	**: Zone 1 oder Zone 21**
Zul. Umgebungstemp. am Anschlusskopf	**: -40/ +50°C**
Schutzart	**: IP 65**
Zeichnungsnummer	**: Handskizze**

2 Bestimmungsgemäßer Gebrauch

Ex-Gerät, Baureihe 95F/..-Exdet.T., entsprechend EG-Baumusterprüfbescheinigung BVS 15 ATEX E 143 X. Einsatzbereich: Zone 1 oder Zone 21.

Das Ex-Gerät dient zum Erwärmen der unter Betriebsdaten angegeben Flüssigkeit innerhalb der vorgegebenen Grenzen. **Abweichungen hiervon sind nicht erlaubt.**

Dazu werden die Heizelemente des Ex-Gerätes in Rohrleitungen, Behälter oder ähnlichem eingeführt.

3 Sicherheit

Beachten sie die grundlegenden Hinweise dieser Betriebsanleitung bei Aufstellung und Betrieb.
Die Betriebsanleitung muss vor Montage und Inbetriebnahme vom Monteur sowie dem zuständigen Betreiber vollständig gelesen und verstanden werden.

Heben sie die Betriebsanleitung zum späteren Gebrauch auf.
Geben sie sie Betriebsanleitung an jeden nachfolgenden Besitzer und Betreiber weiter.

Bedingt durch die hohen Medientemperaturen können am Ex-Gerät im Bereich des Flansches /der Kühlstrecke Oberflächentemperaturen **bis 200°C** auftreten. Es besteht Verbrennungsgefahr. Bauseitig müssen geeignete Maßnahmen zum Schutz vor Verbrennung getroffen werden.

Nehmen Sie keine Modifikationen am Produkt vor.
Modifikationen können Schutzeinrichtungen unwirksam machen und zu Personen- und Sachschäden führen.
Modifikationen führen zum Erlöschen der Konformität.

Beachten sie die Einbaulage des Ex-Gerätes oder die Strömungsrichtung des zu beheizenden Mediums, wenn diese vorgegeben sind.

Befolgen sie die in dem jeweiligen Land gültigen Gesetzesvorschriften über den Betrieb der Druckgeräte.

Führen sie wiederkehrende Prüfungen nach den nationalen Bestimmungen durch.
Überprüfen sie Sicherheitsrelevante Bauteile vor Inbetriebnahme auf Funktion.

Führen sie eine jährliche Funktionsprüfung der Sicherheitsvorrichtungen durch.
In Abhängigkeit vom Einsatz und Umgebung auch in einem kürzeren Intervall.

4 Anschluss- und Leistungsdaten

Ein direkter Anschluss von Aluminiumleitern an die Anschlussklemmen ist nicht zulässig.
Die Anschlussleitung muss einen Mindestquerschnitt von 1,5 mm² haben.
Die Anschlussleitung muss für erhöhte Temperaturen (Isolierstofftemperatur mindestens 85°C) geeignet sein.

Elektrische Daten

Leistung	(kW)	**: 1,3**
Leistungstoleranz	(%)	**: +5/-10**
Stufen		**: 1**
Spannung		**: 400V, 2~**
Verschaltung		**: Dreieck**
Kabelverschraubung		**: 2x M20x1,5 ; -55…+160°C, IP66, Edelstahl**
		5…9mm (Dichteinsatz mit Inlet)
		9…14mm (Dichteinsatz ohne Inlet)
		1x für Anschluss Ex-Heizkörper
		1x für Regler und Begrenzer

Heizelemente

Art der Heizelemente		**: Hochleistungspatrone verdichtet**
Rohrdurchmesser	(mm)	**: 32**
Material Patrone		**: 1.4571**
Einbaulänge	(mm)	**: 1.400**
davon unbeheizt	(mm)	**: 50**
Kühlstrecke	(mm)	**: ohne**
Ø-Rohrbündel	(mm)	**: 50**

Betriebsdaten

Medium		**: Getriebe-Öl, ruhend**
Einbauort		**: Behälter**
Betriebstemperatur	(°C)	**: 40**
Min. zul. Temperatur	(°C)	**: 0**
Max. zul. Temperatur	(°C)	**: 80**
Betriebsdruck	(bar g)	**: …**
max. zul. Druck	(bar g)	**: 0,5**
Prüfdruck	(bar g)	**: …**

4 Anschluss- und Leistungsdaten

Flansch

Norm	**: ISO228, G2“**
Dichtung	**: Novapress universal**

Temperaturüberwachung

Regler	**: 0-100°C, 230V ~, 16A**
Temperaturbegrenzer	**: 0-150°C, 230V ~, 16A**

Der Begrenzer ist auf 80°C eingestellt und verlackt.
Begrenzereinstellung ist vom Hersteller vorgenommen und darf nicht verändert werden.
Regler und Begrenzer sind direkt verschaltet.

Anschlusskopf	**: GGG40.3, lackiert**

Für den Betrieb sind eine Niveauüberwachung und eine elektrische Steuerung erforderlich. Diese Sicherheitsvorrichtungen sind nicht im Lieferumfang des Ex-Gerätes enthalten. Sie müssen durch den Errichter angebracht und eingestellt werden. Hierzu die Anweisungen unter „Errichtungshinweise“ in dieser Betriebsanleitung beachten.

5 Errichtungshinweise

1. Einbauort / Einbauverhältnisse

Das Ex-Gerät muss so in einen geeigneten Behälter eingebaute werden, dass die Heizelemente die Wärme ungehindert abgeben können. Die unbeheizte Länge des Ex-Gerätes und die Einbauverhältnisse müssen aufeinander abgestimmt sein. Die beheizte Länge des Ex-Gerätes muss sich mindestens 50 mm im Medium befinden. Ein Heizen innerhalb des Behälterstutzens ist nicht zulässig. Abweichungen hiervon können zum Wärmestau mit Überhitzung / unwirksam werden der Temperaturbegrenzung führen.

Das Ex-Gerät muss so in den Behälter eingebaut werden, dass sich die Fühlerschutzrohre für Regler und Begrenzer oberhalb des Patronenrohres im Medium befinden.

Für den Betrieb sind eine Niveauüberwachung und eine elektrische Steuerung erforderlich. Diese Sicherheitsvorrichtungen sind nicht im Lieferumfang des Ex-Gerätes enthalten. Sie müssen durch den Errichter angebracht, eingestellt und an eine bauseitig zu errichtende Steuerung angeschlossen werden.

2. Temperaturbegrenzer

Der Temperaturbegrenzer wurde bereits durch den Hersteller angebracht. Die Einstellung der Auslösetemperatur wurde bereits vorgenommen und darf nicht mehr geändert werden

3. Niveauüberwachung

Die Niveauüberwachung muss so angebracht werden, dass eine Mindestüberwachung des Ex-Gerätes von 50 mm mit dem zu erwärmenden Medium sichergestellt ist. Das Ansprechen der Niveauüberwachung muss das Abschalten des Ex-Gerätes zur Folge haben.

Durch diese Maßnahme muss sichergestellt werden, dass das Ex-Gerät nicht trockenlaufen kann und/oder eine zu niedrige Füllhöhe die sichere Anschaltfunktion des Begrenzers, z.B. durch Trockenlauf des Begrenzerfühlers, aufhebt.

4. **Elektrische Steuerung**
   Das Ex-Gerät muss mit einer elektrischen Steuerung betrieben werden. Bei Abschaltung einer Sicherheitsvorrichtung (Temperaturbegrenzer, Strömungsüberwachung oder Niveauüberwachung) muss das Ex-Gerät über einen separaten Abschaltweg (Schütz) der Steuerung sicher vom Netz getrennt werden. Dieser separate Abschaltweg muss unabhängig von betrieblich erforderlichen Mess- und/oder Steuerungsvorrichtungen funktionieren.

5. **Anforderungen an die Sicherheitsvorrichtungen**
   Überwachungseinrichtungen (Temperaturbegrenzer, Niveauüberwachung) müssen entsprechend den einschlägigen Bestimmungen funktions- und zuverlässigkeitsgeprüft sein.
   Im Geltungsbereich der Richtlinie RL2014/34/EU müssen sie entweder:
   - Entsprechend RL2014/34/EU zertifiziert sein (Prüfungsgrundlage DIN EN 50495 SIL 1)
   - Im Rahmen der Bewertung des Schutzkonzeptes für die Anlage durch den Errichter/Betreiber separat entsprechend RL2014/34/EU bewertet werden.

6. **Anordnung Anschlusskopf**
   Der Anschlusskopf des Ex-Gerätes darf nicht in unmittelbarer Nähe (<2m) aufgeladener strömender Teilchen (Hochspannungselektrode, Ionisator, Produktstrom der nicht innerhalb eines geschlossenen metallischen Rohres geführt wird) angeordnet werden.

7. **Umgebungstemperaturbereich**
   Während des Betriebes dürfen die in dieser Anleitung angegebenen minimalen bzw. maximalen Umgebungstemperaturen am Anschlusskopf nicht über- oder unterschritten werden. Bei abweichenden Umgebungstemperaturen muss das Ex-Gerät abgeschaltet werden.

8. **Ungehinderte Wärmeabgabe Anschlusshaube**
   Die Anschlusshaube darf nicht mit einer Wärmeisolierung versehen werden, da sonst der Anschlussbereich überhitzt wird.

9. Bauseitig muss ein **Überdruck- Sicherheitsventil** vorgesehen werden.

10. **Nachträgliche Lackierung**
    Eine nachträgliche Lackierung oder Pulverbeschichtung des Ex-Gerätes ist verboten.

11. **Anforderung an das Medium**
    Es dürfen keine Verunreinigungen oder Fremdkörper in das Ex-Gerät / die Anlage gelangen. Das Medium muss frei von Verunreinigungen sein. Ablagerungen, abrasiver Verschleiß oder ähnliches sind nicht zulässig. Installieren sie geeignete Maßnahmen, z.B. Filter etc.

    Es muss sichergestellt sein, dass innerhalb des Behälters oder der Rohrleitung keine explosionsfähigen Gemische die Oberfläche der Heizelemente erreichen kann.

12. **Entleerung**
    Errichten sie geeignete Möglichkeiten zum Entleeren des Behälters.

13. **Anforderung an die Kabelverschraubung**
    Wenn die durch den Hersteller montierte Kabel- und Leitungseinführung ausgetauscht werden sollte muss eine geeignete Kabel- und Leitungseinführungen mit einer zusätzlichen Dichtung oder einem zusätzlichen Dichtungsmittel verwendet werden.

6 Montage

Vor der Verwendung des Ex- Gerätes muss eine Sichtprüfung auf Transportschäden erfolgen.
Die Verwendung eines beschädigten Ex-Gerätes ist nicht zulässig.

Das Ex-Gerät muss entsprechend der vorgegebenen Einbaulage fest montiert und betrieben werden.

Die Transportmittel und Hebezeuge sind so auszuwählen, dass die Heizelemente bei Transport und Einbau nicht verbogen oder beschädigt werden können.

Das Ex-Gerät darf nur an geeigneten Konstruktionen befestigt werden, die auf das Gewicht des Ex-Gerätes ausgelegt sind. Zum Heben und zum Einbau des Ex-Gerätes dürfen nur Transportmittel und Werkzeuge, die für die Belastung geeignet sind, eingesetzt werden
Zum Heben dürfen nur Lastaufnahmemittel verwendet werden, die ausreichend dimensioniert sind und keine Beschädigungen aufweisen.
Es ist genügend Freiraum einzuplanen, damit ein späterer Ausbau des Ex-Gerätes möglich ist. Die Längenausdehnung bei der Aufheizung ist zu berücksichtigen.
Es sind geeignete Dichtungen, Schrauben und Muttern zu verwenden. Das Ex-Gerät ist langsam und bei gleichzeitigem Ausrichten in die endgültige Montageposition zu bringen.

Montagehinweis:

- Verwenden Sie einen geeigneter Maulschlüssel.
- Setzen sie den Maulschlüssel nur am Sechskant des Gewindeflansches an.
  Auf keinen Fall darf die Kraft über den Anschlusskopf eingeleitet werden.
- Das Gewinde muss in einwandfreiem Zustand sein.
- Schrauben sie den Gewindeflansch fest ein.
- Nachziehen nach dem ersten Aufheizen (falls notwendig).

Das Ex-Gerät ist fest zu montieren.

7 Installation

Die im Weiteren beschriebenen Tätigkeiten dürfen nur durch eine Elektrofachkraft durchgeführt werden.

Für die Installation und Errichtung sind die Bestimmungen EN 60079-14 (VDE 0165 Teil 1) zu beachten. Sie darf nur von Personen die mit dem **Explosionsschutz** vertraut sind bzw. von entsprechend unterwiesenen Fachkräften durchgeführt werden. Hierüber ist vom Errichter eine Installationsbescheinigung auszustellen.

In TT- oder TN-Systemen muss eine Fehlerstrom-Schutzeinrichtung (RCD) verwendet werden, deren Bemessungs-Ansprech-Fehlerstrom 100 mA nicht überschreitet.
Fehlerstrom-Schutzeinrichtungen mit einem Bemessungs-Ansprech-Fehlerstrom von 30 mA sind vorzuziehen.
In IT-Systemen ist eine Isolations-Überwachungseinrichtung zu verwenden, die die Einspeisung abschaltet, sobald der Isolationswiderstand nicht größer 50 Ohm je Volt der Bemessungsspannung ist.

- Die Anschlussspannung muss mit der auf dem Typenschild angegebenen Spannung übereinstimmen.
- Die am Einsatzort geforderte Temperaturklasse muss mit der Angabe der Temperaturklasse auf dem Typenschild übereinstimmen.
- Bei der Auswahl der Anschlussquerschnitte, Belastungen, Absicherung usw. sind die einschlägigen Bestimmungen zu beachten. (s. u.a. VDE 0100, VDE 0298-4)

Elektrischer Anschluss

Ein direkter Anschluss von Aluminiumleitern an die Anschlussklemmen ist nicht zulässig.
Die Anschlussleitung muss einen Mindestquerschnitt von 1,5 mm² haben.
Die Anschlussleitung muss für erhöhte Temperaturen (Isolierstofftemperatur mindestens 85°C) geeignet sein.

1. Die 4 Deckelschrauben lösen.
2. Den Deckel des Anschlusskastens abnehmen.
3. Die Kabel durch die Kabelverschraubungen in den Anschlusskasten einführen.
4. Die Mutter der Kabelverschraubung fest anziehen, um die Zugentlastung und Schutzart sicherzustellen. (Kabel und Verschraubungen müssen aufeinander abgestimmt sein, so dass die geforderte Schutzart sichergestellt wird.)
5. Kabel gemäß Schaltplan an die Ex-Anschlussklemmen anschließen
6. Schutzleiterklemmen anschließen.
7. Schutzleiterverbindung herstellen.
8. Äußere PA-Verbindung herstellen.
9. Anschlüsse auf festen Sitz prüfen.
10. Deckel des Anschlusskastens wieder aufsetzen
11. Die 4 Deckelschrauben fest anziehen. (ca. 2Nm)

8 Inbetriebnahme

Wichtige Hinweise:

Die Temperaturklasse wird vom Hersteller festgelegt. Die örtlichen und betrieblichen Verhältnisse sind vorzugeben.
Die Inbetriebnahme ist nur zulässig, wenn das Ex-Gerät entsprechend den im Kapitel ERRICHTUNGSHINWEISE angegebenen Vorgaben eingebaut wurde. Die geforderten Sicherheitseinrichtungen (Temperaturbegrenzer und Niveauüberwachung) müssen korrekt eingebaut, eingestellt und funktionsfähig sein.

1. Vor dem Einschalten sicherstellen, dass die Temperaturüberwachungen angeschlossen sind.
2. Vor dem Einschalten sicherstellen, dass die Anschlusshaube ordnungsgemäß verschlossen ist.
3. Vor dem Einschalten sicherstellen, dass das Ex-Gerät mit dem zu erwärmenden Medium gefüllt ist, bzw. dass er vom Medium ausreichend überdeckt wird.

9 Beheben von Störungen

Die im Weiteren beschriebenen Tätigkeiten dürfen nur durch eine Elektrofachkraft, die mit dem Explosionsschutz vertraut ist, durchgeführt werden.

- Elektrische Absicherung außerhalb des Ex-Bereiches kontrollieren.
- Feuererlaubnis einholen, wenn vor Ort zu Messzwecken die Anschlusshaube geöffnet werden muss.

Störung: Ex-Gerät wird nicht warm

Behebung:
- Sicherungen kontrollieren
- Spannung kontrollieren
- Steuerung kontrollieren
- Die bauseitige Temperaturregelung ist auf eine zu niedrige Temperatur eingestellt
  → Regelung richtig einstellen.
- Der Temperaturbegrenzer hat das Gerät abgeschaltet.
  → Ursache ermitteln, Fehler beseitigen, Begrenzer zurücksetzen.

- Das Ex-Gerät nach Fehlerbeseitigung erneut in Betrieb nehmen.

10 Reparatur

Reparaturen dürfen nur nach schriftlicher Freigabe durch die Schniewindt GmbH & Co. KG durchgeführt werden.

Es dürfen nur vom Hersteller (Schniewindt GmbH & Co. KG) zugelassene Ersatzteile verwendet werden.

Eine Reparatur an den zünddurchschlagsicheren Spalten darf nur durch den Hersteller erfolgen. Die Reparatur von zünddurchschlagssicheren Spalten entsprechend den Werten der Tabelle 3 der IEC 60079-1:2014 ist nicht zulässig.

11 Instandhaltung und Wartung

Überprüfen sie die Sicherheitsvorrichtung (Temperaturbegrenzer, Niveauüberwachung), entsprechend den einschlägigen Bestimmungen auf Funktion. **Eine jährliche Überprüfung wird empfohlen. In Abhängigkeit vom Einsatz und Umgebung auch in einem kürzeren Intervall.** Um den Forderungen des Ex-Schutzes zu genügen, muss das Ex-Gerät verschlossen bleiben.

Das Ex-Gerät sollte jährlich einer visuellen Prüfung unterzogen werden. Wir empfehlen, die im Weiteren genannten Prüfungen und Kontrollen anfangs in kleinen Intervallen zu prüfen.

Für den einwandfreien Betrieb ist das Ex-Gerät auf folgende Sachverhalte zu untersuchen:

- ✓ Isolationswerte messen
- ✓ Widerstandswerte (Ω) messen
- ✓ Temperaturregler und / oder –begrenzer auf Funktion überprüfen, durchmessen
- ✓ Sichtkontrolle auf Beschädigungen
- ✓ Sichtkontrolle auf Ablagerungen oder Verkrustungen auf der Heizelementen
- ✓ Sichtkontrolle auf Dichtigkeit
- ✓ Sichtkontrolle des elektrischen Anschlussraumes (Feuchtigkeit, Rost, .. verringern die Isolationswerte und müssen entfernt werden.)

Ablagerungen oder Verkrustungen auf den Heizelementen können das Ex-Gerät zerstören und müssen entfernt werden.
Die Reinigung muss sorgfältig durchgeführt werden, damit die Oberfläche nicht beschädigt wird.

Führen sie eine jährliche Funktionsprüfung der Sicherheitsvorrichtungen durch.
In Abhängigkeit vom Einsatz und Umgebung auch in einem kürzeren Intervall.

12 Demontage

- Anlage nur demontieren, wenn keine Explosionsgefahr besteht. (Feuererlaubnis)
- Anlage abschalten und gegen unbeabsichtigtes Einschalten sichern.
- Ex-Gerät auf Raumtemperatur abkühlen lassen.
- Anschlussleitung abschließen und entfernen.

13 Lagerung

Der Lagerraum muss trocken und staubfrei sein.
Stellen Sie sicher, dass die Lagertemperaturen zwischen -40°C und +40°C liegen.
Vor dem Einlagern muss sichergestellt sein, dass beim Transport oder bei einer Zwischenlagerung keine Feuchtigkeit in den Anschlussraum eingedrungen ist.
Alle Öffnungen müssen dicht verschlossen werden, um ein Eindringen von Staub/Feuchtigkeit zu verhindern.
Der Anschlussraum muss dicht verschlossen sein, die Leitungseinführungen müssen ggf. mit Blindstopfen versehen werden.

Geben sie ein Trocknungsmittel in den Anschlussraum, um vorhandene Feuchtigkeit aufzunehmen.
Verwenden sie nur chemisch indifferente Trockenmittel (z.B. Silikagel).
Wechseln sie das Trockenmittel in den vorgeschriebenen Abständen. Beachten sie die Hinweise des Trockenmittel-Herstellers.

Bei der Lagerung über einen längeren Zeitraum (mehrere Monate) ist systembedingt damit zu rechnen, dass der Isolationswiderstand sinkt.
Das Ex-Gerät darf erst in Betrieb genommen werden, wenn sichergestellt ist, dass der Isolationswiderstand, in Anlehnung an die Norm DIN 44874, Teil 1, Abs. 5.3, größer ist

$$\mathbf{Riso} \geq \frac{\mathbf{2\ M\Omega}}{\textbf{Anzahl der eingebauten Rohrheizkörper}}$$

Gemessen im kalten Zustand mit 500V Gleichspannung.

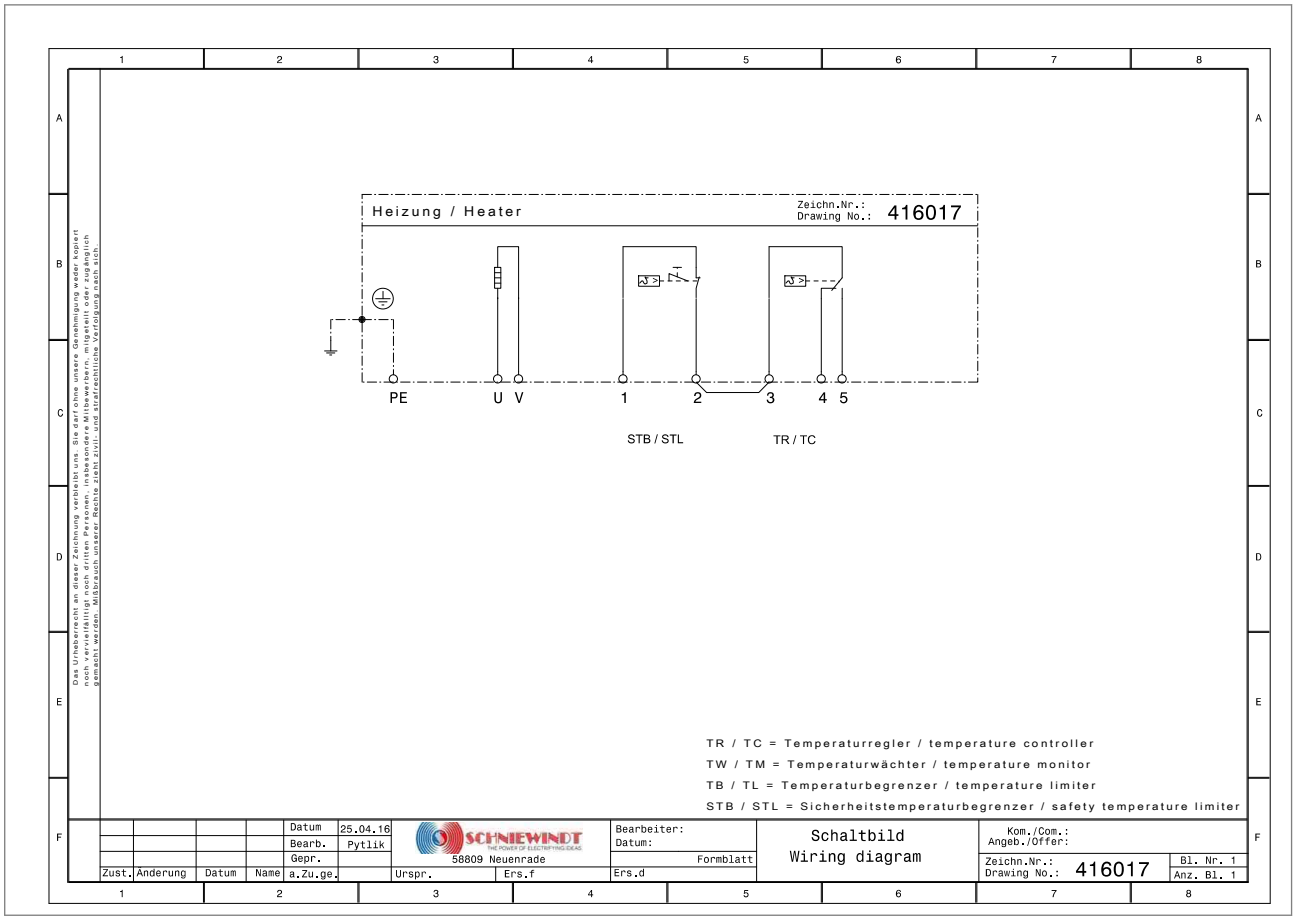
14 Entsorgung

- Problematische Ablagerungen gemäß den örtlich geltenden Vorschriften entfernen.
- Das Ex-Gerät gemäß den örtlich geltenden Vorschriften entsorgen.
- Metalle und Kunststoffe sortenrein zur Wiederverwertung oder Verschrottung geben.

15 Normen

Die angewandten Normen sind der beigefügten Konformitätserklärung zu entnehmen. Das Gerät wird in Übereinstimmung mit folgenden internationalen Normen gefertigt:

⇒ EN 60079-0 : Allgemeine Anforderungen
⇒ EN 60079-1 : Druckfeste Kapselung „d“
⇒ EN 60079-7 : Erhöhte Sicherheit „e“
⇒ EN 60079-31 : Schutz durch Gehäuse „t“



Das Urheberrecht an dieser Zeichnung verbleibt uns. Sie darf ohne unsere Genehmigung weder kopiert noch vervielfältigt noch dritten Personen, insbesondere Mitbewerbern, mitgeteilt oder zugänglich gemacht werden. Mißbrauch unserer Rechte zieht zivil- und strafrechtliche Verfolgung nach sich.

SCHNIEWINDT
THE POWER OF ELECTRIFYING IDEAS

EU-Konformitätserklärung / EU declaration of conformity

Wir/ We **Schniewindt GmbH & Co. KG**
Schöntaler Weg 46, 58809 Neuenrade

erklären in alleiniger Verantwortung, dass das Produkt /
hereby declare in sole responsibility that the product

CSN® Ex Heizkörper / CSN® Ex Heater
95**/**-Exde* ***T*/T***°C

Kennzeichnung/ marking: II 2G Ex db eb IIC T. und / and optional
II 2D Ex tb IIIC T…°C

auf das sich diese Erklärung bezieht, den Bestimmungen der folgenden Richtlinie entspricht /
to which this declaration relates is in accordance with the provisions of the following directive

2014/34/EU **„ATEX- Richtlinie“ / „ATEX- Directive“**
2014/30/EU **„EMV- Richtlinie“ / „EMC- Directive“**

Angewandte harmonisierte Normen / Applied harmonised standards:

EN60079-0:2012+A11:2013	EN60079-1:2014
EN60079-7:2015	und / and optional EN60079-31:2014
EN61000-6-2:2005/AC:2005	EN61000-6-4:2007+A1:2011

EU-Baumusterprüfbescheinigung nach Anh. III/EC type examination certificate according to Ann. III
BVS 15 ATEX E 143 X der / from
DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Kennnummer / identification number: 0158

Produktionsüberwachung nach Anhang VII/Production surveillance according to Annex VII:
BVS 15 ATEX ZQS/E401 der / from
DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Kennnummer / identification number: 0158

Neuenrade, den 12.11.2018

Dr. Karl Kaluza

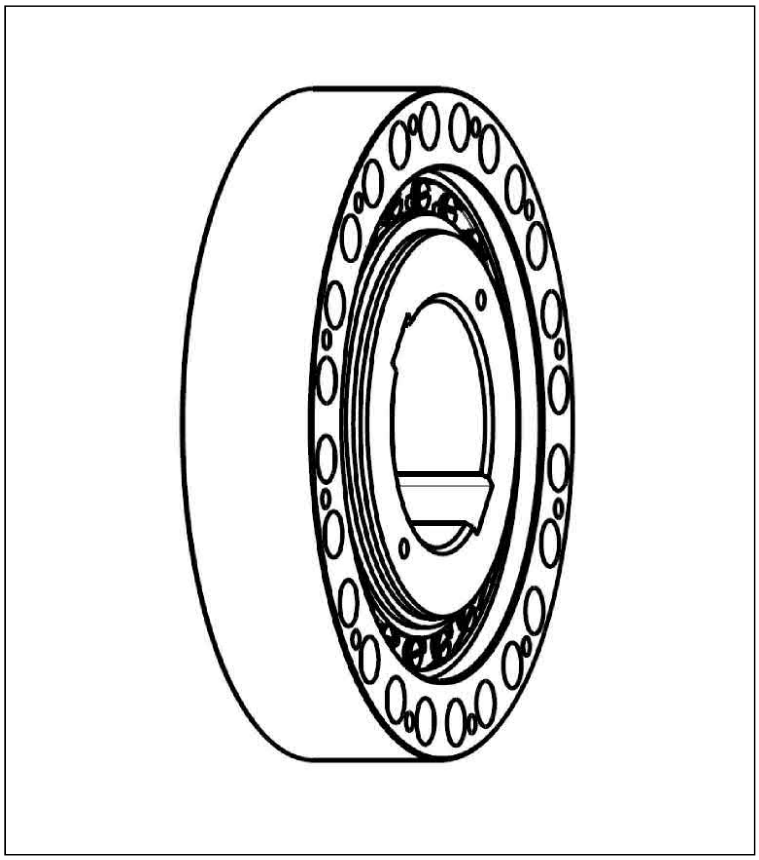
Leiter des Qualitätsmanagements/
Head of Quality Management

9_KE95Exdet_I_EXAM

CE Erklärungen 26.10.2018.xlsm

Montage - und Wartungsanleitung

Typen FC5044



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Ausgabedatum: 30.04.2019 GB
Revision: 0
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Allgemeine Sicherheitshinweise

⚠	**WARNUNG**	**Verletzungsgefahr durch bewegte Bauteile!** Angetriebene, rotierende Bauteile können schwerste Verletzungen verursachen! Deshalb während des Betriebes: ➢ Aufenthalt von Personen im Gefahrenbereich oder in seiner unmittelbaren Umgebung ist strengstens untersagt! ➢ Sicherheitsvorrichtungen und/oder –funktionen nicht außer Betrieb setzen, nicht unbrauchbar machen oder umgehen Vor Betreten des Gefahrenbereiches: ➢ Energieversorgung ausschalten und gegen Wiedereinschalten sichern ➢ Stillstand nachlaufender Bauteile abwarten

⚠	**GEFAHR!**	**Gefahr durch unsachgemäßen Betrieb!** ➢ Umbauten an der Freilaufkupplung sind nicht zulässig und können die Sicherheit beeinträchtigen ➢ Alle Arbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden ➢ Reparatur- und Wartungsarbeiten dürfen nur bei Stillstand der Maschine ausgeführt werden. Die Maschine ist hierzu gegen Wiederanfahren zu sichern!

⚠	**WARNUNG**	**Verletzungsgefahr durch fehlerhafte Montage!** Fehlerhafte Montage und Wartung kann zu Sach- und schweren Personenschäden führen! Montage-, Wartungs- und Reparaturarbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden!

⚠	**WARNUNG**	**Verletzungsgefahr bei unzureichender Qualifikation!** Unsachgemäßer Umgang kann zu erheblichen Personen- und Sachschäden führen. Deshalb: ➢ Jegliche Tätigkeiten immer nur durch die dafür benannten Personen durchführen lassen

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1 Allgemeines

1.1 Informationen zur Montage- und Wartungsanleitung

Diese Montage- und Wartungsanleitung gibt wichtige Hinweise zum Einbau und zur Inbetriebnahme des Freilaufes.

Voraussetzung für sicheres Arbeiten ist die Einhaltung aller angegebenen Sicherheits- und Handlungsanweisungen.

Darüber hinaus sind die für den Einsatzbereich der Freilaufkupplung geltenden örtlichen Unfallverhütungsvorschriften und allgemeinen Sicherheitsbestimmungen einzuhalten.

Die Montage- und Wartungsanleitung vor dem Einbau und der Inbetriebnahme sorgfältig durchlesen! Sie ist Produktbestandteil und muss in unmittelbarer Nähe des Einbauortes für das Personal jederzeit zugänglich aufbewahrt werden. Zusätzlich sind alle Sicherheitshinweise der Montage- und Wartungsanleitung zu beachten.

1.2 Symbolerklärung

Warnhinweise sind in dieser Montage- und Wartungsanleitung durch Symbole gekennzeichnet. Die Hinweise werden durch Signalworte eingeleitet, die das Ausmaß der Gefährdung zum Ausdruck bringen. Die Hinweise unbedingt einhalten und umsichtig handeln, um Unfälle, Personen- und Sachschäden zu vermeiden.

	GEFAHR!	… weist auf eine unmittelbar gefährliche Situation hin, die zum Tod oder zu schweren Verletzungen führt, wenn sie nicht gemieden wird.
	WARNUNG	… weist auf eine möglicherweise gefährliche Situation hin, die zum Tod oder zu schweren Verletzungen führen kann, wenn sie nicht gemieden wird.
	ACHTUNG	… weist auf eine möglicherweise gefährliche Situation hin, die zu geringfügigen oder leichten Verletzungen führen kann, wenn sie nicht gemieden wird.
	VORSICHT	… weist auf eine möglicherweise gefährliche Situation hin, die zu Sachschäden führen kann, wenn sie nicht gemieden wird.
	HINWEIS	… hebt nützliche Tipps und Empfehlungen sowie Informationen für einen effizienten und störungsfreien Betrieb hervor.

1.3 Hersteller

STIEBER GmbH, D-69126 Heidelberg, Hatschekstr. 36, Deutschland
Tel +49 (0) 6221 3047-0, Fax -31

1.4 Beschriftung

Stirnseite des Außenringes

- Herstellername
- Typenbezeichnung
- Herstelldatum (codiert)

1.5 Umweltschutz

Energie: Der Freilauf verbraucht keine elektrische Energie.

Materialien: Stahl

Recycling: Stahlteile sind zu 100% wiederverwertbar.

2 Sicherheit

2.1 Bestimmungsgemäße Verwendung

Freilaufkupplungen des Typs FC5044 sind drehrichtungsabhängig selbsttätig schaltende Kupplungen. Sie übertragen das Drehmoment kraftschlüssig. Sie können als Überholkupplungen und als Rücklaufsperren in Maschinen und Anlagen eingesetzt werden.

Mitnahmebetrieb einer Überholkupplung:

Bei Betrieb der antreibenden Maschinenelemente in Mitnahmerichtung werden das antreibende Maschinenelement und das angetriebene Maschinenelement durch die Überholkupplung kraftschlüssig miteinander verbunden. In diesem Betriebszustand kann eine Leistung übertragen werden.

Überholbetrieb einer Überholkupplung:

Die Überholkupplung löst die kraftschlüssige Verbindung vom antreibenden Maschinenelement und angetriebenem Maschinenelement automatisch, wenn das angetriebene Maschinenelement eine höhere Drehzahl als das antreibende Maschinenelement aufweist. Ist das angetriebene Maschinenelement mit dem Innenring des Freilaufs verbunden, wird ab einer definierten Drehzahl der kontaktfreie Betrieb gewährleistet, sodass ab dieser Drehzahl die Verschleißfreiheit aller funktionsrelevanten Bauteile garantiert ist.

Sperrbetrieb einer Rücklaufsperre:

Bei Betrieb der Maschinenwelle in Sperrrichtung werden die Maschinenwelle und das drehmomentabstützende Maschinenelement durch die Rücklaufsperre kraftschlüssig miteinander verbunden. In diesem Betriebszustand wird ein Drehmoment übertragen werden.

Überholbetrieb einer Rücklaufsperre:

Die Rücklaufsperre löst die kraftschlüssige Verbindung von Maschinenwelle und drehmomentabstützendem Maschinenelement automatisch, wenn die Maschinenwelle in Überholrichtung betrieben wird. Dabei wird ab einer definierten Drehzahl der Maschinenwelle der kontaktfreie Betrieb innerhalb der Rücklaufsperre gewährleistet, sodass ab dieser Drehzahl die Verschleißfreiheit aller funktionsrelevanten Bauteile garantiert ist.

2.2 Verantwortung des Betreibers

Der Betreiber der Maschine, in welche die Freilaufkupplung eingebaut ist, unterliegt den gesetzlichen Pflichten zur Arbeitssicherheit.

Die am Einsatzort geltenden Bestimmungen sowie die Sicherheits- und Unfallverhütungsvorschriften der Berufsgenossenschaft sind zu beachten. Insbesondere gilt, dass der Betreiber:

- sich über die geltenden Arbeitsschutzbestimmungen informiert
- in Betriebsanweisungen die notwendigen Verhaltensanforderungen für den Betrieb der Maschine, in welche die Freilaufkupplung eingebaut ist, am Einsatzort umsetzt
- die Zuständigkeiten für die Installation, Bedienung, Wartung und Reinigung der Maschine, in welche die Freilaufkupplung eingebaut ist, eindeutig regelt
- dafür sorgt, dass alle Mitarbeiter, die am oder mit der Maschine, in welche die Freilaufkupplung eingebaut ist, beschäftigt sind, die Betriebsanleitung gelesen und verstanden haben. Darüber hinaus muss er das Personal in regelmäßigen Abständen im Umgang mit der Maschine schulen, in welche die Freilaufkupplung eingebaut ist und über die möglichen Gefahren informieren. Weiterhin ist der Betreiber verantwortlich, dass die Maschine, in welche die Freilaufkupplung eingebaut ist:
    - stets in technisch einwandfreiem Zustand ist
    - gemäß angegebener Wartungsintervalle instandgehalten wird
    - alle Sicherheitseinrichtungen regelmäßig auf Vollständigkeit und Funktionsfähigkeit überprüft werden

2.3 Montage- und Wartungspersonal

⚠	**WARNUNG**	**Verletzungsgefahr bei unzureichender Qualifikation!** Unsachgemäßer Umgang kann zu erheblichen Personen- und Sachschäden führen. Deshalb: ➢ Jegliche Tätigkeiten immer nur durch die dafür benannten Personen durchführen lassen

Ausgebildete Fachkräfte sind Personen, die auf Grund ihrer Ausbildung, Erfahrung und Unterweisung sowie ihrer Kenntnisse über einschlägige Normen, Bestimmungen, Unfallverhütungsvorschriften und Betriebsverhältnisse von dem für die Sicherheit der Anlage

Verantwortlichen berechtigt worden sind, die jeweils erforderlichen Tätigkeiten auszuführen und dabei mögliche Gefahren erkennen und vermeiden können. Unter anderem sind auch Kenntnisse über Erste-Hilfe-Maßnahmen und die örtlichen Rettungseinrichtungen erforderlich.

2.4 Persönliche Schutzausrüstung

Beim Umgang mit der Maschine, in welche die Freilaufkupplung eingebaut ist, ist das Tragen persönlicher Schutzausrüstung erforderlich, um Gesundheitsgefahren zu minimieren.

Vor allen Arbeiten ist die notwendige Schutzausrüstung wie Arbeitsschuhe, Handschuhe, Schutzbrille, etc. ordnungsgemäß anzulegen und während der Arbeit zu tragen.

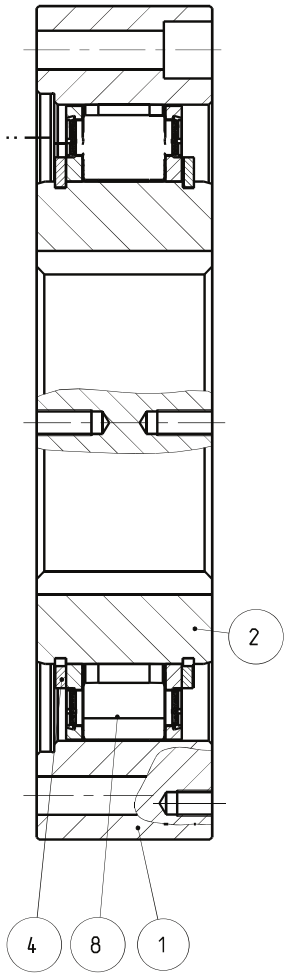
2.5 Einsatzgrenzen

Typ FC5044	Bohrung [mm]	max. Dreh-moment [Nm	Überholdrehzahl [min-1]		zulässige Rundlauf-abweichung Außenring zur Welle [mm	Planlauf Außenring-aufnahme zur Welle [mm]	Anzahl/ Größe Befesti-gungs-schrauben
			min.	max.			
	140	48000	300	1600	0,6	0,2	24xM16

- Grenzen Umgebungstemperatur: –20°C bis +80°C
- maximale Betriebstemperatur: 90°C
- Überholbewegung: Maschinenwelle (Innenring)
- erforderliche Toleranz Maschinenwelle: Ø h6 oder j6
- erforderliche Toleranz Außenringzentrierung (Innen-Ø): Ø h6 oder g6
- Öl-Schmierung: freigegebene Öle laut Stieber Produktkatalog / WN900
- Fett-Schmierung: freigegebene Fette laut Stieber Produktkatalog / WN900

3 Aufbau und Funktion

3.1 Aufbau



Pos. 1	Außenring
Pos. 2	Innenring
Pos. 4	Sicherungsring
Pos. 8	Käfig

Abb.1a Aufbau

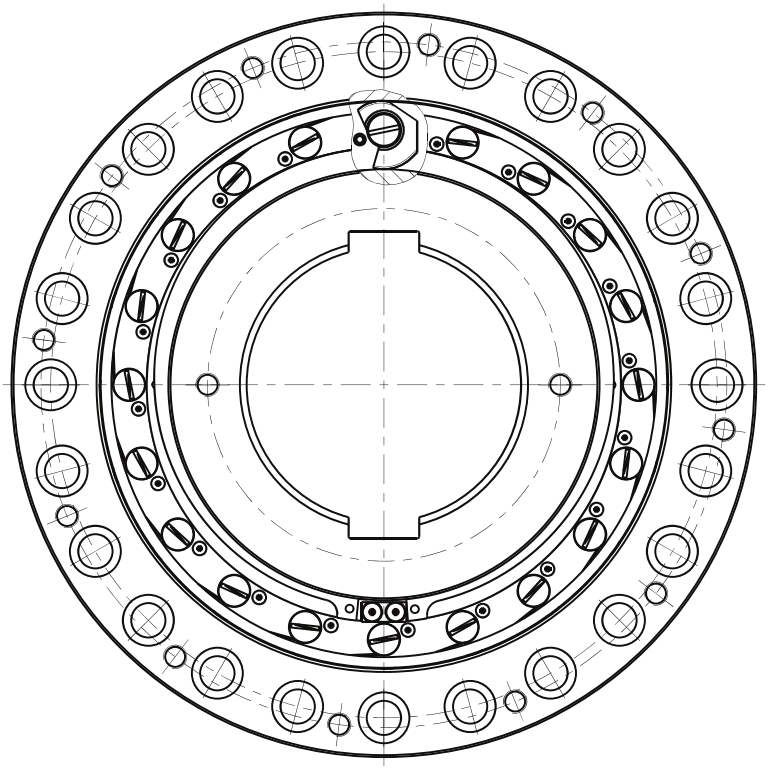


Abb.1b Aufbau

3.2 Funktionsweise

Bei der Drehmomentübertragung über die Freilaufkupplung werden der Außenring (1) und der Innenring (2) kraftschlüssig gekoppelt. Dazu werden Klemmkörper verwendet, deren äußere Kontur die kraftschlüssige Kopplung realisiert. Die Klemmkörper sind in einem Käfig integriert und werden durch Federn in den Kontakt zum Außen- und Innenring gepresst. Die Federn sorgen für ein schnelles Ansprechverhalten der Freilaufkupplung zum Beginn der Drehmomentübertragung.

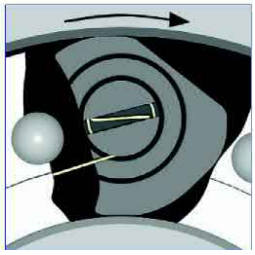


Abb.2 Drehmomentübertragung

Im Überholbetrieb, oberhalb der min. zulässigen Überholdrehzahl, bewirkt die Zentrifugalkraft in Verbindung mit der Klemmkörpergeometrie ein rückstellendes Drehmoment, welches die Klemmkörper gegen die Federkraft verdreht. Auf diese Weise wird eine berührungsfreie Position realisiert, sodass der verschleißfreie Betrieb der Freilaufkupplung bewerkstelligt werden kann. Die minimal zulässige Überholdrehzahl darf nur kurzzeitig während der Start- oder Abschaltphase der Maschine unterschritten werden, da ansonsten die verschleißbedingte Beschädigung der Kontaktpartner zum Ausfall der Freilaufkupplung führen kann.

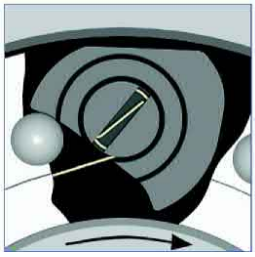


Abb.3 berührungsfreie Position

4 Transport und Verpackung

⚠	**WARNUNG**	**Verletzungsgefahr durch Herunterfallen oder Umkippen der Freilaufkupplung!** Das Gewicht der Freilaufkupplung kann einen Menschen verletzen und schwere Quetschungen verursachen! Deshalb: ➢ Benutzen Sie eine Palette auf der die Freilaufkupplung mit einem Stapler bewegt werden kann ➢ Verwenden Sie geeignetes Hebezeug (Schlingen, etc.), das für das Gewicht der Freilaufkupplung ausgelegt ist

	HINWEIS	Zur Entsorgung der Transport- und Verpackungsmaterialien sind die lokalen Entsorgungsbestimmungen zu beachten!

Die Freilaufkupplungen des Typs FC5044 sind in einer VCI-Luftpolsterfolie verpackt. Die Freilaufkupplung wird in einem Karton auf einer Palette verschickt.

Die Freilaufkupplung wird mit einer Transportsicherung montiert mitgeliefert (siehe Abb. 4), welche das Auseinanderfallen der Freilaufkomponenten verhindert.

Transportschäden an der Verpackung und / oder der Freilaufkupplung sind unverzüglich bei der jeweiligen Transitgesellschaft zu melden!

Das Auspacken der Freilaufkupplung muss in sauberer und trockener Umgebung erfolgen!

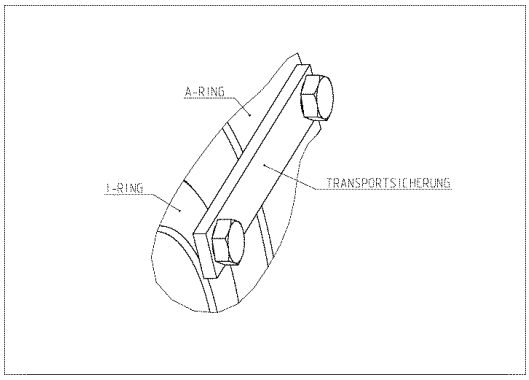


Abb. 4: Transportsicherung

5 Lagerung

5.1 Kurzzeitlagerung

Die Rücklaufsperre des Typs FC5044 ist in einer VCI-Luftpolsterfolie verpackt. Die VCI-Luftpolsterfolie ist in regelmäßigen Abständen zu überprüfen. Die Häufigkeit richtet sich nach den Umweltbedingungen (Temperatur, Feuchtigkeit, Salzgehalt der Luft, ...) am Lagerungsort.

Die maximale Lagerungszeit (Kurzzeitlagerung) beträgt 6 Monate. Darüber hinaus muss die Rücklaufsperre mit einem Langzeitlagerung-Korrosionsschutz versehen werden.

Packstücke unter folgenden Bedingungen lagern:

- Nicht im Freien aufbewahren
- Trocken und staubfrei lagern
- Keinen aggressiven Medien aussetzen

- Vor Sonneneinstrahlung schützen
- Mechanische Erschütterungen vermeiden
- Lagertemperatur: −10 bis +60 °C
- Relative Luftfeuchtigkeit: max. 95%, nicht kondensierend

5.2 Langzeitlagerung

Dazu muss die Freilaufkupplung zusammen mit Trockenmittel in eine Folie eingeschweißt und mit einem Feuchtigkeitsanzeiger versehen werden. Nach spätestens einem Jahr oder aber in Abhängigkeit von den Umweltbedingungen (Temperatur, Feuchtigkeit, Salzgehalt der Luft, ...) am Lagerungsort, muss der Korrosionsschutz überprüft werden.

Packstücke unter folgenden Bedingungen lagern:

- Nicht im Freien aufbewahren
- Trocken und staubfrei lagern
- Keinen aggressiven Medien aussetzen
- Vor Sonneneinstrahlung schützen
- Mechanische Erschütterungen vermeiden
- Lagertemperatur: −10 bis +60 °C
- Relative Luftfeuchtigkeit: max. 95%, nicht kondensieren

6 Installation

6.1 Prüfen der Drehrichtung

⚠	**WARNUNG**	**Verletzungsgefahr durch fehlerhafte Montage!** Fehlerhafte Montage und Wartung kann zu Sach- und schweren Personenschäden führen! Montage-, Wartungs- und Reparaturarbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden!

⚠	**WARNUNG**	**Verletzungsgefahr durch bewegte Bauteile!** Angetriebene, rotierende Bauteile können schwerste Verletzungen verursachen! Deshalb während des Betriebes: ➢ Aufenthalt von Personen im Gefahrenbereich oder in seiner unmittelbaren Umgebung ist strengstens untersagt! ➢ Sicherheitsvorrichtungen und/oder –funktionen nicht außer Betrieb setzen, nicht unbrauchbar machen oder umgehen Vor Betreten des Gefahrenbereiches: ➢ Energieversorgung ausschalten und gegen Wiedereinschalten sichern ➢ Stillstand nachlaufender Bauteile abwarten

M1259D_0	Montage- und Wartungsanleitung	Stieber Altra Industrial Motion

!	**VORSICHT**	**Verletzungsgefahr durch herabfallende Bauteile!** Bei demontierter Transportsicherung kann der Außenring oder Innenring herabfallen. Außenring und Innenring axial fixieren.

Die Leerlauf-Drehrichtung ist durch FREE auf dem Käfig (8) gekennzeichnet. Ein Drehrichtungswechsel ist durch Umdrehen des Innenrings samt Käfig zu erreichen.

Arbeitsschritte:

- Freilaufkupplung mit FREE nach OBEN auf Montagetisch ablegen
- Transportsicherung entfernen
- Innenring (2) inklusive Käfig (8) aus dem Außenring (1) heben, dazu geeignete Hebemittel an Hebegewinde des Innenringes anbringen
- Innenring inklusive Käfig (8) mit FREE nach UNTEN auf Montagetisch ablegen
- die Klemmkörper des Freilaufkäfigs mit einer Montagehilfe (O-Ring/ Kabelbinder) in Abhebestellung fixieren (siehe Abb. 5 und 6)

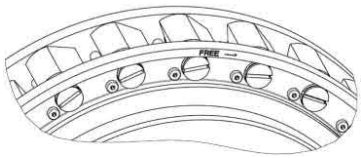


Abb. 5: Klemmkörper in „Eingriff“

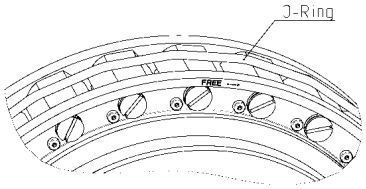


Abb. 6: Klemmkörper „abgehoben“

- Innenring (2) mit Käfig (8) in Außenring (1) einsetzen bis die Hälfte des Klemmkörpers verdeckt wird

i	**HINWEIS**	Die Montagehilfe (O-Ring/ Kabelbinder) muss nach der Montage vollständig entfernt werden! Bei Nichtbeachtung kann dies zu einer Funktionsbeeinträchtigung bis hin zum Ausfall führen.

- Montagehilfe (O-Ring/ Kabelbinder) entfernen und den Innenring inkl. Käfig vollständig absenken
- Überprüfen der Überholbewegung. Die Freilaufkupplung muss in Überholdrehrichtung leichtgängig zu verdrehen sein
- Transportsicherung montieren

6.2 Schmierung

Die Freilaufkupplungen FC5044 benötigen im Überholbetrieb oberhalb der Abhebedrehzahl keine Schmierung, da sie berührungslos arbeiten.

Ebenso wird im Sperrbetrieb keine Schmierung benötigt, da nur eine geringe Wälzbewegung der Klemmkörper stattfindet.

Eine zusätzliche Schmierung ist erforderlich, falls die Rücklaufsperre für einen häufigen oder langanhaltenden Betrieb unterhalb der Abhebedrehzahl eingesetzt wird. Dabei ist ein dünner Schmierfettfilm vorgeschrieben, der die Klemmkörper und die Laufbahn vom Außenring benetzt. Bei diesen Betriebsverhältnissen ist die Lebensdauer begrenzt!

6.2.1 Betrieb bei Ölschmierung

Erfolgt der Einbau direkt in ein Getriebe, reicht ein Ölnebel zur Schmierung aus.

Bei einem häufigen oder langanhaltenden Betrieb unterhalb der Abhebedrehzahl ist eine Tauchschmierung oder eine Ölzuführung zwischen Käfig und Außenringlaufbahn erforderlich. Bei diesen Betriebsverhältnissen ist die Lebensdauer begrenzt! Das notwendige Ölvolumen bei Tauchschmierung hängt von der Umgebungskonstruktion ab. Der Ölstand soll eine maximale Höhe von 10 Millimeter auf dem Innendurchmesser des Außenringes nicht überschreiten.

6.2.2 Betrieb bei Fettschmierung

ℹ	**HINWEIS**	Eine Überfettung kann zur Fehlfunktion der Freilaufkupplung führen! Fettmenge beachten!

ℹ	**HINWEIS**	Ungeeignete Schmiermittel können die Freilauffunktion negativ beeinflussen! Nur Fette verwenden, die durch Firma Stieber freigegeben sind!

Schmierfette entsprechend Produktkatalog / WN900 auswählen.

Arbeitsschritte zum Befetten der Freilaufkupplung:

- Freilaufkupplung mit FREE nach OBEN auf Montagetisch ablegen
- Transportsicherung entfernen
- Innenring (2) inklusive Käfig (8) aus dem Außenring (1) heben, dazu geeignete Hebemittel an Hebegewinde des Innenringes anbringen
- Außenringlaufbahn mit einer Schichtstärke von ca. 1 mm einfetten
    - Fette der NLGI Klasse 000 bis 2 mit einer max. Grundölviskosität von 42 mm^2/s verwenden

- die restliche Fettmenge (siehe Kap.2.5) gleichmäßig auf der Innenringlaufbahn und dem Käfig verteilen
- die Klemmkörper des Freilaufkäfigs mit einem O-Ring/ Kabelbinder als Montagehilfe in Abhebestellung fixieren (siehe Abbildung 5 und 6)
- Innenring (2) mit Käfig (8) in Außenring (1) einsetzen bis die Hälfte des Klemmkörpers verdeckt wird
- Montagehilfe (O-Ring/ Kabelbinder) entfernen und den Innenring inkl. Käfig vollständig absenken

	HINWEIS	Die Montagehilfe (O-Ring/ Kabelbinder) muss nach der Montage vollständig entfernt werden! Bei Nichtbeachtung kann dies zu einer Funktionsbeeinträchtigung bis hin zum Ausfall führen.

- Überprüfen der Überholbewegung. Die Freilaufkupplung muss in Überholdrehrichtung leichtgängig zu verdrehen sein.
- Transportsicherung montieren

6.2.3 Schutz vor Korrosionsschäden

Die Sperre muss vor Korrosionsschäden geschützt werden.

	HINWEIS	Blanke Flächen müssen mit geeignetem Korrosionsschutzmittel behandelt werden. Als Korrosionsschutzmittel sollen Fette der NLGI Klasse 000 bis 2 mit einer max. Grundölviskosität von 42 mm2/s verwendet werden!

6.3 Montage

	WARNUNG	**Verletzungsgefahr durch fehlerhafte Montage!** Fehlerhafte Montage und Wartung kann zu Sach- und schweren Personenschäden führen! Montage-, Wartungs- und Reparaturarbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden!

	WARNUNG	**Verletzungsgefahr durch bewegte Bauteile!** Angetriebene, rotierende Bauteile können schwerste Verletzungen verursachen! Deshalb während des Betriebes: ➢ Aufenthalt von Personen im Gefahrenbereich oder in seiner unmittelbaren Umgebung ist strengstens untersagt! ➢ Sicherheitsvorrichtungen und/oder –funktionen nicht außer Betrieb setzen, nicht unbrauchbar machen oder umgehen Vor Betreten des Gefahrenbereiches: ➢ Energieversorgung ausschalten und gegen Wiedereinschalten sichern ➢ Stillstand nachlaufender Bauteile abwarten

!	**VORSICHT**	**Verletzungsgefahr durch herabfallende Bauteile!** Bei demontierter Transportsicherung kann der Außenring oder Innenring herabfallen. Außenring und Innenring axial fixieren.

Arbeitsschritte:

- Freilaufkupplung auf die geölte Maschinenwelle schieben, dazu ggf. geeignete Hebemittel an Hebegewinde des Innenringes anbringen
- Transportsicherung entfernen
- Freilaufkupplung auf der Maschinenwelle axial fixieren
- angetriebenes, bzw. drehmomentabstützendes Maschinenelement im Außenring zentrieren

i	**HINWEIS**	Die Schraubenqualität 12.9 darf nicht verwendet werden !

- angetriebenes, bzw. drehmomentabstützendes Maschinenelement mit entsprechenden Befestigungsschrauben (z. B. nach Norm DIN EN ISO 4762) und der Schraubenqualität 10.9 bzw. 8.8 fixieren, Anziehdrehmoment siehe Tab. Anzugsdrehmomente

Anziehdrehmoment [Nm]		
Größe	**8.8**	**10.9**
M16	206	290

Tab. Anzugsdrehmomente (nach VDI 2230 Blatt1, μ=0,12 metrisches Regelgewinde)

- Überprüfen der Überholbewegung

6.4 Einbaubeispiel

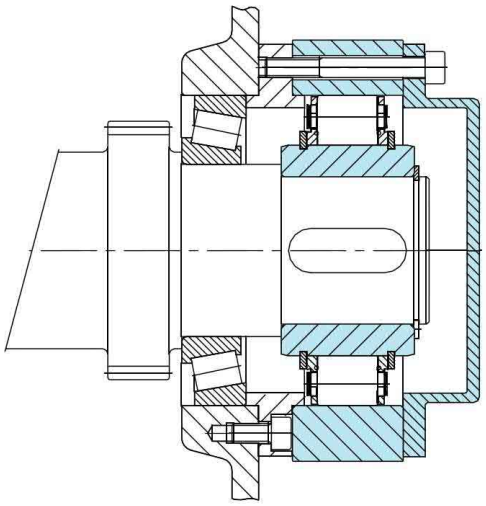


Abb. 7: Einbaubeispiel, Montage auf dem Wellenende

7 Wartung

⚠	**WARNUNG**	**Verletzungsgefahr durch fehlerhafte Montage!** Fehlerhafte Montage und Wartung kann zu Sach- und schweren Personenschäden führen! Montage-, Wartungs- und Reparaturarbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden!

⚠	**WARNUNG**	**Verletzungsgefahr durch bewegte Bauteile!** Angetriebene, rotierende Bauteile können schwerste Verletzungen verursachen! Deshalb während des Betriebes: ➢ Aufenthalt von Personen im Gefahrenbereich oder in seiner unmittelbaren Umgebung ist strengstens untersagt! ➢ Sicherheitsvorrichtungen und/oder –funktionen nicht außer Betrieb setzen, nicht unbrauchbar machen oder umgehen Vor Betreten des Gefahrenbereiches: ➢ Energieversorgung ausschalten und gegen Wiedereinschalten sichern ➢ Stillstand nachlaufender Bauteile abwarten

!	**VORSICHT**	**Verletzungsgefahr durch herabfallende Bauteile!** Bei demontierter Transportsicherung kann der Außenring oder Innenring herabfallen. Außenring und Innenring axial fixieren.

Die Freilaufkupplungen FC5044 müssen nach maximal **5 Jahren Betriebszeit** auf Beschädigungen überprüft und gewartet werden.

7.1 Demontage im Wartungsfall

Arbeitsschritte:

- Befestigungsschrauben vom Außenring (1) und angetriebenem, bzw. drehmomentabstützendem Maschinenelement lösen
- Axiale Fixierung des Innenringes entfernen
- Transportsicherung einfügen

!	**VORSICHT**	**Verletzungsgefahr durch herabfallende Bauteile!** Bei demontierter Transportsicherung kann der Außenring oder Innenring herabfallen. Deshalb: ➢ Transportsicherung einfügen!

- Freilaufkupplung von der Maschinenwelle abziehen, dazu ggf. geeignetes Hebewerkzeug verwenden
- Freilaufkupplung mit FREE nach oben auf Montagetisch ablegen
- Transportsicherung entfernen
- Innenring (2) inklusive Käfig (8) aus dem Außenring (1) heben, dazu geeignete Hebemittel an Hebegewinde des Innenringes anbringen
- Sicherungsring (4) vom Innerring entfernen und den Käfig (8) vom Innenring (2) abziehen

7.2 Prüfkriterien im Wartungsfall

Arbeitsschritte:

- Außenring (1), Innenring (2) und Käfig (8) mit einem Industriereiniger auf Petroleumbasis vorreinigen und mit einem Reiniger auf Acetonbasis entfetten
- Prüfen auf Schäden, Verschleiß und Risse (siehe Prüfkriterien
  - Außenringlaufbahn darf keine Beschädigungen / Ausbrüche aufweisen
  - verschleißbedingte Durchmesservergrößerung der Außenringlaufbahn max. 0,1 mm gegenüber den unverschlissenem Bereich
  - Deformationsspuren / Eindrücke auf den Laufbahndurchmessern des Innen- und Außenrings max. 0,1 mm tief

- Vollzähligkeit aller Federelemente (2 Stück pro Klemmkörper)
- Federelemente ohne Beschädigungen / Verformung
- Leichtgängige Drehbewegung der Klemmkörper von Anschlag zu Anschlag
- maximale Breite der Verschleißfacette auf den Klemmkörpern (siehe Abbildung 8)

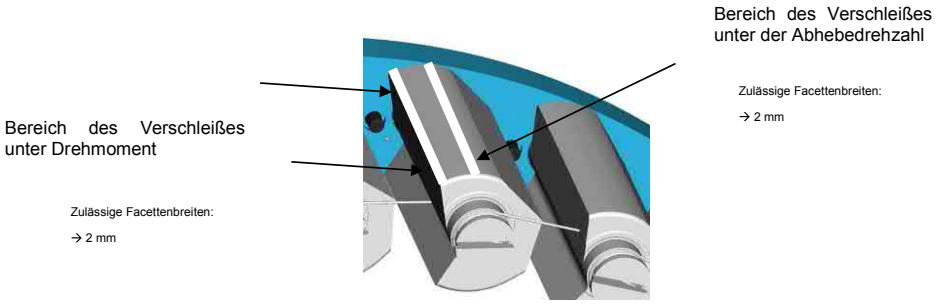


Abbildung 8: Verschleißzonen

- Nur wenn alle Prüfkriterien erfüllt sind, kann die Freilaufkupplung weiterverwendet werden

7.3 Montage im Wartungsfall bei Fettschmierung

Arbeitsschritte:

- Käfig (8) auf den Innenring (2) aufziehen und mit Sicherungsringen (4) axial fixieren
- die Außenringlaufbahn mit einer Schichtstärke von ca. 1 mm einfetten
  - Fette der NLGI Klasse 000 bis 2 mit einer max. Grundölviskosität von 42 mm^2/s verwenden
- die restliche Fettmenge (siehe Kap.2.5) gleichmäßig auf der Innenringlaufbahn und dem Käfig verteilen
- die Klemmkörper des Freilaufkäfigs mit einem O-Ring/ Kabelbinder als Montagehilfe in Abhebestellung fixieren (siehe Abbildung 5 und 6)
- Innenring (2) mit Käfig (8) in Außenring (1) einsetzen bis die Hälfte des Klemmkörpers verdeckt wird
- Montagehilfe (O-Ring/ Kabelbinder) entfernen und den Außenring über die Klemmkörper vollständig absenken

	HINWEIS	Die Montagehilfe (O-Ring/ Kabelbinder) muss nach der Montage vollständig entfernt werden! Bei Nichtbeachtung kann dies zu einer Funktionsbeeinträchtigung bis hin zum Ausfall führen.

- Transportsicherung montieren

- Freilaufkupplung auf die geölte Maschinenwelle schieben, dabei Überholdrehrichtung beachten
- Transportsicherung entfernen
- Freilaufkupplung auf der Maschinenwelle axial fixieren
- angetriebenes, bzw. drehmomentabstützendes Maschinenelement im Außenring zentrieren

	HINWEIS	Die Schraubenqualität 12.9 darf nicht verwendet werden !

- angetriebenes, bzw. drehmomentabstützendes Maschinenelement mit entsprechenden Befestigungsschrauben (z. B. nach Norm DIN EN ISO 4762) und der Schraubenqualität 10.9 bzw. 8.8 fixieren, Anziehdrehmoment siehe Tabelle Anzugsdrehmoment

Anziehdrehmoment [Nm]		
Größe	**8.8**	**10.9**
M16	206	290

Tab. Anzugsdrehmomente (nach VDI 2230 Blatt1, μ=0,12 metrisches Regelgewinde)

- Überprüfen der Überholbewegung

8 Demontage

	WARNUNG	**Verletzungsgefahr durch fehlerhafte Montage!** Fehlerhafte Montage und Wartung kann zu Sach- und schweren Personenschäden führen! Montage-, Wartungs- und Reparaturarbeiten dürfen nur von ausgebildeten Fachkräften durchgeführt werden!

	WARNUNG	**Verletzungsgefahr durch bewegte Bauteile!** Angetriebene, rotierende Bauteile können schwerste Verletzungen verursachen! Deshalb während des Betriebes: ➢ Aufenthalt von Personen im Gefahrenbereich oder in seiner unmittelbaren Umgebung ist strengstens untersagt! ➢ Sicherheitsvorrichtungen und/oder –funktionen nicht außer Betrieb setzen, nicht unbrauchbar machen oder umgehen Vor Betreten des Gefahrenbereiches: ➢ Energieversorgung ausschalten und gegen Wiedereinschalten sichern ➢ Stillstand nachlaufender Bauteile abwarten

	VORSICHT	**Verletzungsgefahr durch herabfallende Bauteile!** Bei demontiertem Deckel und / oder Flansch kann der Außenring von den Lagern rutschen. Außenring und Innenring axial fixieren.

Arbeitsschritte

- Befestigungsschrauben vom Außenring (1) und angetriebenem, bzw. drehmomentabstützendem Maschinenelement lösen
- Axiale Fixierung des Innenringes entfernen
- Transportsicherung montieren
- Freilaufkupplung von der Maschinenwelle abziehen, dazu geeignetes Hebewerkzeug verwenden

9 Entsorgung

	HINWEIS	Zur Entsorgung der metallischen Bauteile und der vorhandenen Schmiermittel, sind die lokalen Entsorgungsbestimmungen zu beachten!

Die Freilaufkupplung besteht aus metallischen Werkstoffen, die mit einem Fett oder Öl benetzt sind. Metallische Werkstoffe sind vollständig wiederverwertbar. Schmiermittel und Korrosionsschutzmittel sind gesondert zu entsorgen. Hier sind die lokalen Entsorgungsbestimmungen zu beachten.

10 Störung

Bei Störung ist der Hersteller unverzüglich zu kontaktieren!

STIEBER GmbH, D-69126 Heidelberg, Hatschekstr. 36, Deutschland
Tel +49 (0) 6221 3047-0, Fax -31

11 Ersatzteile

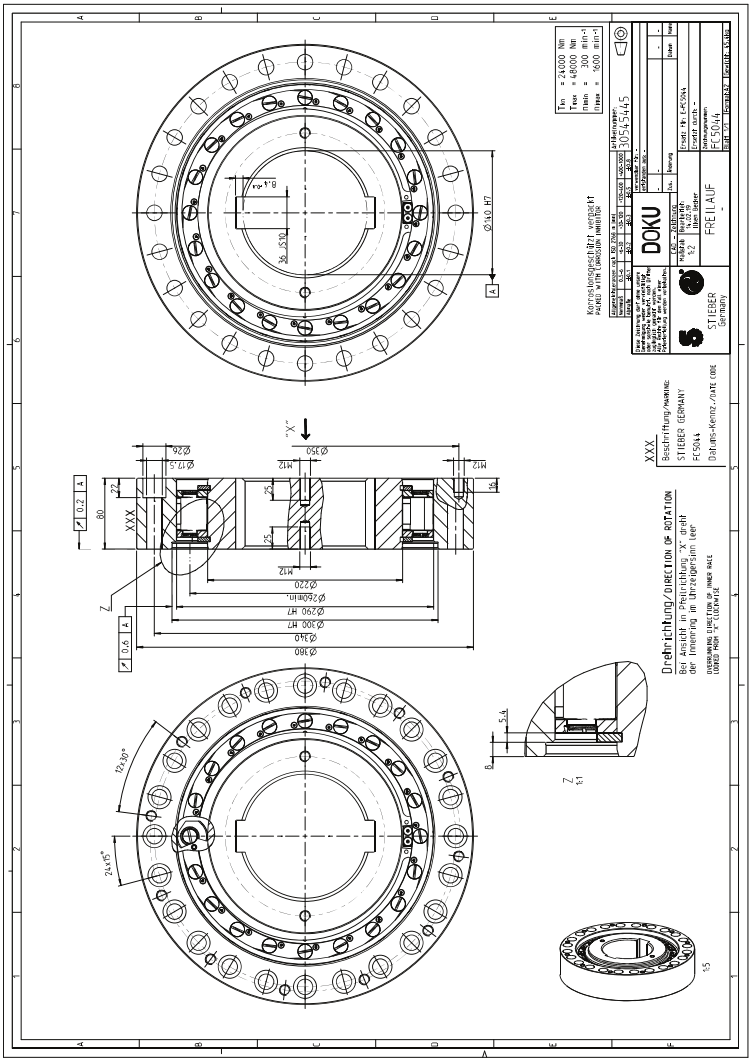
⚠	**WARNUNG**	**Verletzungsgefahr durch falsche Ersatzteile!** Falsche oder fehlerhafte Ersatzteile können zu Beschädigungen, Fehlfunktionen oder Totalausfall führen sowie die Sicherheit beeinträchtigen. Deshalb: ➢ Nur Originalersatzteile des Herstellers verwenden

Ersatzteile nur über Vertragshändler oder direkt beim Hersteller beschaffen.

12 Anhang

M1259D_0	Montage- und Wartungsanleitung	Stieber Ultra Industrial Motion

12.1 Zeichnung FC5044



Stieber

Seite 23/23

Test documentation

[pekrun]
Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn
www.pekrun.de

PRÜFDOKUMENTATION

TESTDOCUMENTATION

ZUM AUFTRAG
TO THE ORDER

IHRE BESTELL NR. *YOUR ORDER NO.*	4500494756
KENNWORT *CODE WORD*	Projekt-Nr. 4000369 / 4000370
IHRE WERKS NR. *YOUR WORKS NO.*	Material-No.: 2000064793
PEKRUN SERIAL NR. *PEKRUN SERIAL NO*	10002294
GETRIEBE TYP *GEAR UNIT TYPE*	ASR 413-R-CCW
PEKRUN KOM. NR. *PEKRUN COM. NO.*	19396/30

PRÜFDOKUMENTATION
TESTDOCUMENTATION

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060563
Werks-Nr.: *Works no.:*	Material-No.: 2000064793	Kennwort: *Code word:*	S/No. 10002294

Inhalt nach ITP	***Contents acc. to ITP***
1. Zeugnisse Radwelle	*1. Certificates to the wheel shaft*
2. Zeugnisse Stirnrad	*2. Certificates to the bull gear*
3. Zeugnisse Baugruppe Radwelle mit Stirnrad	*3. Certificates to the assembly group, bull gear with wheel shaft*
4. Zeugnisse Ritzelwelle	*4. Certificates to the wheel shaft*
5. Zeugnisse Gehäuse	*5. Certificates to the housing*
8. Zeugnisse zur Getriebeprüfung	*8. Gear box test certificates*
9. Allg. Informationen	*9. General Information*

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 02
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370 Mat.Nr.: 2000064793
Pekrun Reference: 19396

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
1	**Gear shaft (LS Shaft)**										
1.1	Material verification	42CrMo4 EN 10083	Specification		Material labeling		R				
1.2	Chemical analysis	42CrMo4 EN 10083	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
1.3	Mechanical characteristics Ultrasonic test	42CrMo4 EN 10083 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
1.4	Dimensional check after mechanical processing	Drawing	All fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
1.5	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
2	**Bull gear**										
2.1	Gear shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R				
2.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			
2.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
2.4	Dimensional check after mechanical processing	Drawing	Al fit measurements Accuracy of toothing	100%	Tolerance acc. to drawing	Measurement record	W	R			
2.5	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Measurement record	W	R			
3	**Assembly group, bull gear with gear shaft**										
3.1	Dimensional check of the toothing		Tooth trace, profile, pitch and runout	3 times circumference	Tolerance acc. to drawing	Test report	W	R			
3.2	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
4	**Pinion Shaft (HS Shaft)**										
4.1	Pinion shaft Material verification	18 CrNiMo7-6 EN 10084	Specification		Material labeling		R	R			
4.2	Chemical analysis	18 CrNiMo7-6 EN 10084	Chemical composition in % by weight (% by mass) according to ladle analysis		Material Standard	EN10204 3.1	R	R			

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 02
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370 Mat.Nr.: 2000064793
Pekrun Reference: 19396

[pekrun]

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
4.3	Mechanical characteristics Ultrasonic test	18 CrNiMo7-6 EN 10084 EN 10228 / SEP 1921	Tensile strength, Yield strength, Elongation, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
4.4	Hardness check of toothing	EN 6508	Check on a test piece	100%	Tolerance acc. to drawing	Test report	R	R			
4.5	Dimensional check after mechanical processing	Drawing	Al fit measurements	100%	Tolerance acc. to drawing	Measurement record	W	R			
4.6	Surface crack test: magnetic particle examination	EN 571-1 EN 9934 ASTM A275	Acc. to drawing	100%	No cracks allowed	Test report	W	R			
5	**Housing**										
5.1	Chemical analysis	P355NL1/2 EN 10028-3	Chemical composition in % by weight (% by mass) according to ladle analysis	100%	Material Standard	EN10204 3.1	R	R			
5.2	Mechanical characteristics	P355NL1/2 EN 10028-3	Tensile strength, Yield strength, Impact test	Requirements acc. to drwg	Tolerance acc. to drawing	EN10204 3.1	R	R			
5.3	Annealing		Stress free	100%	Material Standard	Diagram or record	R	R			
5.3	Casing leak test		Liquid penetrant inspection	all relevant welding seams	welding seams, no leakage allowed	Test report	W	R			
5.5	Dimensional check after mechanical processing	Drawing	All bearing seats and connecting dimensions	100%	Tolerance acc. to drawing	Measurement record	W	R			
8	**Gear unit**										
8.1	Backlash + contact check of the toothing	Manufacturer test instructions	Executed in job casing contact check, tape lift			Test report	W	W			
8.2	Control of assembly and conneting dimensions	Manufacturer test instructions	Al fit dimensions		Tolerance acc. to drawing	Test report	W	R			
8.3	Check at the Oil supply system bevor the test run.	Pekrun Testprocedure	Filter and cleanliness				W				
8.4	Test run main rotors	Pekrun Testprocedure	No load full speed			Test report	W	W			4 hour test run
8.5	Vibration and temperature reading during the test run	Pekrun Testprocedure	Measured with vibration probes and resistance thermometer			Test report	W	W			
9	**General Information**										
9.1	Machinery directive	2006/42/EG	Machinery Directive			Certificates	R	R			Part of the operating instructions.

PEKRUN Inspection and Test Plan (ITP) for Turboshafts and Gears, Rev. 02
Customer: Aerzener Maschinenfabrik Purchase Order: 4500494756 Project: 4000369 / 4000370 Mat.Nr.: 2000064793
Pekrun Reference: 19396

Item	Activity / Kind of tests	Test specification	Description	Scope of testing	Acceptance criteria	Test Log	Inspection by:				Remarks
							Pekrun	Aerzener			
9.2	Coating check		Surface cleanlines, Thickness of the coat, Adhesion acc. to ISO 2409		Grid cut test on test piece: ISO GT (1)	Certificates	R	R			
9.3	Documentation										

Remarks: Documentation (Quality certificates and reports) in german and english, **MRT**= Mechanical running test
R: Review. Verification of test results.
H: Hold Point. Inspection of a critical step in fabrication or testing. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer shall not continue fabrication if inspection parties are not present, except inspection has been waived by prior written notice.
W: Witness Point. Witnessing of a critical fabrication or testing step. Advance Inspection notification by manufacturer is required 25 calendar days in advance. Manufacturer may continue with work even if inspection parties are not present.

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Radwelle_wheel shaft_material certificates_PART-068833

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

BGH SL-Stahl GmbH
Chromstraße 3
30916 Isernhagen
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat 412193

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **BSVF16004734TSE**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816364-010-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält Round bars,forged,peeled
Werkstoff / Quality	1.7225 42CrMo4mod/4140mod/4145mod
Anforderungen / Requirements	SL-LV 4 Rev. 6 - 12/11 AISI 4140 mod. + AISI 4145 mod. ,Kundenvereinbarung

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d´élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d´identification(analyse spectrale)
ohne Beanstandung without objection	E- LF/VD	ohne Beanstandung without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
10	2	280 mm rd. x 5715 + 5868 mm	5608 kg	733746

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Al
733746	0,430	0,29	0,98	0,006	0,0010	1,14	0,28	0,45	0,020

Wärmebehandlungszustand / Condition of heat treat	vergütet quenched and tempered gehärtet/quenched + 600°C 10h Luft/air

Probe-Nr. / Test-No.	Lage / Loc.	Temp. °C	Rp0,2 N/mm²		Rm N/mm²	A5 %	Z %	Kerbschlagarbeit / Impact value J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness / HB
Soll/Req.	L L	RT	>=760		>=965 <=1100	>=13	>=40	>=45 >=27			RT -30°C	>=285 <=326
503R2 503R2	L L	RT	818		965	14,3	58	103 56	110 45	100 45	RT -30°C	300-290

Stirnabschreckversuch / Jominy test - EN ISO 642:

mm	1,5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
HRC	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56

Umformgrad : 8.3 : 1
Reduction ratio:

Gefüge : Vergütungsgefüge
Microstructure: quench and temper structure

Korngröße nach ASTM E 112: 5
Grain size acc. ASTM E 112:

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	16.09.2021	Langer

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **BSVF16004734TSE**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816364-010-01**

Reinheitsgrad nach ASTM E 45, Methode A :
Degree of purity acc. ASTM E 45, method A:

Type	A	B	C	D
dünn/thin	0,0	0,8	0,5	1,0
dick/heavy	0,0	0,3	0,3	0,5

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection limit of 0.1 Bq/g.

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	16.09.2021	**Langer**

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Page

US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Radwelle_wheel shaft_material certificates_PART-068833

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. **BSVF16004734TSE**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816364-010-01**
BGH works no.
BGH référence

Zeugnis-Nr. **412193**
Certificate no.
No. de certificat

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.7225 42CrMo4mod/4140mod/4145mod
Abmessung/Dimension: 280 mm rd. x 5715 + 5868 mm
Anzahl/Quantity : 2 Gewicht /Weight : 5608 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
Tab.3 Typ 1a (100%) und Tab.5, QK 4 (Randzone) / QK 3 (Restbereich)
table 3 type 1a (100%) and table 5, quality class 4 (edge zone) / quality class 3 (residual area)

Prüfgerät : Deutsch Echograph 1090
Testing device

Prüfkopf : S 10 W 4 C
Search unit

Kopplungsmittel : Kleister / Wasser
Couplant glue / water

Prüfumfang : halber Umfang über gesamte Länge
Amount of inspection half circumference over total length

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0 mm
Recording threshold FBH 2.0 mm

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 16.09.21	Prüfer Testing operator Opérateur Kosch Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A BGH Q 30	Überwacher Supervisor Surveilleur

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-068833
Werks-Nr.: *Works no.:*	Material No. 2000064793 TAG-No. 2.7.1.651	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002294

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Radwelle / wheel shaft	PN-00095298.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagersitz	Ø 240 m6	+0,046 +0,017	240,02
Fügesitz	Ø 242,48 h6	0 -0,029	242,48
Lagersitz	Ø 240 m6	+0,046 +0,017	240,045
Durchmesser	Ø 240 m6	+0,046 +0,017	240,045
Durchmesser	Ø 240 m6	+0,046 +0,017	240,045

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	11.04.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-068833
Werks-Nr.: *Works no.:*	Material No. 2000064792 TAG-No. 2.7.1.651	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002294

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Radwelle / wheel shaft	PN-00095298.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	42 CrMo4+QT	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Wellenübergang*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	11.04.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
58640 ISERLOHN

TELEFON 02371/945-0
TELEFAX 02371/945-299
EMAIL: INFO@PEKRUN.DE

Stirnrad_spur gear_material certificates_PART-069596

REINOSA Forgings Castings

ABNAHMEPRÜFZEUGNIS

ISO 9001; IATF 16949; ISO 14001 E ISO 45001

REINOSA FORGINGS & CASTINGS S. L.
Paseo Alejandro Calonge,1 39200 Reinosa (Cantabria)
TLF. (942) 775074 FAX (942) 775071
www.reinosafc.com

Produkt hergestellt in Spanien

KUNDE:SIPRO SIDERPRODUKTE AG		PROZESSNUMMER:2149646
AUFTRAGSN°.:170092	AUFTRAGSN°:335147-11	CHARGEN°.:640707
ARTIKELNUMMER:	DATENBLATT:335147000011	SCHMIEDEN:88331

PRODUKT IM AUFTRAG

18CrNiMo7-6+HH+FP RUNDE STANGES GESCHÄELT FERRIT-PERLIT GEGLÜHT (FP) 600+0/+3mm AUFTRAG TOLERANZ 4.000/7.000mm FEST

EXPEDITIONSDATEN ZUSTELLUNG:0080714234 GEWICHT (KG):12.694 BÜNDEL:1 BARREN:1

NORMEN UND VORSCHRIFTEN

DELTA LVL02 18CR 18 27.07.2020; EN 10084 - ABRIL 2008; EN 10204 - OCT. 2004 3.1
ISO 6336-5 3ªED. 15.08.2016; ISO 683-3 2ª EDICION 15.07.2016

CHEMISCHE ZUSAMMENSETZUNG GUSS U:% CHARGEN°.:640707

	C	Mn	Si	P	S	Cr	Ni	Mo	V	Cu	Al
Min.	0,150	0,500	0,150			1,600	1,400	0,250			0,020
Max.	0,190	0,700	0,400	0,015	0,008	1,800	1,700	0,350	0,030	0,250	0,045
Rep.	0,185	0,510	0,236	0,007	0,003	1,676	1,500	0,283	0,004	0,176	0,038

	Sn	Ti	Ca	Nb	H	O	N	Sb
Min.							0,0090	
Max.	0,030	0,0050	0,0010		0,00020	0,0020	0,0150	0,00500
Rep.	0,012	0,0010	0,0003	0,0300	0,00010	0,0019	0,0120	0,00100

Cu+10Sn>=0,000<=0,500:0,296 Al/N2>=2,0000<=3,5000:3,1667

HÄRTBARKEITSPROBE HÄRTE U.:HRC HÄRTETEMPERATUR:860-5/5°C

	1,5 mm	3 mm	5 mm	7 mm	9 mm	11 mm	13 mm	15 mm	20 mm	25 mm	30 mm
Min.	43,0	43,0	43,0	41,0	40,0	40,0	39,0	38,0	36,0	35,0	34,0
Max.	48,0	48,0	48,0	48,0	47,0	47,0	46,0	46,0	44,0	43,0	42,0
Rep.	48,0	47,5	47,4	47,1	47,0	46,8	45,8	45,2	42,5	41,0	39,0

	35 mm	40 mm
Min.	33,0	33,0
Max.	41,0	41,0
Rep.	38,4	35,9

JOMINY Norm(EN ISO 642:99 - 01.09.1999); Observaciones (Jominy)

PRÜFUNGEN REINHEITSGRAD

Norm(1)(ISO 4967 - 15.07.2013); Norm(2)(DIN 50602 - .09.1985); Typ/Methode(A); K(S+O):K4 8; DS:1; A(d):1,5 A(g):1; B(d):1,5; B(g):1; C(d):0; C(g):0; D(d):1; D(g):1

MECHANISCHE REFERENZEIGENSCHAFTEN

Muster:Rund von 30mm
Temperatur von:(1):Haerten 870°C; Zeit:(1):2Stunden; Abkühlung:(1):Oel
Temperatur von:(2):Anlassen 180°C; Zeit:(2):2Stunden; Norm Zugprobe(EN ISO 377 3ª EDICION . . .2013)
Norm Kerbschlagzähigkeit(ISO 148-1 - 2016)

MECHANISCHE REFERENZEIGENSCHAFTEN

Richtung Probestück Zugprobe:laengst
Rm(1.120/1.350N/mm2):1.228N/mm2; Re(Rp(0,2%) >=785N/mm2):Rp(0,2%) 883N/mm2; A(5d >=11%):5d 12,8%
Z(>=35%):44,8%
Richtung Probestück Kerbschlagzähig:laengst; Probestück Kerbschlagzähigkeit(KV):KV
Temperatur Kerbschlagzähigkeitsprobe(20°C):20°C; K(1):96J; K(2):92J; K(3):99J
K(Durchschnitt)(>=40J):95,67J
Richtung Probestück Zugprobe:quer

ABTEILUNG TECHNIK & QUALITÄT VERSICHERT, DASS DAS PRODUKT DEN IM AUFTRAG FESTGELEGTEN VORSCHRIFTEN ENTSPRICHT

VERANTWORTLICHER:Noelia Fernandez Miguelez UNTERSCHRIFT:

DATUM:14.06.2021 Seite 1 von 2

REF.:6002536510000 Der Werkssachverständige

Stirnrad_spur gear_material certificates_PART-069596

REINOSA Forgings Castings

ABNAHMEPRÜFZEUGNIS

ISO 9001; IATF 16949; ISO 14001 E ISO 45001

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Produkt hergestellt in Spanien

KUNDE:SIPRO SIDERPRODUKTE AG		PROZESSNUMMER:2149646
AUFTRAGSN°.:170092	AUFTRAGSN°:335147-11	CHARGEN°.:640707
ARTIKELNUMMER:	DATENBLATT:335147000011	SCHMIEDEN:88331

Rm(1.120/1.350N/mm2):1.184N/mm2; Re(Rp(0,2%) >=785N/mm2):Rp(0,2%) 837N/mm2; A(5d >=8%):5d 9,1%
Z(>=25%):27,9%
Richtung Probestück Kerbschlagzähig:quer; Probestück Kerbschlagzähigkeit(KV):KV
Temperatur Kerbschlagzähigkeitsprobe(20°C):20°C; K(1):49J; K(2):45J; K(3):52J
K(Durchschnitt)(>=30J):48,67J

Richtung Probestück Kerbschlagzähig:laengst; Probestück Kerbschlagzähigkeit(KV):KV
Temperatur Kerbschlagzähigkeitsprobe(-20°C):-20°C; K(1):66J; K(2):74J; K(3):48J
K(Durchschnitt)(>=27J):62,67J

TECHNISCHE LIEFERBEDINGUNGEN

Härte(159/229HBW):161HBW

WEITERE PRÜFUNGEN (LIEFERBEDINGUNGEN)

Korngrosse norm(ISO 643 4'ED\CORR. 03.2020 2019); Typ / Methode(Mac Quaid Ehn):Mac Quaid Ehn
Korngrösse(1):Austenitisch 6; Korngrösse(2):Ferrittisch 6; Temperatur von:950°C; Zeit:50Stunden

ZERSTÖRUNGSFREIE PRÜFUNGEN

Standard U.T.(EN 10228-3 - 01.06.2016); Art von U.T.(1)(Tab 3 Typ 1a + Tab 5 Klasse 4)
Art von U.T.(2)(Tab 3 Typ 1a + Tab 5 Klasse 3); 100 % Kontrolle auf Oberflächenfehler: ohne Befund
100% Ultraschallprufung: Ohne

ZUSATZINFORMATION

Reduktionsrate:3,5; Magnetismus:<= 5Gauss

ABTEILUNG TECHNIK & QUALITÄT VERSICHERT, DASS DAS PRODUKT DEN IM AUFTRAG FESTGELEGTEN VORSCHRIFTEN ENTSPRICHT

VERANTWORTLICHER:Noelia Fernandez Miguelez UNTERSCHRIFT:

DATUM:14.06.2021 Seite 2 von 2

REF.:6002536510000 Der Werkssachverständige

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-069596
Werks-Nr.: *Works no.:*	Material No. 2000064794 TAG-No. 2.7.1.651	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002294

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Stirnrad / spur gear	PN-00096653.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Fügesitz	Ø 242 H7	+0,046 0	242,02
Verzahnung Vorfräsen			i.O.

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	11.04.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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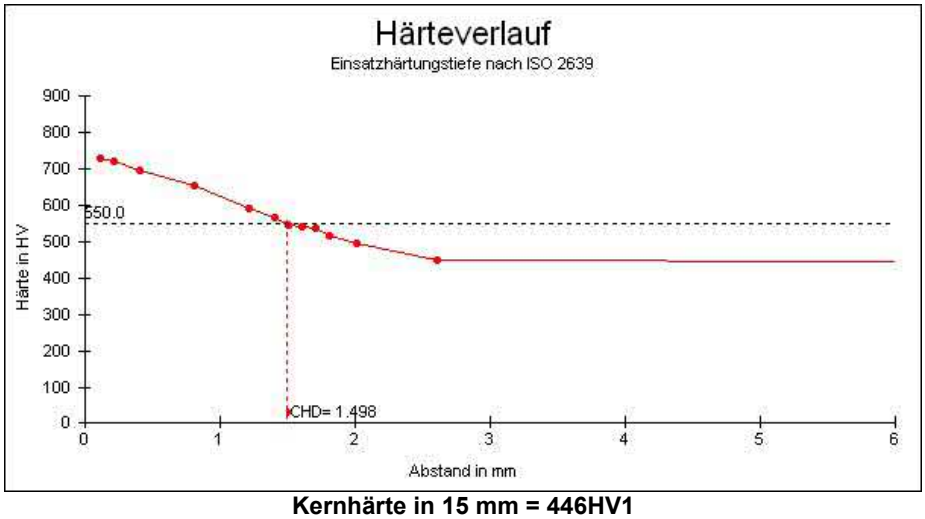
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

DOK-QS-121	Härteverlauf Hardness profile	REINTJES POWERTRAIN SOLUTIONS

Abnahmeprüfzeugnis gemäß DIN/EN 10204 – 3.1
Inspection certificate according to DIN/EN 10204 - 3.1

Kunde: Customer:	**Pekrun**	**Benennung:** Object:	**Stirnrad 70**
FAUF: Production No.:		**Bestell Nr. /Pos:** Purchase Order No./Item:	**4500060271**
Zeichnungs Nr.: Drawing No.:	**PN-00096653.000.01**	**Auftrags Nr.:** Order No.:	**2054507**
Werkstoff: Material:	**18 CrNiMo 7-6**	**Proben Nr.:** Sample No.:	**09264**
Stückzahl: No. of pieces:	**1**	**Ofencharge:** Oven batch:	**C22-22046**

CHD 550H V1 = 1.50 mm



Kernhärte in 15 mm = 446HV1

Oberfl.-Härte IST: Surface hardness actual:	**60**	HRC	**EHT IST:** Penetration depth actual:	**1,50**	mm
Oberfl.-Härte SOLL: Surface hardness nominal:	**60 +- 2**	HRC	**EHT SOLL:** Penetration depth nominal:	**1,3 + 0,2**	mm
Martensit IST: Martensit actual:		%	**Restaustenit IST:** Resodual austenite:		%
Randoxidation IST: Surface oxidation actual:		µm	**Randentkohlung IST:** Surface dicarborising actual:	---	µm
Karbidanteil IST: Katbit actual:	---	%	**Rand C-Gehalt IST:** Surface-C actual:		%
Bemerkungen: Remark:					

Prüfer / Workinspector i.A. V.Gärtner Prüfdatum / Work date: 30.03.22

Dieses Zeugnis wurde maschinell erstellt und ist OHNE Unterschrift gültig.
This certificate was provided by machine and is valid also without signature.

Prozessverantwortlicher:	QS / Hr. Dr. Reso / 17.01.2018	Revisions-Nr.:	02

Seite 1 von 1

Profilmessung

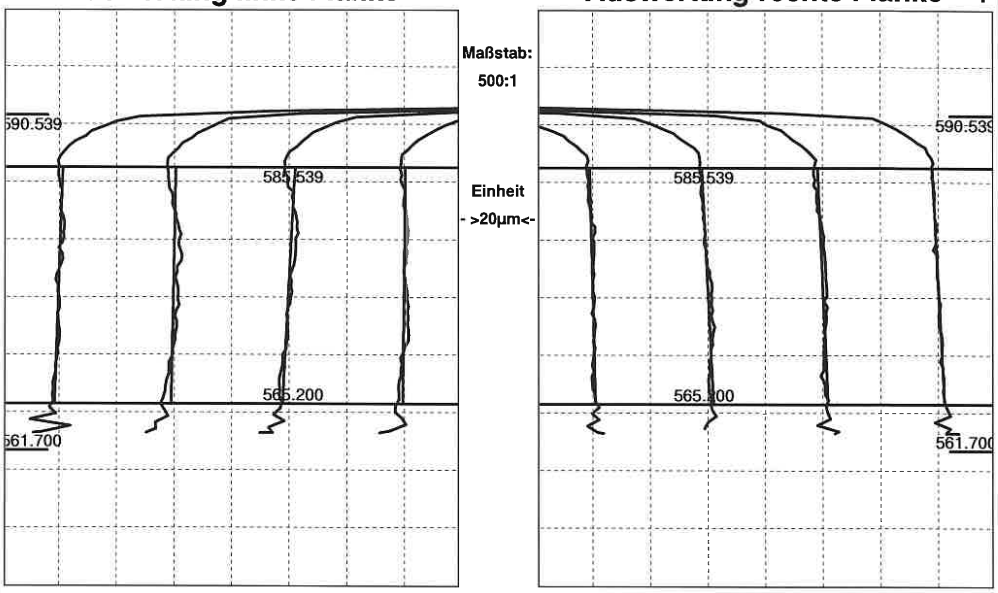
Messung vom 04/19/2022 10:53:21 Dauer: 00:02:54 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
L.V.OBEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-O	Profil	Evolventisch
Zähnezahl	70	Taststiftdurchmesser	2.000 mm
Normalmodul	7.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Linksschräg 32.000000 Grad	Meßbreite	45.000 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	590.539 mm	Fußformkreis (d)	561.700 mm

+ Auswertung linke Flanke - | - Auswertung rechte Flanke +



Q	M	S	54	36	19	1	Lücke Nr.	1	19	36	54	S	M	Q
4	5.6		4.4	7.3	6.5	4.0	F_α	3.6	5.2	5.2	4.8		4.7	3
4	- 2.4	0.0	- 2.8	- 1.6	- 4.4	- 0.9	fH_α	- 2.0	- 4.1	- 3.6	- 4.3	0.0	- 3.5	4
4	4.7		3.0	6.3	6.0	3.7	ff_α	2.5	3.2	3.4	1.7		2.7	2
	- 3.2	0.0	- 1.5	- 5.2	- 3.4	- 2.8	C_α	1.3	1.9	2.5	- 0.1	0.0	1.4	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

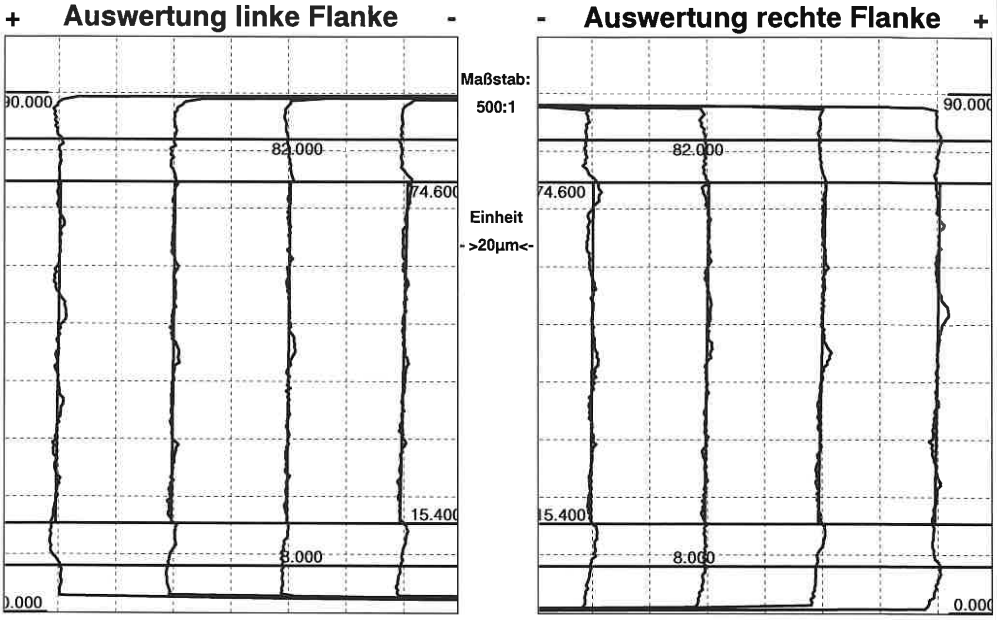
Flankenlinienmessung

Messung vom 04/19/2022 10:47:58 Dauer: 00:05:00 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
L.V.OBEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-O	Profil	Evolventisch
Zähnezahl	70	Taststiftdurchmesser	2.000 mm
Normalmodul	7.000 mm	Anzahl gemessener Punkte	181
Schrägungswinkel	Linksschräg 32.000000 Grad	Meßzylinder (d)	575.071 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	90.000 mm		



Q	M	S	54	36	19	1	Lücke Nr.	1	19	36	54	S	M	Q
2	5.1		5.6	4.5	4.9	5.5	Fβ	5.4	4.1	5.6	7.0		5.5	3
3	- 2.2	0.0	- 2.1	- 1.6	- 1.5	- 3.5	fHβ	1.4	2.1	3.7	2.7	0.0	2.5	3
3	4.8		5.6	4.0	4.5	5.0	ffβ	5.2	4.4	4.6	6.2		5.1	4
	- 0.9	0.0	- 1.7	- 1.0	- 1.2	0.3	Cβ	0.5	2.0	0.9	1.7	0.0	1.3	

Vert. Maßstab 1:1, d.h. 10 mm entspr. 10 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

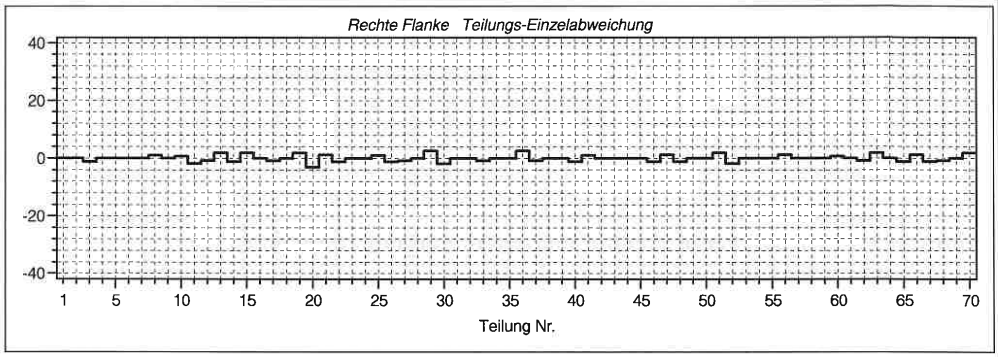
Teilungsmessung

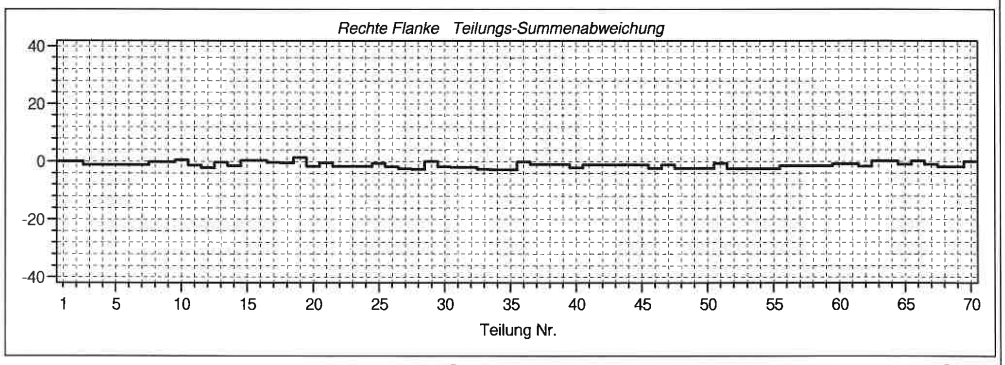
Messung vom 04/19/2022 10:56:39 Dauer: 00:12:49 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
L.V.OBEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-O	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	70
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	575.071 mm
Meßbreite	45.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.145		
Zahnweite (Nennmaß)	268.562 mm	Anzahl Meßzähne	13
Diametrales Zweikugelmaß (Nennmaß)	592.600 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	592.600 mm	Meßrollendurchmesser	12.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 3.0	2	Teilungs-Schwankung (Rp)	5.6	
Teilungs-Gesamtabw. (Fp)	4.2	1	Max. Teilungssprung (fumax)	4.8	3
Teilungs-Spannenabw. (Fp(z/8))	4.0	1			

Alle Angaben in µm

Qualitäten nach DIN 3961

Maßstab 500:1

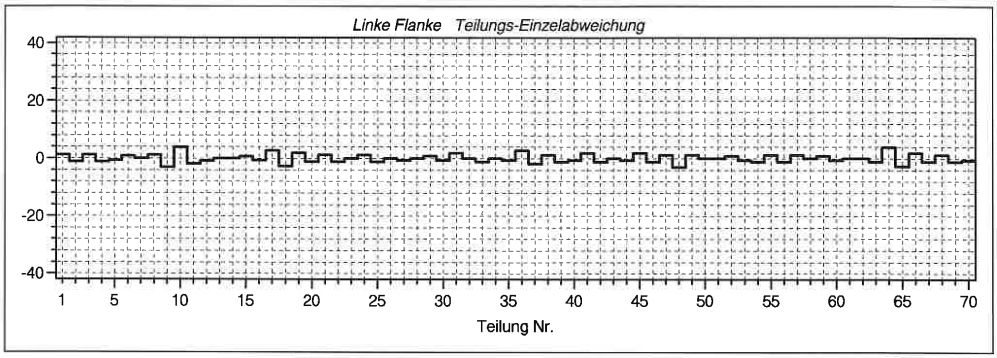
Teilungsmessung

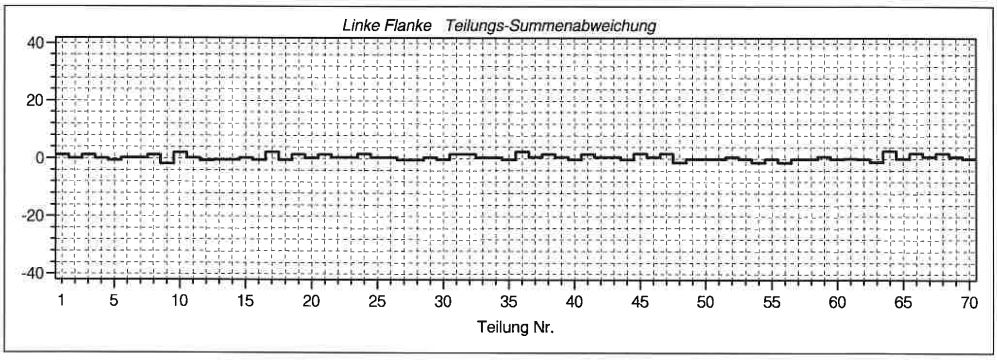
Messung vom 04/19/2022 10:56:39 Dauer: 00:12:49 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
L.V.OBEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-O	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	70
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	575.071 mm
Meßbreite	45.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.145		
Zahnweite (Nennmaß)	268.562 mm	Anzahl Meßzähne	13
Diametrales Zweikugelmaß (Nennmaß)	592.600 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	592.600 mm	Meßrollendurchmesser	12.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	3.9	3	Teilungs-Schwankung (Rp)	7.0	
Teilungs-Gesamtabw. (Fp)	4.4	1	Max. Teilungssprung (fumax)	6.9	4
Teilungs-Spannenabw. (Fp(z/8))	3.0	1			

Alle Angaben in µm

Qualitäten nach DIN 3961

Maßstab 500:1

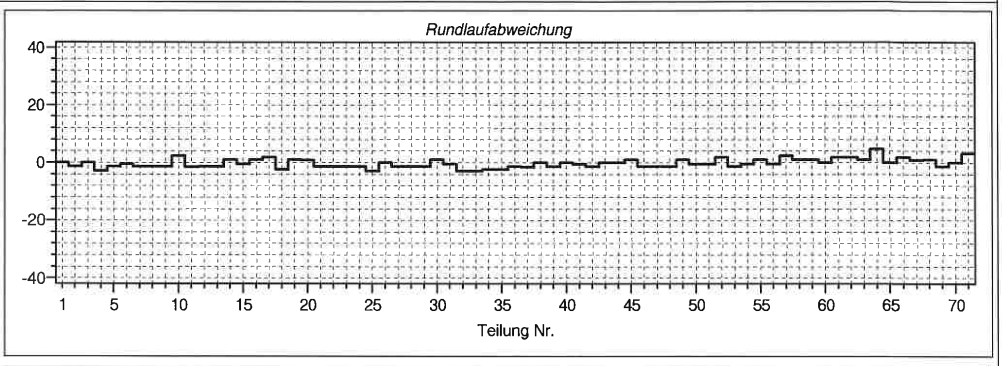
Teilungsmessung

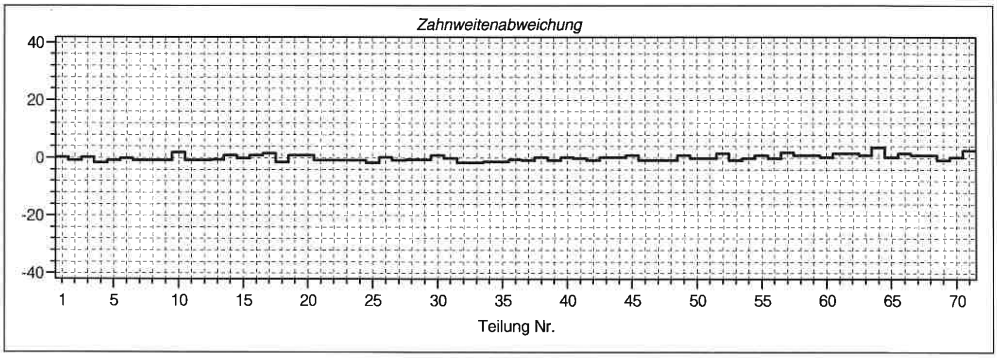
Messung vom 04/19/2022 10:56:39 Dauer: 00:12:49 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
L.V.OBEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-O	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	70
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	575.071 mm
Meßbreite	45.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.145		
Zahnweite (Nennmaß)	268.562 mm	Anzahl Meßzähne	13
Diametrales Zweikugelmaß (Nennmaß)	592.600 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	592.600 mm	Meßrollendurchmesser	12.000 mm





				Q
Min. Zahnweite (mm)	268.552	Mittl. Zahnweite (mm)	268.554	
Max. Zahnweite (mm)	268.557	Zahnweiten-Schwankung (µm)	5.3	
Anzahl Meßzähne	13			
		Rundlaufabweichung (Fr)	7.5	2
		Meßkugeldurchmesser (mm)	12.000	

Alle Angaben in µm

Qualitäten nach DIN 3961

Maßstab 500:1

Zahnweitenmessung

Messung vom 04/19/2022 11:09:51 Dauer: 00:00:12 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
L.V.OBEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-O	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	70
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	575.071 mm
Meßbreite	45.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.145		
Zahnweite (Nennmaß)	268.562 mm	Anzahl Meßzähne	13
Diametrales Zweikugelmaß (Nennmaß)	592.600 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	592.600 mm	Meßrollendurchmesser	12.000 mm
Profilverschiebungsfaktor	- 0.146		
Zahnweite	268.558 mm	Anzahl Meßzähne	13
Diametrales Zweikugelmaß	592.587 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß	592.587 mm	Meßrollendurchmesser	12.000 mm

Profilmessung

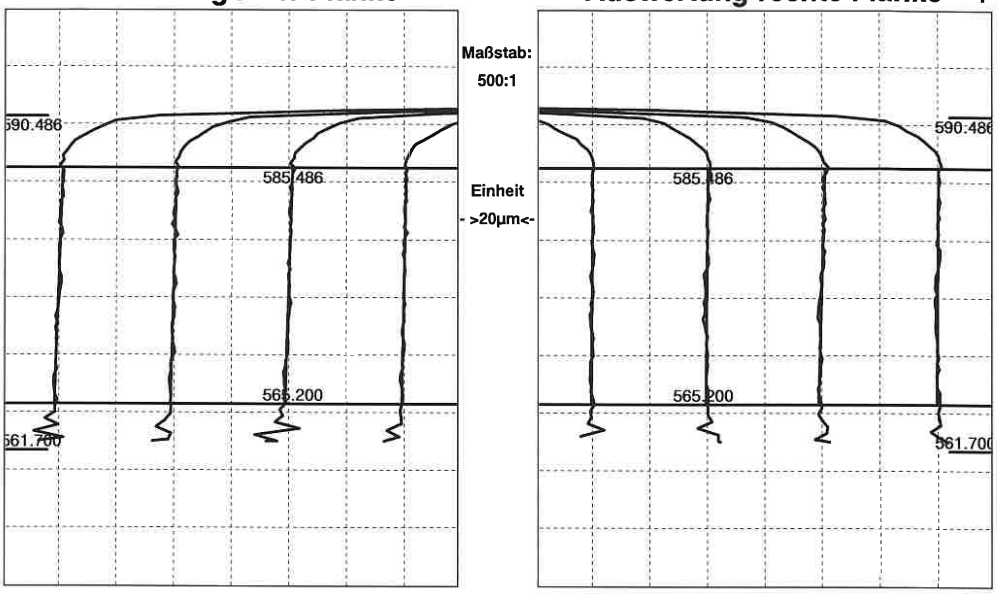
Messung vom 04/14/2022 13:05:59 Dauer: 00:02:55 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
R.V.UNTEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-U	Profil	Evolventisch
Zähnezahl	70	Taststiftdurchmesser	2.000 mm
Normalmodul	7.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Rechtsschräg 32.000000 Grad	Meßbreite	45.000 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	590.486 mm	Fußformkreis (d)	561.700 mm

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	54	36	19	1	Lücke Nr.	1	19	36	54	S	M	Q
2	3.2		3.5	2.9	4.0	2.4	F_α	1.6	2.8	3.7	2.3		2.6	2
3	- 2.3	0.0	- 2.9	- 2.1	- 2.6	- 1.6	fH_α	0.6	0.8	2.2	0.5	0.0	1.0	2
1	1.9		2.1	2.1	1.9	1.4	ff_α	1.6	2.3	2.3	2.0		2.1	1
	- 0.1	0.0	0.1	- 0.2	- 0.1	0.0	C_α	- 0.1	- 1.2	- 0.6	- 1.0	0.0	- 0.7	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

Flankenlinienmessung

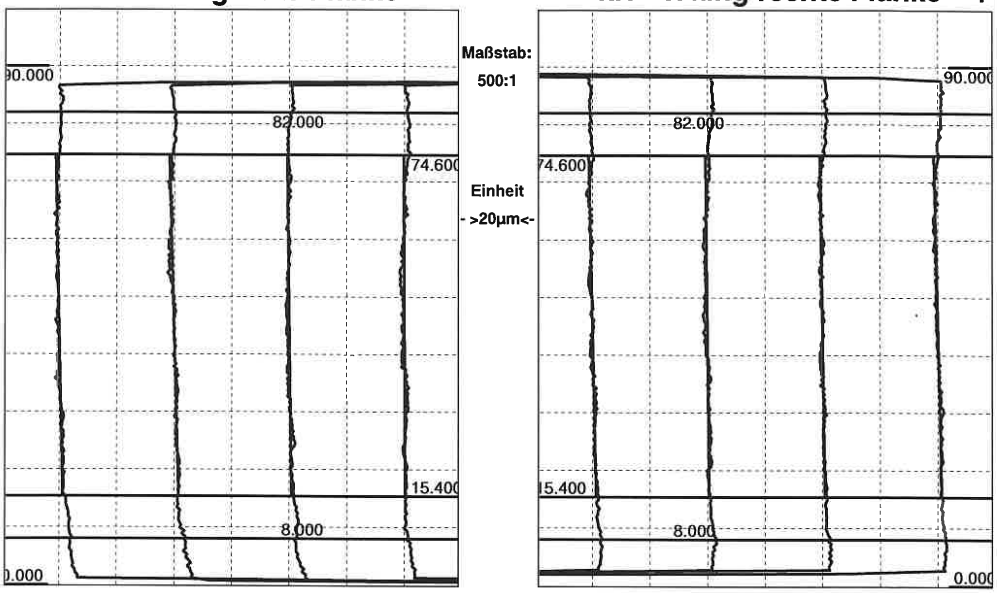
Messung vom 04/14/2022 13:00:39 Dauer: 00:04:58 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
R.V.UNTEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-U	Profil	Evolventisch
Zähnezahl	70	Taststiftdurchmesser	2.000 mm
Normalmodul	7.000 mm	Anzahl gemessener Punkte	181
Schrägungswinkel	Rechtsschräg 32.000000 Grad	Meßzylinder (d)	575.048 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	90.000 mm		

+ Auswertung linke Flanke - | - Auswertung rechte Flanke +



Q	M	S	54	36	19	1	Lücke Nr.	1	19	36	54	S	M	Q
1	3.7		3.9	4.3	3.3	3.4	Fβ	5.5	5.0	4.5	4.9		5.0	2
3	2.5	0.0	3.2	4.1	2.0	0.6	fHβ	- 3.2	- 1.5	- 2.0	- 3.5	0.0	- 2.5	3
1	3.0		2.8	2.9	2.7	3.6	ffβ	2.9	4.8	3.9	4.8		4.1	2
	1.8	0.0	1.9	0.8	2.3	2.1	Cβ	- 1.4	- 2.1	- 1.0	- 1.1	0.0	- 1.4	

Vert. Maßstab 1:1, d.h. 10 mm entspr. 10 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

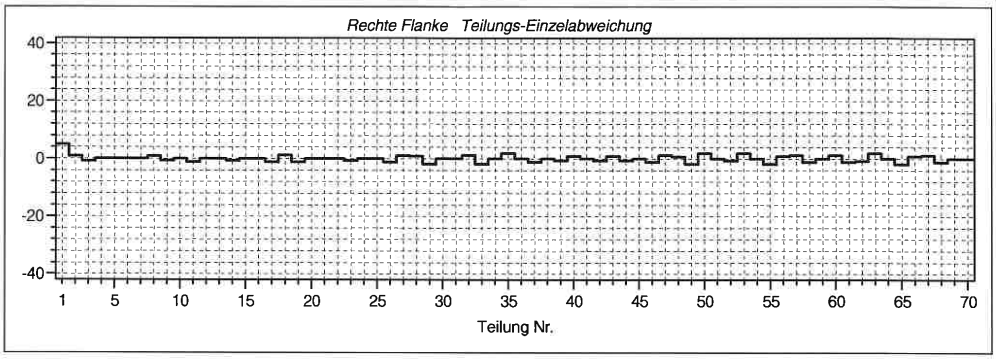
Teilungsmessung

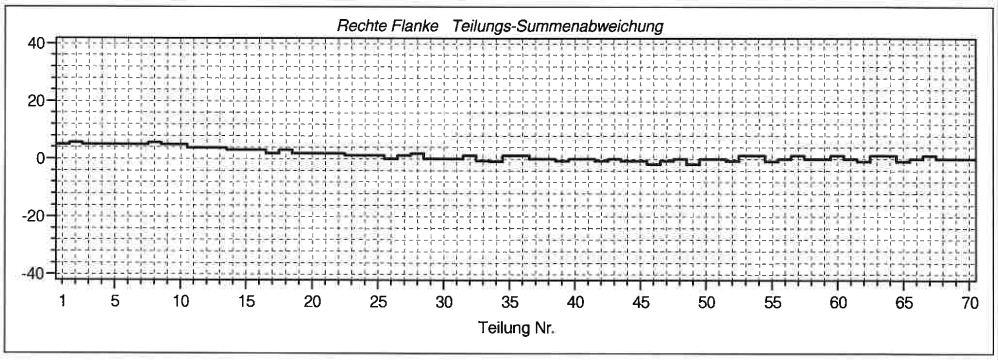
Messung vom 04/14/2022 13:09:17 Dauer: 00:12:49 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
R.V.UNTEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-U	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	70
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	575.048 mm
Meßbreite	45.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.145		
Zahnweite (Nennmaß)	268.562 mm	Anzahl Meßzähne	13
Diametrales Zweikugelmaß (Nennmaß)	592.600 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	592.600 mm	Meßrollendurchmesser	12.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	4.9	4	Teilungs-Schwankung (Rp)	6.8	
Teilungs-Gesamtabw. (Fp)	7.5	1	Max. Teilungssprung (fumax)	4.9	3
Teilungs-Spannenabw. (Fp(z/8))	5.7	2			

Alle Angaben in µm

Qualitäten nach DIN 3961

Maßstab 500:1

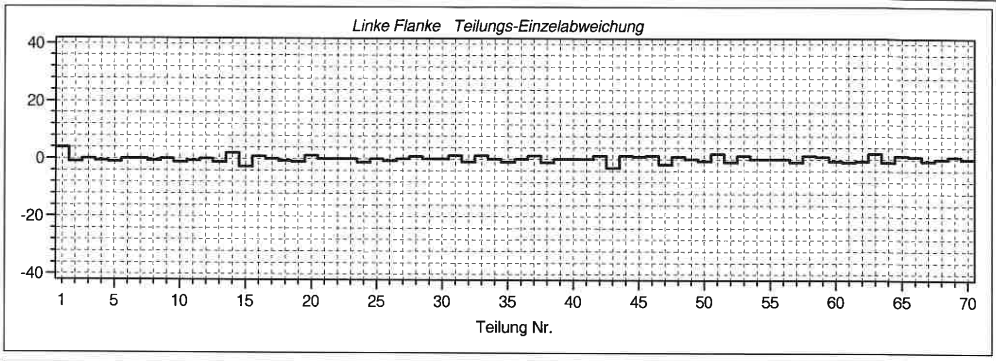
Teilungsmessung

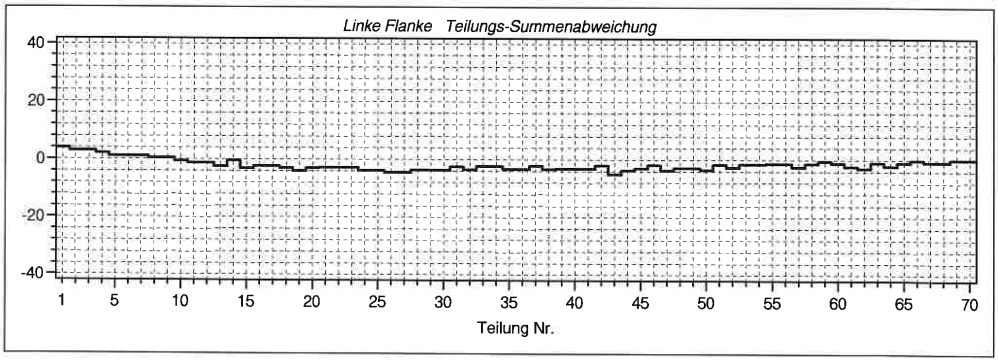
Messung vom 04/14/2022 13:09:17 Dauer: 00:12:49 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
R.V.UNTEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-U	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	70
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	575.048 mm
Meßbreite	45.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.145		
Zahnweite (Nennmaß)	268.562 mm	Anzahl Meßzähne	13
Diametrales Zweikugelmaß (Nennmaß)	592.600 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	592.600 mm	Meßrollendurchmesser	12.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	3.9	3	Teilungs-Schwankung (Rp)	6.9	
Teilungs-Gesamtabw. (Fp)	8.9	1	Max. Teilungssprung (fumax)	5.0	3
Teilungs-Spannenabw. (Fp(z/8))	6.9	2			

Alle Angaben in µm

Qualitäten nach DIN 3961

Maßstab 500:1

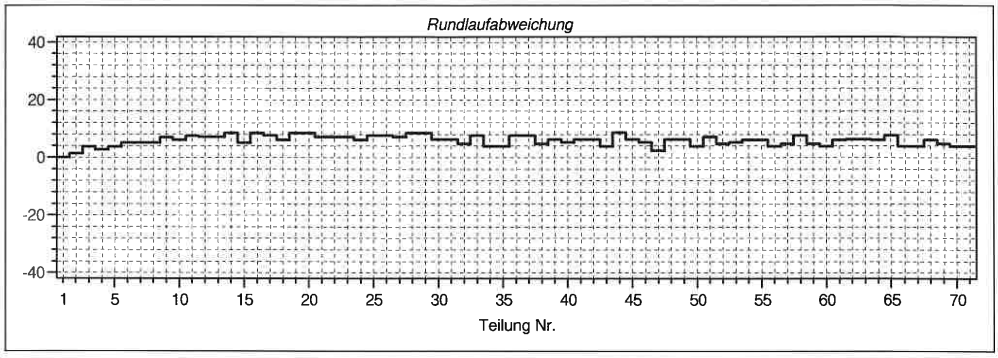
Teilungsmessung

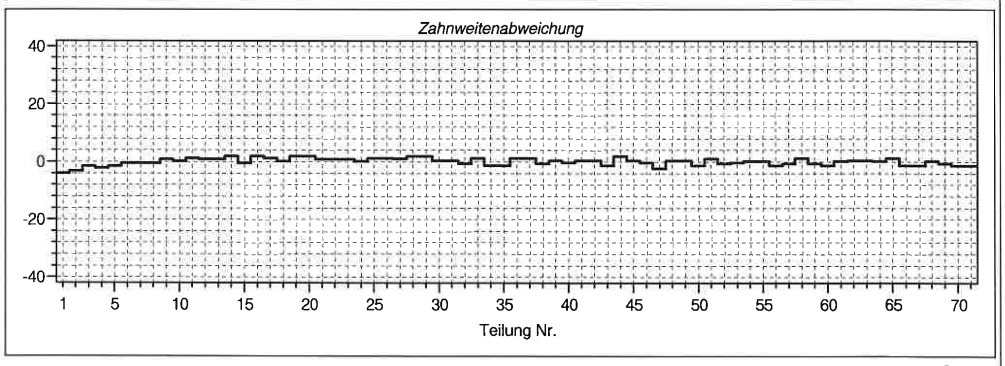
Messung vom 04/14/2022 13:09:17 Dauer: 00:12:49 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
R.V.UNTEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-U	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	70
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	575.048 mm
Meßbreite	45.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.145		
Zahnweite (Nennmaß)	268.562 mm	Anzahl Meßzähne	13
Diametrales Zweikugelmaß (Nennmaß)	592.600 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	592.600 mm	Meßrollendurchmesser	12.000 mm





				Q
Min. Zahnweite (mm)	268.549	Mittl. Zahnweite (mm)	268.553	
Max. Zahnweite (mm)	268.555	Zahnweiten-Schwankung (µm)	6.0	
Anzahl Meßzähne	13			
		Rundlaufabweichung (Fr)	8.6	2
		Meßkugeldurchmesser (mm)	12.000	

Alle Angaben in µm

Qualitäten nach DIN 3961

Maßstab 500:1

Zahnweitenmessung

Messung vom 04/14/2022 13:22:29 Dauer: 00:00:12 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:

19396/30-P-069596	ZW:	592.692-592.478	
R.V.UNTEN	KUGEL:	12	

Name der Verzahnung:	70Z 7M-P-069596-U	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	70
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	575.048 mm
Meßbreite	45.000 mm		
Profilverschiebungsfaktor (Nennmaß)	- 0.145		
Zahnweite (Nennmaß)	268.562 mm	Anzahl Meßzähne	13
Diametrales Zweikugelmaß (Nennmaß)	592.600 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	592.600 mm	Meßrollendurchmesser	12.000 mm
Profilverschiebungsfaktor	- 0.147		
Zahnweite	268.554 mm	Anzahl Meßzähne	13
Diametrales Zweikugelmaß	592.578 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß	592.578 mm	Meßrollendurchmesser	12.000 mm

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-069596
Werks-Nr.: *Works no.:*	Material No. 2000064794 TAG-No. 2.7.1.651	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002294

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Stirnrad / spur gear	PN-00096653.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo7-6	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Verzahnung*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	20.04.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
58640 ISERLOHN

TELEFON 02371/945-0
TELEFAX 02371/945-299
EMAIL: INFO@PEKRUN.DE

Seite / Page 1 / 3

Ritzelwelle_pinion shaft_material certificates_PART-069593

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **414756**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-003-01**

Erzeugnisform / Product	Stab, rund, geschmiedet, geschält Round bars,forged,peeled
Werkstoff / Quality	1.6587 18CrNiMo7-6
Anforderungen / Requirements	LVL- 02 18Cr Rev.18 - 07/20 1.6587 18CrNiMo7-6 ,ISO 6336 -5 Third ed. 2016-08-15 1.6587 18CrNiMo7-6 ,DIN EN ISO 683 -3 April 2019 Lieferzustand: Vorvergütet Die Werkstoffqualität "MQ/ME" nach ISO 6336-5 wird bestätigt. Diese Bestätigung gilt nur für die Eigenschaften, die vom Stahlhersteller beeinflußt werden können. Für Eigenschaften, die von der konstruktiven Gestaltung, der Endwärmebehandlung und der Einsatzbedingungen abhängig sind, kann der Stahlhersteller keinerlei Garantie und Gewährleistung übernehmen. The material quality "MQ/ME" acc. ISO 6336-5 will be confirmed. This confirmation is only valid for the properties, which can be affected by the steel producer. The steel producer cannot provide any guarantee for properties, which are dependent on the constructional design, the final heat treatment and the application conditions.

Besichtigung und Maßnachprüfung / Inspection and dimensional control / Inspection et contrôle de dimension	Erschmelzung/Nachbehandlung / Meltingprocess/secondary refining / Mode d´élaboration/traitement ultérieur	Verwechslungsprüfung (spectroanalytisch) / Identification test (spectral-analysis) / examination d´identification(analyse spectrale)
ohne Beanstandung without objection	E- LF/VD	ohne Beanstandung without objection

Pos. / Item / Poste	Anzahl / Quantity / Quantité	Abmessung / Dimension / Dimensions	Gewicht / Weight / Poids	Schmelz-Nr. / Heat-No. / No. de coulée
3	7	270 mm rd. x 3296 - 5865 mm	12028 kg	735127

Schmelze / Heat %	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb	V	Ti
735127	0,180	0,29	0,53	0,005	0,0010	1,68	0,30	1,54	0,098	0,003	0,006	0,003

Al	N	H(ppm)	O	Sn	Sb	Ca	Al/N	Cu+10xSn
0,038	0,0121	1,00	0,0012	0,004	0,003	0,0006	3,14	0,138

Wärmebehandlungszustand / Condition of heat treat	vergütet quenched and tempered

Probe-Nr. / Test-No.	Lage / Loc.	Temp. / °C	Rp0,2 / N/mm²		Rm / N/mm²	A5 / %	Z / %	Kerbschlagarbeit / Impact value / J			Probenform / Shape of test piece / Charpy-V	Härte / Hardness / HB
Soll/Req.	T	RT	>=785		>=1120 <=1450	>=8	>=25	>=30			RT	<=238
489W4	T	RT	937		1273	10,2	75	52	57	66	RT	192
489W4	T							35	42	34	-20°C	am Material

Die mechanischen Kennwerte wurden an einer Referenzprobe (30 mm rd.) ermittelt:
The mechanical properties were tested at a reference block (30 mm dia.) :
870°C 2h Oel/oil, 180°C 2h Luft/air

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	07.12.2021	**Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

This certificate was generated by data system and it is valid without signature as well.
Ce certificat a été établi sur système informatique et est valable sans signature aussi.

Seite / Page 2 /3

Ritzelwelle_pinion shaft_material certificates_PART-069593

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. / Certificate no. / No. de certificat **414756**

Bescheinigung über Werkstoffprüfung nach DIN EN 10204
Certificate of material tests according to DIN EN 10204 **3.1**
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.
Delivery in accordance with the agreed terms of delivery.
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes / Trade mark / Signe du fournisseur

Stempel des Werkssachverständigen / Inspector's stamp / Poincon de l'inspecteur

BGH Q 07

Kunden-Bestell-Nr. / Customer order no. / Cde. no. du client **171472**

BGH-Auftrags-Nr. / BGH works no. / BGH référence **816888-003-01**

```
Stirnabschreckversuch / Jominy test - EN ISO 642:
mm     1,5   5     11    25    40
HRC    45    44    44    38    36

Umformgrad      : 4.4 : 1
Reduction ratio:

Korngröße  nach ASTM E 112: 6
Grain size acc. ASTM E 112:

Korngröße  nach ISO 643 (950°C 50h Oel): 7
Grain size acc. ISO 643 (950°C 50h oil):

Reinheitsgrad nach DIN 50602   : K4 = 3 (Ox + S)
Degree of purity acc. DIN 50602:

Reinheitsgrad nach ISO 4967, Methode A  : DS = 1,5
Degree of purity acc. ISO 4967, method A:
Type            A      B      C      D
Dünn/fine      0,0    1,0    0,3    1,0
Dick/thick     0,0    0,5    0,3    0,5

Restmagnetismus   : < 8 A/cm
Residual magnetism:

Das Material wurde gemäß der Spezifikation hergestellt.
The Material was produced in compliance with the Specification.

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung
Visual surface control was done                  : without objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der Nachweisgrenze
von 0,1 Bq/g.
Radioactivity inspection without objection, the measured value is below the detection
limit of 0.1 Bq/g.
```

Anlagen / Encl. / Annexe	Siegen,den / Place and date / Lieu et date	Abnahmebeauftragter / Inspector representative / Inspecteur de réception
US-Zeugnis / UT cert.	07.12.2021	**Langer**

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Page

Ritzelwelle_pinion shaft_material certificates_PART-069593

BGH

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestraße 9 57076 Siegen

Delta Qualitätsstahl GmbH
Stahlstraße 1
59069 Hamm
Deutschland

Zeugnis-Nr. **414756**
Certificate no.
No. de certificat

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Zeichen des Lieferwerkes
Trade mark
Signe du fournisseur

Stempel des Werkssachverständigen
Inspector's stamp
Poincon de l'inspecteur

Kunden-Bestell-Nr. **171472**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816888-003-01**
BGH works no.
BGH référence

BGH
Q 07

Bei Überschreitung der regelwerksseitigen Abmessungsgrenze sind im Zweifelsfall die Vorgaben
des Regelwerks vom Bauteilhersteller zu verifizieren. Seitens des Werkstoffherstellers werden
nur die, an der von ihm produzierten Geometrie, überprüften Eigenschaften bestätigt.
In case of doubt, the specifications of the regulations must be verified by the component manufacturer
if the dimensional limit of the regulations is exceeded. On the part of the material manufacturer,
only the properties verified on the geometry, produced by him, are confirmed.

Anlagen Encl. Annexe US-Zeugnis / UT cert.	Siegen,den Place and date Lieu et date 07.12.2021	Abnahmebeauftragter Inspector representative Inspecteur de réception **Langer**

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Page

US-Protokoll
Ultrasonic certificate

DIN EN 10204 3.1

BGH

Ritzelwelle_pinion shaft_material certificates_PART-069593

BGH Edelstahl Siegen GmbH

Kunden-Bestell-Nr. **171472**
Customer order no.
Cde. no. du client

BGH-Auftrags-Nr. **816888-003-01**
BGH works no.
BGH référence

Zeugnis-Nr. **414756**
Certificate no.
No. de certificat

Erzeugnisform : Stab, rund, geschmiedet, geschält
Product : Round bars,forged,peeled

Werkstoff/Quality : 1.6587 18CrNiMo7-6
Abmessung/Dimension: 270 mm rd. x 3296 - 5865 mm
Anzahl/Quantity : 7 Gewicht /Weight : 12028 kg

Wärmebehandlungszustand : vergütet
Condition of heat treat : quenched and tempered

Prüfrichtlinie
Specification

DIN EN 10228-3 - 10/16
DIN EN 10228-3 Tab. 3 Typ 1a (100%)und
Tab. 5 Qualitätsklasse 4 für Randzone (1/3 D, min. 60mm)
Tab. 5 Qualitätsklasse 3 für Restbereich
DIN EN 10228-3 Tab.3 typ 1a (100%)and
Tab.5 quality class 4 for surface zone (1/3 D, min. 60 mm)
Tab.5 quality class 3 for remaining area

Prüfrichtlinie : DIN EN 10228-3 Tab. 3 & 4 (vollständig 360°)
Specification

Prüfgerät : K.Deutsch RPT.S 1156
Deutsch Echopraph 1090
Testing device

Prüfkopf : STS32.20P4L150C, STSE18/16P4
S 10 W 4 C
Search unit

Kopplungsmittel : Wasser / Kleister
Couplant water / glue

Prüfumfang : 360°
Amount of inspection

Prüfrichtung : radial
Scanning direction radial

Registriergrenze : FBB 2,0
Recording threshold FBH 2.0 mm

Schallschwächung : < 6 dB/m
Wave attenuation

Befund : Keine registrierpflichtigen Anzeigen.
Result No reportable indications.

Siegen,den Place and date Lieu et date 07.12.21	Prüfer Testing operator Opérateur M.Groos Stufe 2, ISO 9712 / SNT-TC-1A	Abnahmebeauftragter Inspector representative Inspecteur de réception Jung Stufe 3, ISO 9712 / SNT-TC-1A BGH Q 30	Überwacher Supervisor Surveilleur

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

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Ce certificat a été établi sur système informatique et est valable sans signature aussi.

EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Abnahmeprüfzeugnis

gemäß DIN EN 10204-3.1

Belegnr	**PZ-2022-0097443**
Auftragsnr	**2022-0238131-2**
Kundennr	1011419
Ausgeber	Dirk Süssmuth
Telefon	+49 (0) 2 34-90 36-0
Datum	30.03.2022
Seite	1/1

Teile/Verfahren	Stück	Gewicht
	1	242 kg

Ihre Auftragsnr: 19396/30
Ihre Bestellnr: 4500060058-P / 20 vom 10.03.2022
Uns. Auftragsnr: 2022-0238131-2 von 2 vom 11.03.2022
Bezeichnung: Ritzelwelle
Teilenummer: PART-069593
Zeichnungsnr: PN0009664500001
Fr. Feld: 3000136
WE-Nummer: WE-000096524
Werkstoff: 1.6587/18CrNiMo7-6/17CrNiMo6
Vorschrift: Isolieren, Einsatzhärten, Strahlen, Richten, Zeugnis

Soll-Vorgaben

Randhärte	58-62 HRC
Einsatzhärtetiefe	1,3-1,5 mm

Ergebnisse	Prüfer	Prüfdatum
RH:59-60 HRC EHT:1,50 mm	Rainer Theuer	24.03.2022

Die CHD haben wir an unserer Chargenbegleitprobe aus 18CrNiMo7-6 ermittelt.

Hiermit bestätigen wir, dass obige Teile gemäß den Vereinbarungen bei der Bestellannahme auf der Grundlage der Ihnen bekannten Allgemeinen Geschäftsbedingungen der Härterei Reese Bochum GmbH, Stand: Juli 2018 behandelt wurden.

Dieses Dokument wurde elektronisch erstellt und ist daher ohne Unterschrift gültig.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/90 36-0
Fax +49 (0) 234/90 36-96

Oberscheidstr. 25 · 44807 Bochum
bochum@haerterei.com
Handelsregister: HRB 1717
Ust-ID-Nr.: DE257486215
Steuer-Nr.: 306/5709/0368

National-Bank Essen BIC: NBAGDE3EXXX IBAN: DE89 3602 0030 0006 3781 29
VB Bochum Witten eG BIC: GENODEM1BOC IBAN: DE83 4306 0129 0123 2073 00
Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

www.haerterei.com

EXPERTEN FÜR WÄRMEBEHANDLUNG.

REESE

Härterei Reese Bochum GmbH · Oberscheidstraße 25 · 44807 Bochum

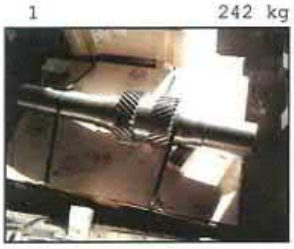
PEKRUN GETRIEBEBAU GMBH
KÖBBINGSER MÜHLE 14
D-58640 ISERLOHN-SÜMMERN

Inspection certificate

according to DIN EN 10204-3.1

Document #	**PZ-2022-0097443**
Job #	**2022-0238131-2**
Customer #	1011419
Issuer	Dirk Süssmuth
Telephone	+49 (0) 2 34-90 36-0
Date	30.03.2022
Page	1/1

Parts/Process		Quantity	Weight
Your Job #:	19396/30	1	242 kg
Your P.O. #:	4500060058-P / 20 from 10.03.2022		
Our Job #:	2022-0238131-2 of 2 from 11.03.2022		
Description:	pinion shaft		
Serial #:	PART-069593		
Drawing #:	PN0009664500001		
Free Field:	3000136		
RG-No.:	WE-000096524		
Material:	1.6587/18CrNiMo7-6/17CrNiMo6		
Process:	protection, case hardening, shot blasting, straightening, certificate		



Hardness requirements

Surface hardness	58-62 HRC
Case hardening depth	1,3-1,5 mm

Results	Auditor	Test date
EH:59-60 HRC CHD:1,50 mm	Rainer Theuer	24.03.2022

The CHD was testet on our test piece 18CrNiMo7-6 from the same batch.

We hereby confirm that the above parts will be treated and examined in accordance with the agreements applying on acceptance of order and based on the familiar General terms and conditions of business of Härterei Reese Bochum GmbH Edition: July 2018.

This document automatically generated valid without signature.

Härterei Reese Bochum GmbH
GF Dipl. Ing. Gerhard Reese
GF Dipl. Ing. Jörg Döllekes
Tel. +49 (0) 234/9036-0
Fax +49 (0) 234/9036-96

Oberscheidstr. 25 · 44807 Bochum
bochum@haerterei.com
Handelsregister: HRB 1717
Ust-ID-Nr.: DE257486215
Steuer-Nr.: 306/5709/0368

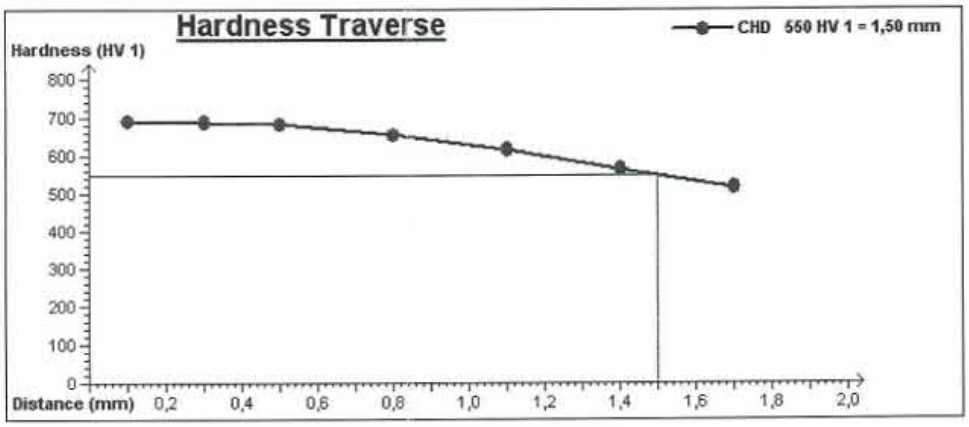
National-Bank Essen BIC: NBAGDE3EXXX IBAN: DE89 3602 0030 0006 3781 29
VB Bochum Witten eG BIC: GENODEM1BOC IBAN: DE83 4306 0129 0123 2073 00
Deutsche Bank AG BIC: DEUTDEDE440 IBAN: DE54 4407 0050 0108 0530 00
Sparkasse Bochum BIC: WELADED1BOC IBAN: DE50 4305 0001 0006 4042 97

www.haerterei.com

Härterei Reese
Bochum GmbH
Oberscheidstrasse 25
44807 Bochum

Chargen-Nr.:	.
Datum:	25.03.2022
Auftrags-Nr.:	2022-0238131-2
Prüfer:	Labor

Kunde: Pekrun
Proben-Nr.: 18 CrNiMo7-6
H.R.Probe



Ergebnis

CHD 550 HV 1 = 1,50 mm

Reihe 1

Punkt	Abstand	Härte	Kommentar
1	0.100	692 HV 1	
2	0.300	689 HV 1	
3	0.500	684 HV 1	
4	0.800	656 HV 1	
5	1.100	617 HV 1	
6	1.400	566 HV 1	
7	1.700	518 HV 1	

QUALITÄTSWESEN HÄRTEREI REESE BOCHUM

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-069593
Werks-Nr.: *Works no.:*	Material No. 2000064793 TAG-No. 2.7.1.651	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002294

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
2	Ritzelwelle / pinion shaft	PN-00096645.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Durchmesser	Ø 140 m6	+0,040 +0,015	140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,04
Lagersitz	Ø 140 m6	+0,040 +0,015	140,04
Durchmesser	Ø 140 m6	+0,040 +0,015	140,035

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	18.05.2022	J. Strunk	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

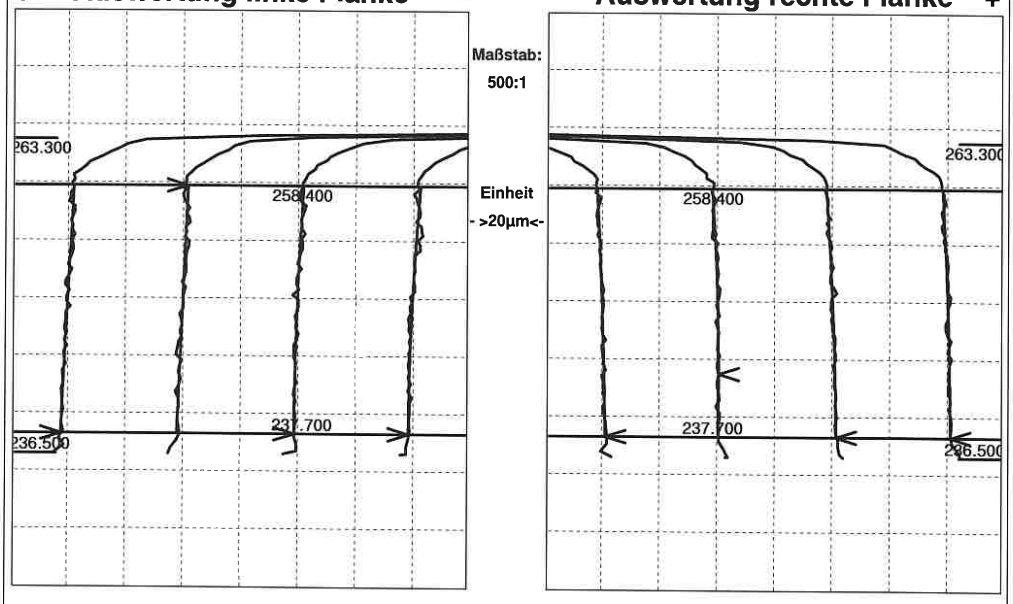
Profilmessung

Messung vom 05/12/2022 18:55:50 Dauer: 00:03:10 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/30-P-069593 ZW: 118.956-118.909
R.V.UNTEN

Name der Verzahnung:	30Z 7M-P-069593-U	Profil	Evolventisch
Zähnezahl	30	Taststiftdurchmesser	2.000 mm
Normalmodul	7.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Rechtsschräg 32.000000 Grad	Meßbreite	47.500 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	263.300 mm	Fußformkreis (d)	236.500 mm

+ Auswertung linke Flanke - | - Auswertung rechte Flanke +



Q	M	S	24	16	9	1	Lücke Nr.	1	9	16	24	S	M	Q
3	4.8		5.2	4.4	4.2	5.3	F_α	4.0	2.9	4.3	3.7		3.7	2
4	- 3.8	0.0	- 4.4	- 3.6	- 3.2	- 4.1	fH_α	- 2.9	- 2.1	- 3.5	- 2.8	0.0	- 2.8	4
3	3.2		2.4	2.8	3.2	4.3	ff_α	1.7	2.1	2.4	2.0		2.1	1
	0.4	2.0	0.1	- 0.0	0.6	0.9	C_α	0.4	1.0	0.7	0.6	2.0	0.7	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

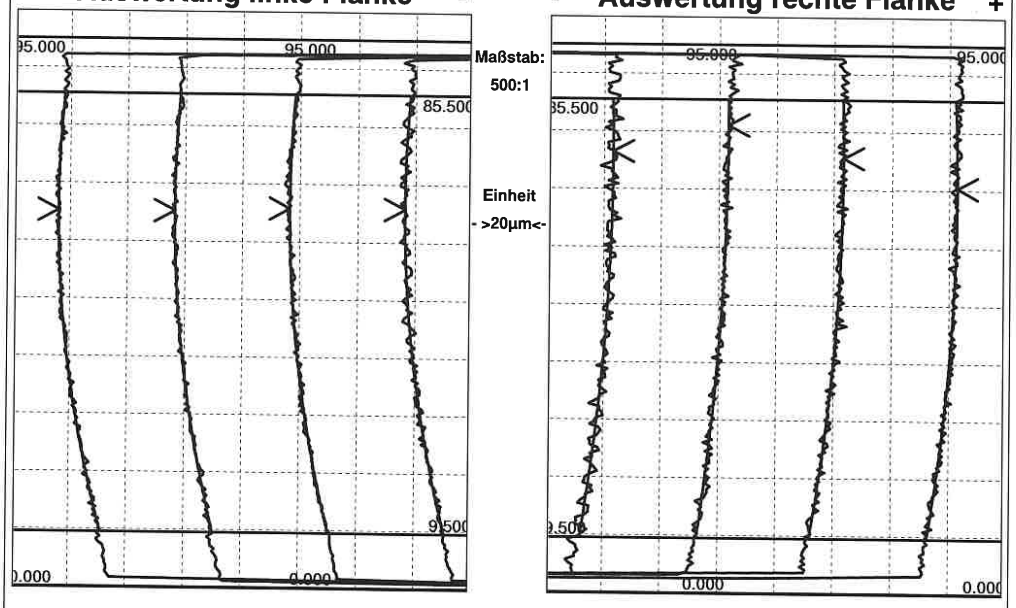
Flankenlinienmessung

Messung vom 05/12/2022 18:03:25 Dauer: 00:06:58 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/30-P-069593 ZW: 118.956-118.909
R.V.UNTEN

Name der Verzahnung:	30Z 7M-P-069593-U	Profil	Evolventisch
Zähnezahl	30	Taststiftdurchmesser	2.000 mm
Normalmodul	7.000 mm	Anzahl gemessener Punkte	191
Schrägungswinkel	Rechtsschräg 32.000000 Grad	Meßzylinder (d)	247.936 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	95.000 mm		

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	24	16	9	1
2	4.5		4.4	4.2	3.7	5.6
1	15.6	15.0	16.6	15.0	15.1	15.6
3	4.2		4.2	3.6	3.2	5.6
	10.3	7.0	11.0	10.0	9.9	10.2

Lücke Nr.	1	9	16	24	S	M	Q
Fβ	8.2	8.0	5.7	5.8		6.9	4
fHβ	13.6	13.1	14.0	12.0	15.0	13.2	2
ffβ	7.7	7.0	5.7	5.7		6.5	5
Cβ	5.6	4.6	6.0	6.2	7.0	5.6	

Vert. Maßstab 1:1, d.h. 10 mm entspr. 10 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

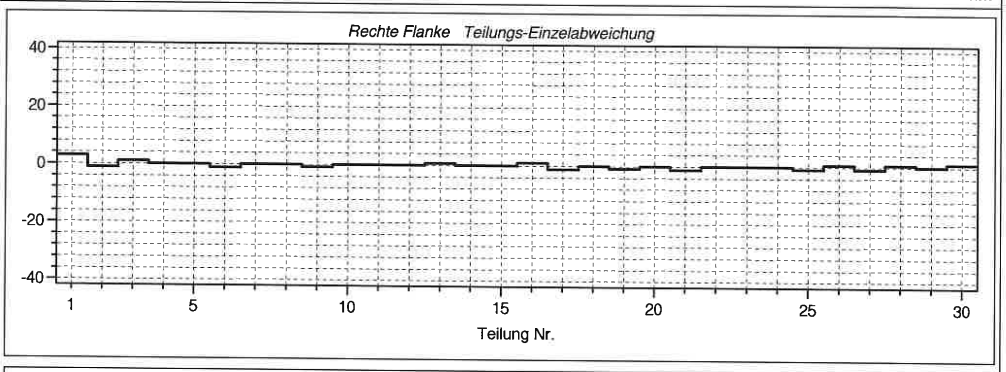
Alle Angaben in µm
Qualitäten nach DIN 3961

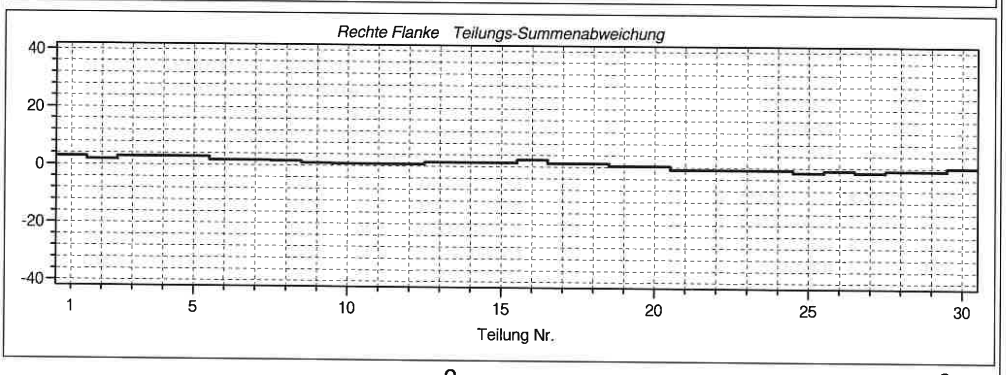
Teilungsmessung

Messung vom 05/12/2022 18:59:26 Dauer: 00:05:54 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/30-P-069593 ZW: 118.956-118.909
R.V.UNTEN

Name der Verzahnung:	30Z 7M-P-069593-U	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	30
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	247.936 mm
Meßbreite	47.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.123		
Zahnweite (Nennmaß)	118.940 mm	Anzahl Meßzähne	6
Diametrales Zweikugelmaß (Nennmaß)	265.836 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	265.836 mm	Meßrollendurchmesser	12.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	3.0	3	Teilungs-Schwankung (Rp)	4.1	
Teilungs-Gesamtabw. (Fp)	4.7	1	Max. Teilungssprung (fumax)	4.1	3
Teilungs-Spannenabw. (Fp(z/8))	4.7	1			

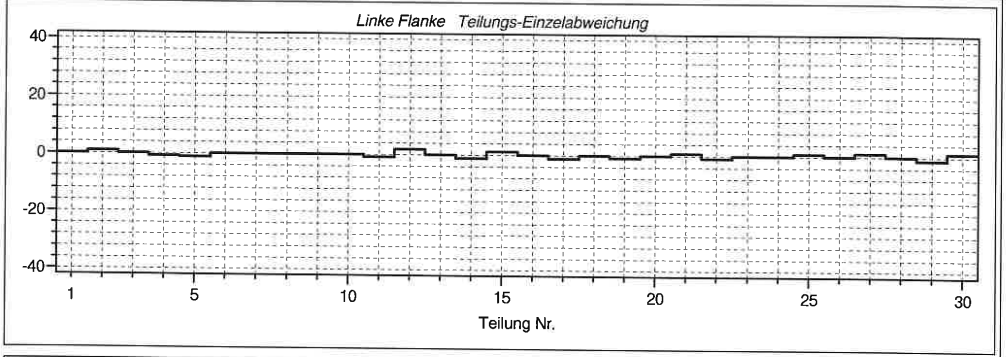
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

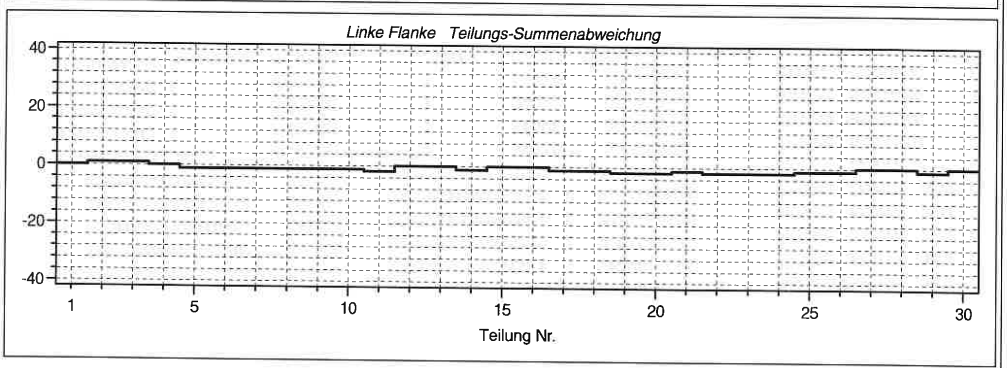
Teilungsmessung

Messung vom 05/12/2022 18:59:26 Dauer: 00:05:54 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/30-P-069593 ZW: 118.956-118.909
R.V.UNTEN

Name der Verzahnung:	30Z 7M-P-069593-U	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	30
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	247.936 mm
Meßbreite	47.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.123		
Zahnweite (Nennmaß)	118.940 mm	Anzahl Meßzähne	6
Diametrales Zweikugelmaß (Nennmaß)	265.836 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	265.836 mm	Meßrollendurchmesser	12.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	1.9	1	Teilungs-Schwankung (Rp)	3.1	
Teilungs-Gesamtabw. (Fp)	2.7	1	Max. Teilungssprung (fumax)	2.7	2
Teilungs-Spannenabw. (Fp(z/8))	1.9	1			

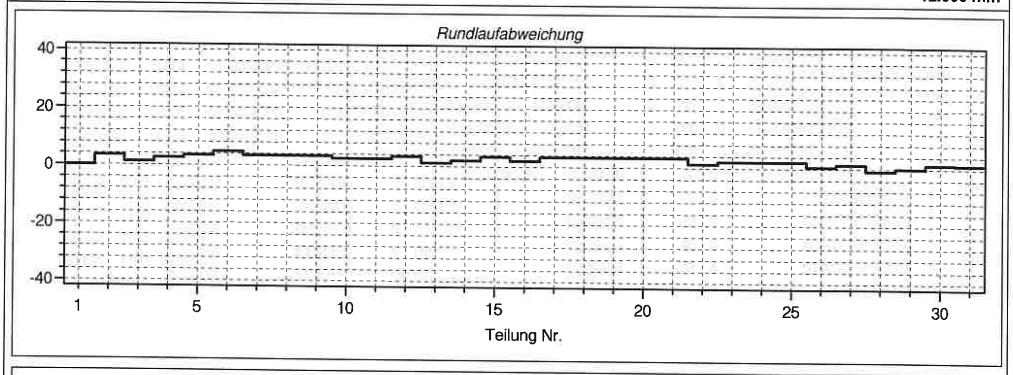
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

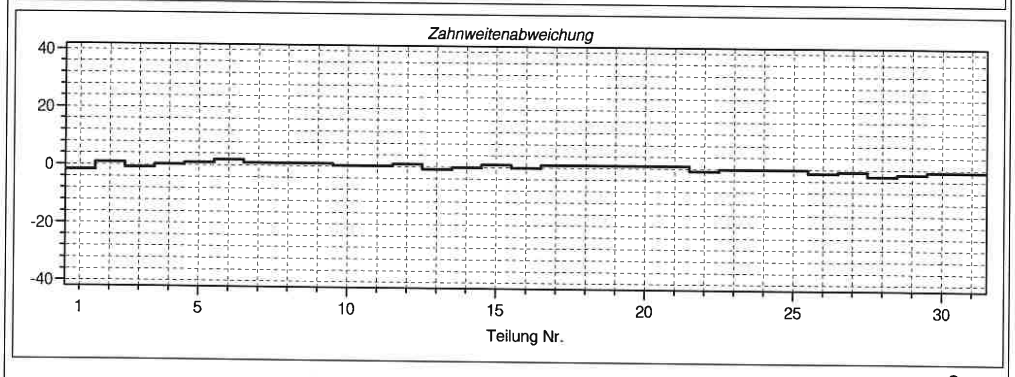
Teilungsmessung

Messung vom 05/12/2022 18:59:26 Dauer: 00:05:54 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/30-P-069593 ZW: 118.956-118.909
R.V.UNTEN

Name der Verzahnung:	30Z 7M-P-069593-U	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	30
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Rechtsschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	247.936 mm
Meßbreite	47.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.123		
Zahnweite (Nennmaß)	118.940 mm	Anzahl Meßzähne	6
Diametrales Zweikugelmaß (Nennmaß)	265.836 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	265.836 mm	Meßrollendurchmesser	12.000 mm





				Q
Min. Zahnweite (mm)	118.937	Mittl. Zahnweite (mm)	118.940	
Max. Zahnweite (mm)	118.942	Zahnweiten-Schwankung (µm)	4.2	
Anzahl Meßzähne	6			
		Rundlaufabweichung (Fr)	5.5	2
		Meßkugeldurchmesser (mm)	12.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

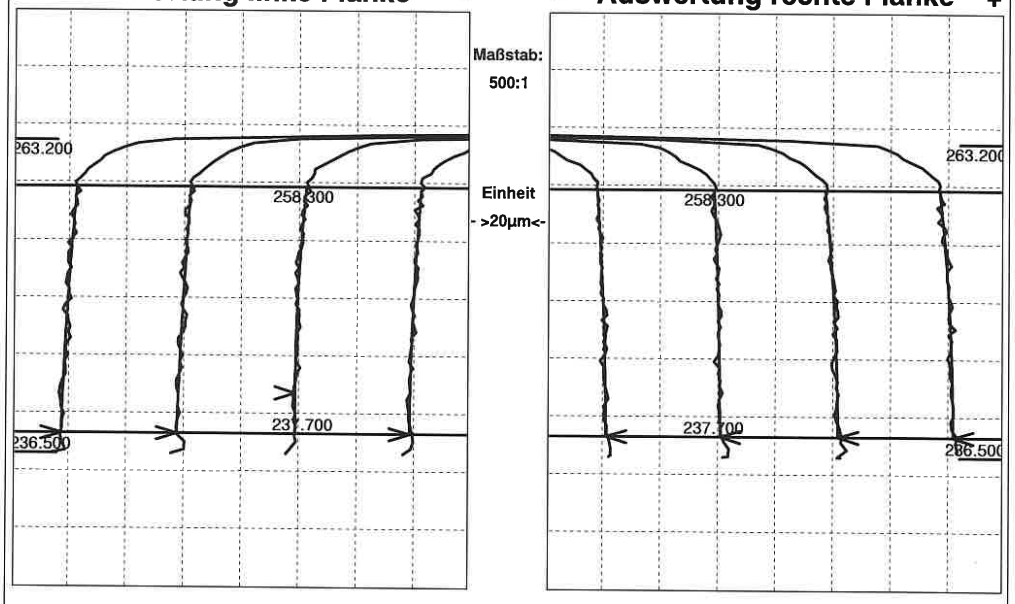
Profilmessung

Messung vom 05/12/2022 16:58:00 Dauer: 00:03:09 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/30-P-069593 ZW: 118.956-118.909
L.V.OBEN

Name der Verzahnung:	30Z 7M-P-069593-O	Profil	Evolventisch
Zähnezahl	30	Taststiftdurchmesser	2.000 mm
Normalmodul	7.000 mm	Anzahl gemessener Punkte	64
Schrägungswinkel	Linksschräg 32.000000 Grad	Meßbreite	47.500 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Vom Fuß zum Kopf
Kopfformkreis (d)	263.200 mm	Fußformkreis (d)	236.500 mm

+ Auswertung linke Flanke - - Auswertung rechte Flanke +



Q	M	S	24	16	9	1	Lücke Nr.	1	9	16	24	S	M	Q
3	5.2		6.2	5.6	4.7	4.3	F_α	4.8	4.9	5.9	7.1		5.7	4
5	- 4.3	0.0	- 5.2	- 4.6	- 3.6	- 3.9	fH_α	- 3.3	- 2.2	- 4.5	- 4.8	0.0	- 3.7	5
2	3.1		3.2	3.3	2.9	3.1	ff_α	2.9	3.6	2.9	3.4		3.2	3
	0.8	3.0	0.6	0.4	1.3	0.8	C_α	0.7	0.5	1.0	1.1	3.0	0.8	

Vert. Maßstab 2:1, d.h. 10 mm entspr. 5 mm (Durchmesser)
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

Alle Angaben in µm
Qualitäten nach DIN 3961

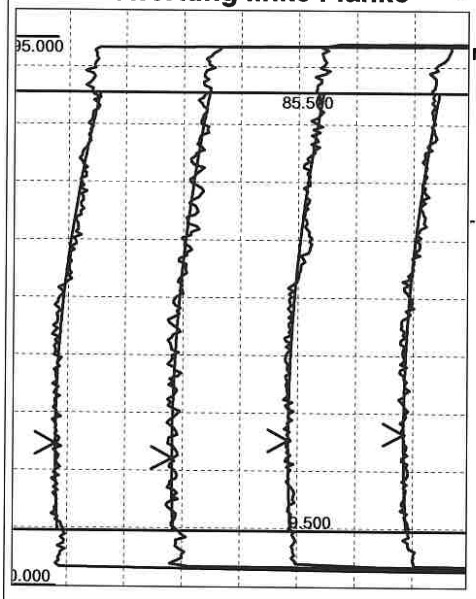
Flankenlinienmessung

Messung vom 05/12/2022 16:02:30 Dauer: 00:06:59 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/30-P-069593 ZW: 118.956-118.909
L.V.OBEN

Name der Verzahnung:	30Z 7M-P-069593-O	Profil	Evolventisch
Zähnezahl	30	Taststiftdurchmesser	2.000 mm
Normalmodul	7.000 mm	Anzahl gemessener Punkte	191
Schrägungswinkel	Linksschräg 32.000000 Grad	Meßzylinder (d)	247.897 mm
Eingriffswinkel	20.000000 Grad	Meßrichtung	Von oben nach unten
Zahnbreite	95.000 mm		

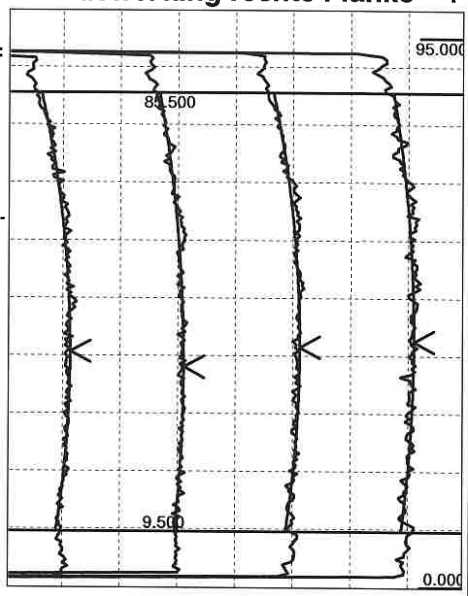
+ Auswertung linke Flanke -



Maßstab: 500:1

Einheit - >20µm<-

- Auswertung rechte Flanke +



Q	M	S	24	16	9	1
5	8.7		10.0	9.8	7.5	7.5
5	- 12.1	-8.0	- 14.2	- 12.2	- 11.1	- 11.0
5	6.5		6.0	7.5	6.6	6.0
	5.0	6.0	5.9	4.5	4.7	5.0

Lücke Nr.	1	9	16	24	S	M	Q
Fβ	7.3	5.7	7.6	9.0		7.4	4
fHβ	- 5.4	- 5.5	- 4.3	- 2.8	-8.0	- 4.5	3
ffβ	4.7	4.7	5.7	8.7		6.0	5
Cβ	7.3	5.5	6.9	5.7	6.0	6.3	

Vert. Maßstab 1:1, d.h. 10 mm entspr. 10 mm
Hor. Maßstab 500:1, d.h. 10 mm entspr. 20 µm

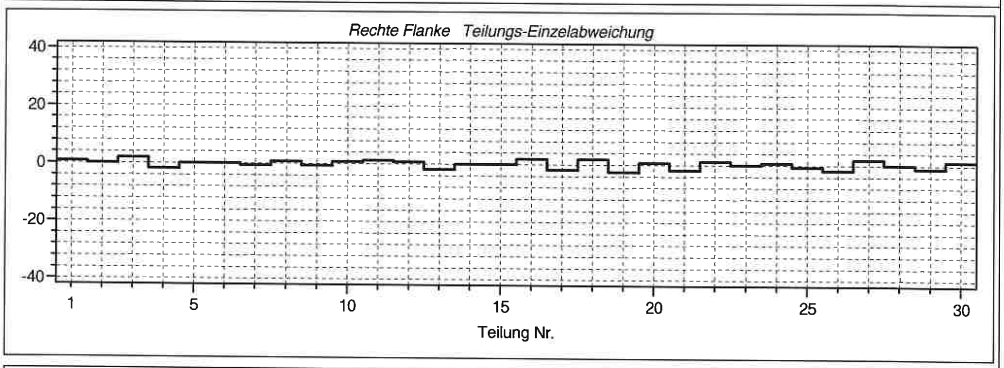
Alle Angaben in µm
Qualitäten nach DIN 3961

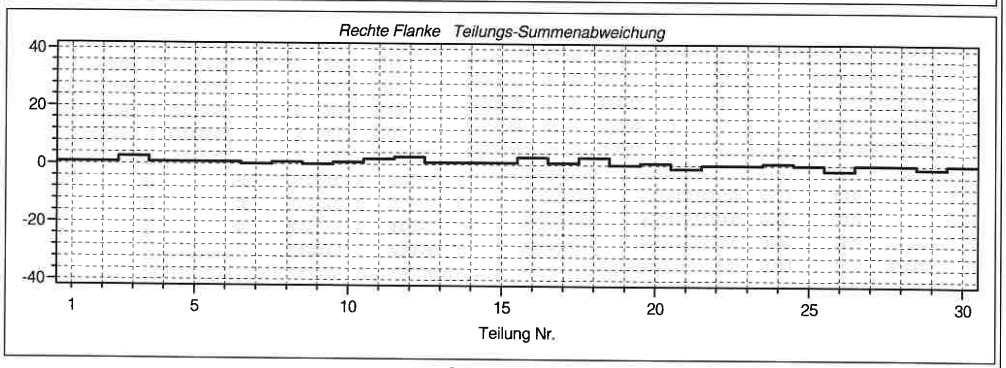
Teilungsmessung

Messung vom 05/12/2022 17:01:35 Dauer: 00:05:53 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/30-P-069593 ZW: 118.956-118.909
L.V.OBEN

Name der Verzahnung:	30Z 7M-P-069593-O	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	30
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	247.897 mm
Meßbreite	47.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.123		
Zahnweite (Nennmaß)	118.940 mm	Anzahl Meßzähne	6
Diametrales Zweikugelmaß (Nennmaß)	265.836 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	265.836 mm	Meßrollendurchmesser	12.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 2.6	2	Teilungs-Schwankung (Rp)	4.5	
Teilungs-Gesamtabw. (Fp)	4.5	1	Max. Teilungssprung (fumax)	4.5	3
Teilungs-Spannenabw. (Fp(z/8))	3.7	1			

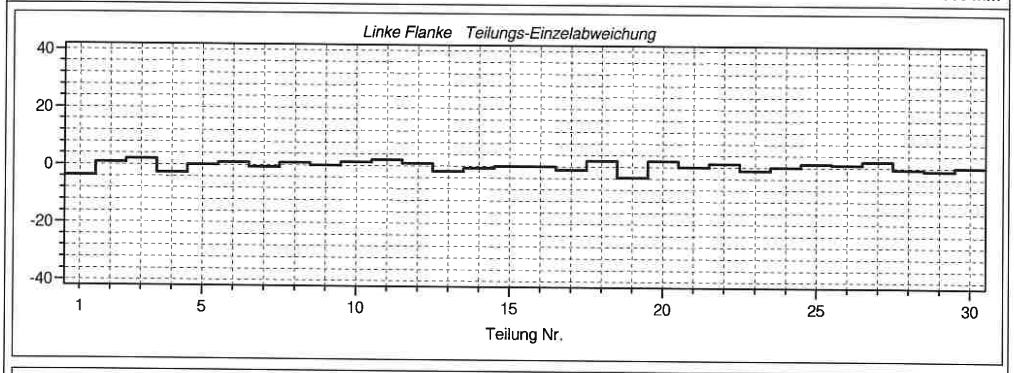
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

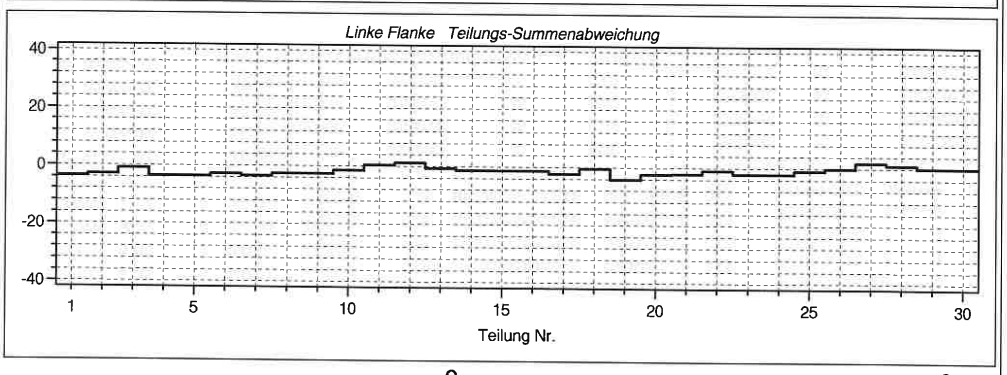
Teilungsmessung

Messung vom 05/12/2022 17:01:35 Dauer: 00:05:53 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/30-P-069593 ZW: 118.956-118.909
L.V.OBEN

Name der Verzahnung:	30Z 7M-P-069593-O	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	30
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	247.897 mm
Meßbreite	47.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.123		
Zahnweite (Nennmaß)	118.940 mm	Anzahl Meßzähne	6
Diametrales Zweikugelmaß (Nennmaß)	265.836 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	265.836 mm	Meßrollendurchmesser	12.000 mm





		Q			Q
Teilungs-Einzelabw. (fpmax)	- 3.8	3	Teilungs-Schwankung (Rp)	5.8	
Teilungs-Gesamtabw. (Fp)	6.1	1	Max. Teilungssprung (fumax)	5.8	4
Teilungs-Spannenabw. (Fp(z/8))	5.6	2			

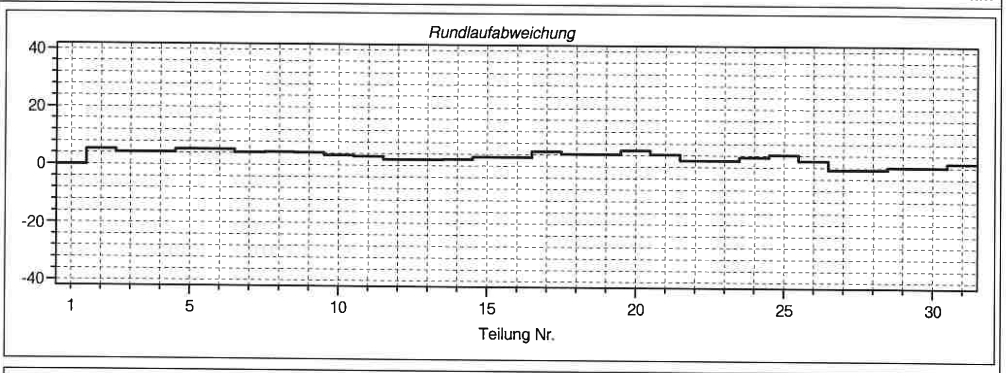
Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

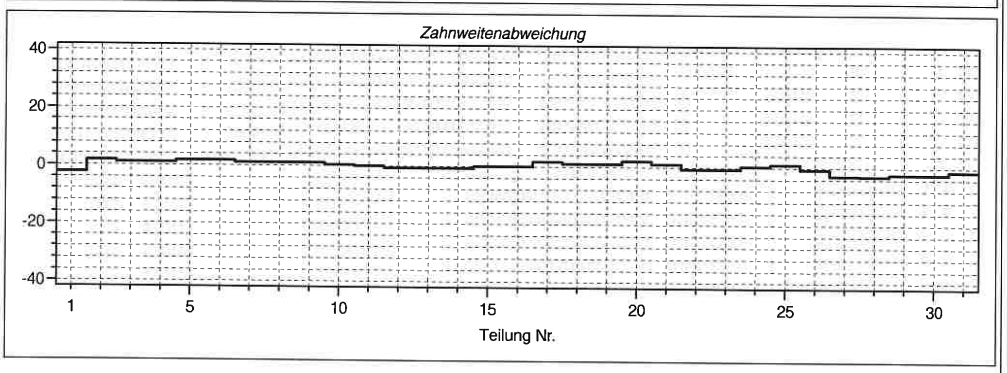
Teilungsmessung

Messung vom 05/12/2022 17:01:35 Dauer: 00:05:53 h:min:sec Maschine: P 1200 G / 28771 / 2.40.007f

Beschreibung:
19396/30-P-069593 ZW: 118.956-118.909
L.V.OBEN

Name der Verzahnung:	30Z 7M-P-069593-O	Profil	Evolventisch
Normalmodul	7.000 mm	Zähnezahl	30
Eingriffswinkel	20.000000 Grad	Schrägungswinkel	Linksschräg 32.000000 Grad
Taststiftdurchmesser	2.000 mm	Meßzylinder (d)	247.897 mm
Meßbreite	47.500 mm		
Profilverschiebungsfaktor (Nennmaß)	0.123		
Zahnweite (Nennmaß)	118.940 mm	Anzahl Meßzähne	6
Diametrales Zweikugelmaß (Nennmaß)	265.836 mm	Meßkugeldurchmesser	12.000 mm
Diametrales Zweirollenmaß (Nennmaß)	265.836 mm	Meßrollendurchmesser	12.000 mm





				Q
Min. Zahnweite (mm)	118.941	Mittl. Zahnweite (mm)	118.944	
Max. Zahnweite (mm)	118.946	Zahnweiten-Schwankung (µm)	5.0	
Anzahl Meßzähne	6			
		Rundlaufabweichung (Fr)	6.5	2
		Meßkugeldurchmesser (mm)	12.000	

Alle Angaben in µm
Qualitäten nach DIN 3961
Maßstab 500:1

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenbaufabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-069593
Werks-Nr.: *Works no.:*	Material No. 2000064793 TAG-No. 2.7.1.651	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002294

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Ritzelwelle / pinion shaft	PN-00096645.000.01

Magnetpulverprüfung / *magnetic particle test*

Prüfvorschrift: *Test specification:*	DIN EN ISO 9934-1-/-2/-3 / EN ISO 3059 / DIN EN 10228-1		
Prüfverfahren: *Inspection procedure:*	Magnetischer Streustrom / Wechselstrom / Jochmagnetisierung Bild 9 *Magnetic stray current / AC / Yoke magnetization fig. 9*		
Prüfgerät: *Test equipment:*	Handjoch *hand yoke*	Typ: *Type:*	Tiede TWA 230 A
Feldstärke: *Field strength value:*	H = 43 A/cm	Felderzeugung: *Type of magnetization:*	Jochmagnetisierung *Yoke magnetization*
Prüfmittel: *Test medium:*	Magnetpulver Fluid *magnetic powder fluid*	Typ: *Type:*	MR 76F
Beleuchtung: *Lighting:*	UV Handlampe *UV Hand lamp*	Typ: *Type:*	Karl Deutsch Serial no.: 10486
Beleuchtungsstärke: *Illuminance:*	8 Lux	Bestrahlungsstärke: *Irradiance:*	35 W/m^2

Beschreibung der Prüfung/*Discription of testing:*		
Werkstoff: *Material:*	18CrNiMo7-6+FP	
Oberflächenbeschaffenheit: *Surface structure:*	☒ bearbeitet ☒ *machined*	☐ nicht bearbeitet ☐ *unmachined*
Prüfbereich: *Test area:*	*Verzahnung und Wellenübergänge / Toothing and shaft transitions*	

Anzeigen: *Indications:*	-	Linear / *linear*
	-	Rund / *round*
	-	Sonstiges / *others*

Testergebnis: *Test result:*	☒ i.O. ☒ *o.k.*	☐ n.i.O. ☐ *n.o.k.*

58640 Iserlohn	18.05.2022	J. Linke (Level 2)	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

Dieses Zeugnis wurde maschinell erstellt und ist gemäß DIN EN 10204 ohne Unterschrift gültig.
This certificate was been generated by EDP system and it is valid without signature acc. to DIN EN 10204.

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

Gehäuse_housing_material certificates_PART-057561

Juan Lasa
steel works

+34 943 88 28 61
info@juanlasa.com
www.juanlasa.com

Talleres Juan Lasa, S.A.
Barrio Alegi, Nº 14
20217 Gabiria (Gipuzkoa)
CIF: A-20082244

Cliente:
PEKRUN GETRIEBEBAU GMBH
Köbbingser Mühle 14
Phone: 02371/ 945-0 **Fax:**

Sent in:
Pekrun Getriebebau GmbH
Pekrun Getriebebau GmbH
58640 ISERLOHN

DELIVERY NOTE: **54.962**

Supplier Nº:	

Customer Order Ref.	Delivery Date	Order Date	TJL Order	TJL Proyect	Page
4500058885	04/03/2022	19/01/2022	54011	4614	1/1

OF	Description	Drawing Nº	Quantity
8619	GEHÄUSE	PN-00077206.000.01-0	1

Observations: 10018703 / PART-057561

TOTAL PIECES:	**1**

Gehäuse_housing_material certificates_PART-057561

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPQ8IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : Q8S1006030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Size	Product No.	Quantity	Weight (kg)	Heat No.	Position	Tensile Test YP (N/㎟)	Tensile Test TS (N/㎟)	Tensile Test EL (%)	Impact Test V Notch -20°C Energy (Joule)	Division	Chemical Composition C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Cu (%)	Mo (%)	N (ppm)	Nb (%)	Ti (%)	V (%)	Sol-Al (%)
6x2500x12000	PK20727001	1	1,413	SK21827	T	502	549	31	1: 104 2: 108 3: 119 A: 110	L P	0.0762 0.0751	0.241 0.240	1.547 1.551	0.0104 0.0107	0.0020 0.0017	0.024 0.023	0.004 0.004	0.008 0.008	0.000 0.001	33 31	0.025 0.025	0.0133 0.0130	0.040 0.040	0.037 0.035
*** Sub Total (010) ***		47	66,411 (kg)																					
*** Heat Treatment ===> Normalizing rolling ***											CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5													
8x3000x12000	PK20684601-4603	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110	L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.046 0.066	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
------>8x3000x12000	PK20684701-4703	3	6,783	SK21908	T	484	565	36	1: 103 2: 113 3: 115 A: 110	L P	0.0832 0.0832	0.258 0.254	1.557 1.564	0.0096 0.0095	0.0014 0.0013	0.046 0.066	0.005 0.004	0.008 0.008	0.000 0.000	30 29	0.027 0.026	0.0122 0.0126	0.042 0.043	0.031 0.034
8x3000x12000	PK20684801-4803	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.008 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20684901-4903	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.008 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033
8x3000x12000	PK20685001-5003	3	6,783	SK21909	T	468	556	32	1: 102 2: 114 3: 108 A: 108	L P	0.0761 0.0741	0.255 0.258	1.539 1.555	0.0109 0.0106	0.0014 0.0014	0.032 0.033	0.005 0.004	0.008 0.008	0.000 0.000	32 30	0.026 0.025	0.0122 0.0119	0.041 0.041	0.034 0.033

* Position - T : Top, M : Middle, B : Bottom
* Tensile Test. Direction : Transversal, Gauge Length : 5.65 √A₀ (Rectangular), YP Method : Upper Point
* Impact Test. Direction : Surface Longitudinal, Sub-Size : 10mmX5.0mm
* Division - L : Ladle Analysis, P : Products Analysis
* Supply Condition : As-Rolled unless otherwise Heat Treated.

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN100025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

CE 0035 14 0035-CPR-A258 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia

Technical Inspection Team Leader NA SEON-HA

Copia de certificados de materiales empleados
Para el trabajo de.....OLAN, S.A.....
Realizado con la O.F. de OLAN Nº.....70579.....
Su pedido N.º.....66837.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057561

KRAKATAU POSCO

Mill Test Certificate

Certificate No. : 160814-FPQ8IS-0008A1-0023
Date of Issue : Sep., 30, 2016

Order No. : Q8S1006030
Supplier : POSCO DAEWOO CORPORATION
Customer : OLAN S.A.

PO No. : PLT-OLAN-160715
Commodity : PLATE
Spec & Type : EN10025-2 S355J2+N(NR)

Product No.	Division	Total-Al (%)	CEQ (%)		
PK20727001	L P	0.036 0.037	0.348		
*** Sub Total (010)	**		47	66,411 (kg)	CEQ (G) = C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5
PK20684601-4603	L P	0.033 0.035	0.361		
PK20684701-4703	L P	0.033 0.035	0.361		
PK20684801-4803	L P	0.035 0.034	0.348		
PK20684901-4903	L P	0.035 0.034	0.348		
PK20685001-5003	L P	0.035 0.034	0.348		

We hereby certify that the material herein has been made in accordance with the order and above specification.
This material has been fully killed and made by basic oxygen process. This material is fine grained steel.
This material has been made by vacuum degassing and calcium treated process.
No repair welding was performed to the products. Test Certificate is issued according to EN10204 3.1.
EN100025-2
Thickness tolerance as per EN 10029 of Class B and Flatness as per EN 10029 Class N
Surface as per EN 10163 class A Subclass 3

Legal sanction can be imposed on forging. Improper use of product can cause safety issues.

CE 0035 14 0035-CPR-A258 Surveyor To :

NA SEON-HA

KRAKATAU POSCO Jl. Afrika, No. 2, Kawasan Industri Krakatau Cilegon, Banten, 42443, Indonesia < PAGE : 172 > Testing and Inspection Team Leader NA SEON-HA

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000008647

Date : 09.12.2020

Page 12 of 19

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PL.TA.28016 MADRID.SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : EN10025-2 S355 J2+N Plate Dimension -Thickness x Width x Length : 20.00MMX2950MMX11600MM

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
A02613	A0261311B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261311D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261312A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261312B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261312D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261313A0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261313B0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02613	A0261313D0	1	5.373	L	0.190	1.35	0.004	0.020	0.21	0.023	0.005	0.001	0.005	0.002	0.0040	0.007	0.0004	0.010	55	0.41	392	540	27		170	118	178	155.33	-20	Lo.
A02614	A0261401A0	1	5.373	L	0.187	1.37	0.003	0.013	0.18	0.026	0.004	0.001	0.005	0.002	0.0040	0.006	0.0004	0.009	59	0.41	394	553	32		210	210	190	203.33	-20	Lo.
A02614	A0261401B0	1	5.373	L	0.187	1.37	0.003	0.013	0.18	0.026	0.004	0.001	0.005	0.002	0.0040	0.006	0.0004	0.009	59	0.41	394	553	32		210	210	190	203.33	-20	Lo.
Sub Total		38	204.174																												

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/10025 13.08.2020
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Copia de certificados de materiales empleados
Para el trabajo de...OLAN LASA.....
Realizado con la O.F. de OLAN Nº...70379
Su pedido N.º.....66837.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000008647

Date : 09.12.2020

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition: NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355 J2+N** **Plate Dimension** -Thickness x Width x Length : **20.00MMX3000MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																			Mechanical Properties											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)					
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp °C	Orien
B08643	B0864303B0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo
B08643	B0864303D0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864304A0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo
B08643	B0864304B0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864304D0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864305A0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864305B0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
B08643	B0864305D0	1	5.652	L	0.192	1.40	0.003	0.015	0.21	0.027	0.003	0.001	0.006	0.002	0.0010	0.006	0.0005	0.011	56	0.42	406	548	32		170	210	180	186.67	-20	Lo.
Sub Total		9	50.868																											
G Total		161	813.897																											

Remarks :
1. Test Certificate as per EN 10204, 2004 Type 3. 1

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification.
The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions
UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/10025 13.08.2020
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED
Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000008647

Date : 09.12.2020

Page 19 of 19

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PI.TA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-M04606C: Rev.01, Dt.:08.08.2020
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class B
5. Surface Inspection: As per EN10163:2005 class A Subclass 3
6. Flatness: As per EN10029:2011 table 4 class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW): C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
11. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions
UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/10025 13.08.2020
Despatch Advice No:
Vehicle No:
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :09.12.2020 16:49:43
Printing Date 14.12.2020 & Time 17:31:41

Sridhar Behera
Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

JINDAL STEEL & POWER

CE
0045
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0045 - CPR - 1835

INSPECTION CERTIFICATE

Test Certificate No. 0000011094

Date : 16.10.2021

Page 7 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N** **Plate Dimension -**Thickness x Width x Length : **25.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)						
																			ppm		Mpa	Mpa			I	II	III	Avg	Temp. °C	Orien
B17532	B1753211B0	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.018	56	0.42	419	552	27		322	334	309	321.67	-20	Lo.
B17532	B1753211D0	1	5.838	L	0.190	1.38	0.003	0.022	0.21	0.030	0.006	0.001	0.005	0.002	0.0010	0.007	0.0003	0.018	56	0.42	419	552	27		322	334	309	321.67	-20	Lo.
B17533	B1753301A0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753301B0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753301D0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753302A0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753302B0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753302D0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753303A0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
B17533	B1753303B0	1	5.838	L	0.193	1.40	0.002	0.019	0.21	0.030	0.007	0.001	0.006	0.002	0.0010	0.007	0.0003	0.017	57	0.43	421	555	29		306	267	307	293.33	-20	Lo.
Sub Total		17	99.246																												

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

Copia de certificados de materiales empleados
Para el trabajo de.....OLAN...LANA.....
Realizado con la O.F. de OLAN Nº.....70379.....
Su pedido N.º.....66833.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
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Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

CE 0045

INSPECTION CERTIFICATE

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olan@olan.es

13
0045 - CPR - 1835

Test Certificate No. 0000011094

Date : 16.10.2021

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To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N Plate Dimension -**Thickness x Width x Length : **8.000MMX3000MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)					
																			ppm		Mpa	Mpa			I	II	III	Avg.	Temp °C	Orien
B16737	B1673710E0	1	2.211	L	0.180	1.33	0.004	0.016	0.21	0.050	0.007	0.001	0.021	0.002	0.0010	0.009	0.0005	0.014	56	0.40	432	589	28		94	98	107	99.670	-20	Lo.
Sub Total		1	2.211																												
G Total		114	670.884																												

Remarks ; 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-00733A; Rev.02, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029 of Class B
5. Surface Inspection: As per EN10163 class A Subclass 3
6. Flatness: As per EN10029 Class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) :C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

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INSPECTION CERTIFICATE

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Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

Test Certificate No. 0000011094

Date : 16.10.2021

Page 16 of 16

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

11. In Chemical Analysis column, L stands for Ladle Analysis &In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :16.10.2021 17:31:12
Printing Date 18.10.2021 & Time 11:16:31

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
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INSPECTION CERTIFICATE

OLAN SA
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olan@olan.es

Test Certificate No. 0000011045

Date : 14.10.2021

Page 21 of 25

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N Plate Dimension -**Thickness x Width x Length : **50.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
				Chemical Analysis																	**Mechanical Properties**									
		.	MT																											
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2 ppm	CE	YS Mpa	UTS Mpa	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
A13620	A1362001A0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0005	0.018	56	0.42	405	536	27		126	132	144	134.00	-20	Lo.
A13620	A1362001B0	1	11.725	L	0.190	1.40	0.005	0.022	0.20	0.028	0.009	0.001	0.026	0.002	0.0010	0.007	0.0005	0.018	56	0.42	405	536	27		126	132	144	134.00	-20	Lo.
B17069	B1706906A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706906B0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706907A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706907B0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	400	548	28		279	305	302	295.33	-20	Lo.
B17069	B1706908A0	1	11.725	L	0.184	1.41	0.004	0.018	0.24	0.033	0.003	0.002	0.025	0.003	0.0010	0.009	0.0005	0.014	57	0.42	390	538	26		144	134	133	137.00	-20	Lo.
Sub Total		7	82.075																											

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Copia de certificados de materiales empleados
Para el trabajo de....OLAN LASA.....
Realizado con la O.F. de OLAN Nº....00379.....
Su pedido N.º.....66337.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At\Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
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INSPECTION CERTIFICATE

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01250 Araia - Alava - Spain
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olan@olan.es

Test Certificate No. 0000011045

Date : 14.10.2021

Page 24 of 25

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

Material Grade : **EN10025-2 S355J2+N Plate Dimension -**Thickness x Width x Length : **55.00MMX2500MMX12000MM**

Heat No	Plate ID	Pcs	Wt. MT	L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J) I	II	III	Avg	Temp °C	Orien
					Chemical Analysis																Mechanical Properties									
																			ppm		Mpa	Mpa								
B16535	B1653506A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.001	0.0020	0.010	0.0003	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo.
B16535	B1653508A0	1	12.903	L	0.180	1.41	0.005	0.017	0.20	0.037	0.006	0.002	0.025	0.001	0.0020	0.010	0.0003	0.012	55	0.41	398	545	26		185	195	155	178.33	-20	Lo.
Sub Total		3	38.709																											
G Total		157	1150.149																											

Remarks : 1. Test Certificate as per EN 10204, 2004 Type 3.1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/- 00733A; Rev.2, Dt.:09.03.2021
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class B
5. Surface Inspection: As per EN10163:2005 class A Subclass 3
6. Flatness: As per EN10029:2011 table 4 class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) : C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER LIMITED

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Test Certificate No. 0000011045

Date : 14.10.2021

Page 25 of 25

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:NORMALIZING ROLLING

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Deoxidation : Fully Killed

10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
11. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/11030 Lot 2-H 14.07.2021
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

Prepared by SRIDHAR.BEHERA
Preparation Date :14.10.2021 12:23:48
Printing Date 14.10.2021 & Time 14:26:57

Deepak Prasad
Authorised Signatory
TSD PlateMill

REC-PM-TSD-14-41,Rev 01,Eff date : 07.10.2020

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER LIMITED

JINDAL STEEL & POWER

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Phone No.:-06761 254191-95, Fax :-06761 -254141-44

INSPECTION CERTIFICATE

CE
0045
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0045 - CPR - 1835
Date : 01.09.2018

Test Certificate No. 0276
To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

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TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF : Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Supply Condition: Furnace Normalized
Deoxidation :Fully Killed

Material Grade : EN10025-2:2005 S355J2+N Plate Dimension -Thickness x Width x Length : 55.00MMX2500MMX12000MM

Heat No	Plate No	No of Pcs	Wt. MT	Chemical Analysis (Laddle)																Mechanical Properties: <=25mm Flat & >25mm Round Sample				Impact (V Notch Charpy) Value at 0 Deg. Sent 10*10*55 mm					
				%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	%Nitrogen	CE	YS(Mpa)	UTS(Mpa)	%El	Orien	I	II	III	Avg	Temp	Orien
H83700	05A0, 09A0, 10A0, 11A0, 12A0, 13A0, 14A0	7	90.671	0.18	1.46	0.002	0.02	0.22	0.021	0.005	0.093	0.045	0.015	0	0.005	0.0035	0.023	49	0.429	391	555	78	T	121	101	130	117.00	-20	L
																				386	549	30	T	129	137	111	125.67	-20	L
H83702	01A0, 02A0, 03A0, 04A0, 05A0, 06A0, 07A0, 08A0, 09A0, 11A0, 12A0	11	142.483	0.173	1.45	0.002	0.015	0.2	0.024	0.007	0.002	0.046	0.018	0	0.006	0.0045	0.018	51	0.42	389	576	27	T	115	122	110	115.67	-20	L
																				382	542	27	T	110	108	98	105.33	-20	L
H83781	12A0	1	12.953	0.183	1.45	0.002	0.015	0.18	0.021	0.006	0.002	0.045	0.018	0.0000	0.006	0.0017	0.022	55	0.430	366	492	32	T	78	72	68	72.67	-20	L

Sreehar Behera
AGM, QA & QC
Jindal Steel & Power Ltd.,
Angul, Odisha, India

Copia de certificados de materiales empleados
Para el trabajo de.....OLAN..LASA.....
Realizado con la O.F. de OLAN Nº..120379.....
Su pedido N.º.....6837.....
Ref.:.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, A/Po : Jindal Nagar, Dist.: Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No 6 ,O.P.Jindal Marg, Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -11 066 INDIA
Phone No.:(06761) 254191-95, Fax :-06761-254141-44

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0045 - CPR - 1835
Date : 01.09.2018

INSPECTION CERTIFICATE

Test Certificate No. 0276
To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-8 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vacuum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Supply Condition: Furnace Normalized
Deoxidation :Fully Killed

Remarks :
1. Test Certificate as per EN 10204, 2004 Type 3. 1
2. Material mentioned above also conforms to EN10025-2:2005. S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-M1216; Rev.00. Dt.:22.01.2018
4. Supply Condition: Furnace Normalized at 900 ± 20°C, Cycle time: 1.4 minutes per mm thickness + 10 minutes Soaking
5. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class A
6. Surface Inspection: As per EN10163:2005 class A Subclass 3
7. Flatness: As per EN10029:2011 table 4 class N (L Type)
8. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
9. CE (IIW) : C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
10. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec
11. Orientation of Sample: Tensile is Transverse & Impact is Longitodinal to rolling direction
12. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification
UltraSonic Examination : All the above plates are ultrasonically tested as per EN10160:1999 S1E1 and found ok

Purchase Reference & Date: PROV/EXP/PLT/R019/LOT 2/ 04.07.2018
" DOP can be viewed at www.jindalsteelpower.com", DOP No.: JSPL/CE/PL/S355J2
" Gauge Length: 5.65(SO)1/2

Sridhar Behera
AGM QA & QC
Jindal Steel & Power Ltd.,
Angul, Odisha, India

Authorised Signatory
QA/QC Plate Mill

JSPL/ANG/PM-QA&QC/F-251

Gehäuse_housing_material certificates_PART-057561

검 사 증 명 서
MILL TEST CERTIFICATE

HYUNDAI STEEL
0038/07

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

주문번호 Order No. : F171200026
품 명 Commodity : Hot Rolled Steel Plate
제품규격 Specification : EN 10025-2 S355J2+N
고객사 Customer : OLAN
주문자 Contractor : HYUNDAI CORPORATION
증명서 번호 Certificate No. : 20180301-PS-010-003
발행일자 Date of Issue : 2018-03-01

제품치수 Dimension	수량 Quantity	중량 Weight (Kg)	제강번호 Heat No.	제품번호 Product No.	Position	인장시험 Tensile Test YP (N/㎟)	TS	EL (%)	YP-EL (%)	RA (%)	YR (%)	YP Mtd	충격시험 Impact Test V Notch -20.0 ℃ Energy (Joule)	SF (%)	LE (mm)	Division	화학성분 Chemical Composition(%) 단위 Unit 2:x100 3:x1,000 4:x10,000 5:x100,000 C 4	Si 3	Mn 3	P 4	S 4	Cr 2	Ni 2	Cu 3	Mo 2	N 4	Nb 3	Ti 3	V 3	Sol-Al 3	CEQ 3
65 x 2500 x 12000	1	15,306	P59185	FA82167401	T	380.6	514.1	32				U	1: 263 2: 312 3: 255 A: 277			L P	1,152 1,201	210 207	1,454 1,453	147 160	40 37	2 2	10 10	82 78	0 0	41 37	31 29	16 16	1 2	30 27	374 379
65 x 2500 x 12000	1	15,306	P59185	FA82167501	T	380.6	514.1	32				U	1: 263 2: 312 3: 255 A: 277			L P	1,152 1,201	210 207	1,454 1,453	147 160	40 37	2 2	10 10	82 78	0 0	41 37	31 29	16 16	1 2	30 27	374 379
65 x 2500 x 12000	1	15,306	P59753	FA82223601	T	384.1	500.0	32				U	1: 313 2: 272 3: 320 A: 302			L P	1,142 1,147	198 191	1,455 1,452	145 118	38 25	2 2	9 9	81 82	1 1	43 35	29 29	15 16	2 1	32 34	374 374
65 x 2500 x 12000	1	15,306	P59750	FA82223701	T	389.8	501.2	32				U	1: 288 2: 313 3: 255 A: 285			L P	1,170 1,247	186 194	1,454 1,428	156 134	35 37	2 2	8 9	81 79	0 1	41 36	29 31	16 16	2 1	36 31	374 380

NOTE
- Position – T:Top, M:Middle, B:Bottom
- Tensile test – Direction:Transverse, Gauge length:5.65√A, (Round), YP Mtd : 2 (0.2% off-set),5 (0.5% underload), U (Upper yield point), L (Lower yield point)
- Impact test – Direction:Longitudinal, Size:10mmX10mm, SF:Shear fracture, LE:Lateral Expansion
- Division – P:Product analysis, L:Ladle analysis

- THIS CERTIFICATE IS ISSUED ACCORDING TO EN 10204 3.1 AD2000W0(W1)
This Mill Test Certificate is issued in accordance with EN 10204 Type 3.1

상기의 제품은 검사의 결과 주문요구사항과 지정된 규격에 합격한 것을 증명합니다.
WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ORDER AND SPECIFICATION

Signature S. B. Park
Chief Of Quality Assurance Team

* 본 검사증명서는 원본인 전자문서(전자서명 정보 교환)로부터 출력된 사본입니다. 전자문서의 내용은 현대제철 고객포탈에서 확인하실 수 있습니다.(http://sm.hyundai-steel.com/cs/cm/login.jsp)
* This Mill Test Certificate is a copy that has been printed from original electronic document(with digital signing).
You are able to check an original electronic document at hyundaisteel's customer portal.(http://sm.hyundai-steel.com/cs/cm/login.jsp) * QRcode scanner App : 'QReal'
* [사용상 주의사항] 본 검사증명서에 명기된 규격 외 사용시 제품손상 및 안전상 문제가 발생할 수 있습니다.
* [Caution for Use] Damage on products and safety problems may arise if used other than to the spec stated in this Mill Test Certification.

Copia de certificados de materiales empleados
Para el trabajo de....OLAN....LA-A.....
Realizado con la O.F. de OLAN Nº.....110379
Su pedido N.º.....66.837.....
Ref.....OLAN, S.A.

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
Registered Office:Post box No. 6 ,O P Jindal Marg ,Hisar (Haryana)
Corporate Office :Jindal Center,12 Bhikaji Cama Palace, New Delhi -110066 INDIA
Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000007747

Date : 15.07.2020

Page 8 of 28

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

OLAN SA
Pol.Ind.Asparrena C\Intxerdui 9
01250 Araia - Alava - Spain
Telf: 945 314 580 FAX: 945 314 598
olan@olan.es

TEST RESULTS

Supply Condition:Normalizing Rolling

Deoxidation : Fully Killed

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

Material Grade : **EN10025-2 S355J2+N Plate Dimension -**Thickness x Width x Length : **130.0MMX2500MMX7000MM**

Heat No	Plate ID	Pcs	Wt. MT	Chemical Analysis																	Mechanical Properties										
				L/P	%C	%Mn	%S	%P	%Si	%Al	%Cu	%V	%Nb	%Ti	%Mo	%Ni	%B	%Cr	N2	CE	YS	UTS	%EL*	Bend Test	Impact Value at(J)						
																			ppm		Mpa	Mpa		Mand Dia.	I	II	III	Avg	Temp ^{0}C	Orien.
A00951	A0095103A0	1	17.859	L	0.210	1.42	0.004	0.022	0.21	0.028	0.004	0.001	0.026	0.001	0.0010	0.005	0.0005	0.012	54	0.45	362	545	26		72	78	66	72.000	-20	Lo.
A00951	A0095104A0	1	17.859	L	0.210	1.42	0.004	0.022	0.21	0.028	0.004	0.001	0.026	0.001	0.0010	0.005	0.0005	0.012	54	0.45	368	538	26		79	70	65	71.333	-20	Lo.
B03441	B0344110A0	1	17.859	L	0.192	1.40	0.003	0.018	0.19	0.030	0.005	0.002	0.026	0.002	0.0010	0.006	0.0005	0.012	52	0.42	358	522	24		114	120	132	122.00	-20	Lo.
--> B03441	B0344111A0	1	17.859	L	0.192	1.40	0.003	0.018	0.19	0.030	0.005	0.002	0.026	0.002	0.0010	0.006	0.0005	0.012	52	0.42	358	522	24		114	120	132	122.00	-20	Lo.
B03441	B0344112A0	1	17.859	L	0.192	1.40	0.003	0.018	0.19	0.030	0.005	0.002	0.026	0.002	0.0010	0.006	0.0005	0.012	52	0.42	358	522	24		114	120	132	122.00	-20	Lo.
Sub Total		7	125.013																												

Copia de certificados de materiales empleados
Para el trabajo de.....LAN LASA.....
Realizado con la O.F. de OLAN Nº.....70339.....
Su pedido N.º.....66.337.....
Ref.:.....OLAN, S.A.

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

Purchase Reference & Date: PROV/EXP/PLT/10002 04.05.2020
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41, Eff date : 26.08.2019

Prepared by SRIDHAR.BEHERA
Preparation Date :15.07.2020 15:48:05
Printing Date 16.07.2020 & Time 16:11:16

Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057561

JINDAL STEEL & POWER

JINDAL STEEL & POWER LIMITED

Works:Chhendipada Road,SH- 63, At/Po : Jindal Nagar, Dist : Angul (ODISHA)-759111 INDIA
Email:qclab.pm@angul.jspl.com
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Phone No.:-(06761) 254191-95; Fax :-06761 -254141-44

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INSPECTION CERTIFICATE

Test Certificate No. 0000007747

Date : 15.07.2020

Page 28 of 28

To, M/s NETWORK STEEL S.L. SPAIN
CARDENAL MARCELO SPINOLA 2-5 PLTA.28016 MADRID SPAIN CIF 883,SPAIN,PIN-00000

TEST RESULTS

Supply Condition:Normalizing Rolling

Deoxidation : Fully Killed

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling
(EAF - Electric Arc Furnace / LRF: Ladle Refining Furnace / VD : Vaccum Degassing / CCM : Continuous Casting Machine/ RHF : Re-Heating Furnace)

1. Test Certificate as per EN 10204, 2004 Type 3. 1
2. Material mentioned above also conforms to EN10025-2 S355J2+N
3. Material also conforms to TDC Doc. No. : JSPL/ANGUL/TDC/-M04213C, Rev.00, Dt.:02.05.2020
4. Dimensional Tolerance: Thickness tolerance found satisfactory as per EN 10029:2011 of Class B
5. Surface Inspection: As per EN10163:2005 class A Subclass 3
6. Flatness: As per EN10029:2011 table 4 class N (L Type)
7. Test Piece: Chemical as per EN ISO 14284:2003, Tensile as per DIN EN ISO 6892-1:2009 & Impact as per DIN EN ISO 148-1:2011
8. CE (IIW) ; C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
9. Marking details: Mfg. Name, & logo, plate identification, specification & grade, size, customer name & UT Spec.
10. Orientation of Sample: Tensile is Transverse & Impact is Longitudinal to rolling direction
11. Ultrasonic Examination: Upto 120mm Thickness EN 10160S1E1 & for above 120mm Thickness plates are ultrasonically tested as per ASTM A-578 L-B and found ok
12. In Chemical Analysis column, L stands for Ladle Analysis & In Mechanical Properties Column, L stands for Longitudinal Direction

We hereby certify that Material described herein has manufactured and tested with satisfactory results in accordance with the requirements of the above said material specification. The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

Purchase Reference & Date: PROV/EXP/PLT/10002 04.05.2020
Despatch Advice No:
Vehicle No.
" DOP can be viewed at www.jindalsteelpower.com"
* Gauge Length: 5.65(SO)1/2

REC-PM-TSD-14-41, Eff date : 26.08.2019

Prepared by SRIDHAR BEHERA
Preparation Date :15.07.2020 15:48:05
Printing Date 16.07.2020 & Time 16:11:16

Authorised Signatory
TSD PlateMill
For, JINDAL STEEL & POWER LIMITED

Gehäuse_housing_material certificates_PART-057561

OLAN, S.A.
PRODUCTOS METALICOS · CORTE A MEDIDA
OXICORTE · TRATAMIENTOS ANTICORROSIVOS

INFORME DE INSPECCIÓN POR ULTRASONIDOS
ULTRASONIC INSPECTION REPORT

Nº Informe (Report): **O.F. 170.379**

Cliente: Customer:	JUAN LASA	**Nº Pedido:** Order:	66.837	**Referencia:** Reference:	OF.8619
Descripción: Description:	Chapa	**Norma:** Standard:	UNE-EN 10160:2000	**Clase:** Grade:	S2 + E2
Tipo de material: Type of material:	Chapas de acero			**Acabado superficial:** Surface finish:	Laminación
Equipo: Equipment:	KRAUTKRAMER USM 32			**Acoplamiento:** Couplant:	AGUA

PALPADOR - PROBE				CALIBRACIÓN - CALIBRATION				
TIPO TYPE	FREC. FREQ (MHz.)	TAMAÑO SIZE (mm.)	Espesor Thickness (mm.)	PARA CAMPO FOR RANGE	CAMPO RANGE (mm.)	TALADRO REGISTRO REC. HOLD	PARA LA GANANCIA FOR GAIN	GANANCIA GAIN
SEB-4T	4	Ø 24 mm	8 / 65	Chapa	16 / 130	Ø 5 mm.	80 % ECO	42 / 56 dB
B2S-E	2	Ø 24 mm	130	Chapa	260	Ø 8 mm.	80 % ECO	46 dB

RESULTADOS (RESULTS):
Se ha efectuado la inspección por ultrasonidos según la norma UNE-EN10160:2000 según clases S2 + E2 al siguiente material / The inspection by ultrasonic test has been made in accordance with UNE-EN10160:2000 standard and S2 + E2 grade the following material:

1 chapa/*plate* 8 x 3000 x 12000 (S-355-J2+N):	PK20684701
1 chapa/*plate* 20 x 2950 x 11600 (S-355-J2+N):	A0261311D0
1 chapa/*plate* 25 x 2500 x 12000 (S-355-J2+N):	B1753303A0
1 chapa/*plate* 50 x 2500 x 12000 (S-355-J2+N):	B1706906A0
1 chapa/*plate* 55 x 2500 x 12000 (S-355-J2+N):	B8370204A0
1 chapa/*plate* 65 x 2500 x 12000 (S-355-J2+N):	FA92167401
1 chapa/*plate* 130 x 2500 x 7000 (S-355-J2+N):	B0344111A0

En dicha inspección se han detectado indicaciones que NO superan el nivel de referencia, por lo que se clasifica la chapa como ACEPTABLE / In this inspection weren't found indications exceeding the reference level, so the material is classified as **ACCEPTABLE.**

CROQUIS (SKETCH):

OPERADOR (OPERATOR): José Ignacio Bañales Esparza
Nº CERTIFICADO (CERTIFICATE NR.): E-A-004397-UT-2-M-2
FECHA (DATE): 15/02/2022

OLAN, S.A.
Pol. Ind. Asparrena - C/ Amezaga, 9
01250 ARAMA (ALAVA)
Tl.: 945 31 45 89 Fax 945 31 45 89

Gehäuse_housing_material certificates_PART-057561

INTEC Inspección Técnica	INSPECCIÓN VISUAL *(Visual Testing)*	INFORME Nº *(ReportNr.)* 220301

CLIENTE *(Customer)*	ORDEN DE FABRICACIÓN *(Purchaseorder)*	PLANO CLIENTE *(CustomerDrwg).*
TALLERES JUAN LASA, S.A.	65.516/ OF 8619	PART-057561
DESIGNACIÓN *(Item)*	**MATERIAL** *(Material)*	**SOLDADURA** *(Welding)*
GEHÄUSE (1 pieza)	S355J2+N	FW / BW

CONDICIONES DE EXAMEN(Examination Conditions)

ILUMINACIÓN *(Ilumination)*		SOLDADURA *(Welding)*		ESTADO DE LA SUPERFICIE *(Surface status)*
				SOLDADURA EN BRUTO
Natural *(Natural)*	Artificial *(Artificial)*	Procedimiento *(Proced.)*	Tipo Junta *(Jointtype)*	PROCEDIMIENTO DE INSPECCIÓN *(Inspectionprocedure)*
	X	MAG	FW/BW	UNE EN ISO 17637

ESPECIFICACIÓN *(Specification)*	OBSERVACIONES (Observations)
S/EN5817	
GRADO *(Grade)*	**RESULTADO DEL EXAMEN** *(ExaminationResults)*
C	ACEPTABLE

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.

(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2 E-A-002024-VT-2-S-3 *(Level 2 Inspector)*	FECHA *(Date)*
INTEC Inspección Técnica email: intec.ana@gmail.com Tel: 696 320 618 / Lasiko Gipuzkoa	01/03/2022

Gehäuse_housing_material certificates_PART-057561

INTEC Inspección Técnica	EXAMEN POR LÍQUIDOS PENETRANTES *(Examfor penetran liquids)*	INFORME Nº *(ReportNr.)* *220218*

CLIENTE *(Customer)*	PEDIDO CLIENTE *(Purchaseord.)*	PLANO CLIENTE *(PurchaseDrwg.)*
TALLERES JUAN LASA, S.A.	65.516/ OF 8619	PART-057561

MATERIAL *(Material)*	COLADA *(Heat)*
S355J2+N	--

DESIGNACIÓN *(Item)*
GEHÄUSE

LIMPIEZA *(Cleaning)*	TIPO DE PENETRANTE *(Type of penetrating)*	ELIMINADOR *(Eliminator)*	REVELADOR *(Revealer)*
ARDROX 9PR5	ARDROX 996 PB	ARDROX 9PR5	ARDROX LD7

MÉTODO *(Method)*
LIQUIDOS PENETRANTES COLOREADOS LAVABLES CON DISOLVENTE

ESTADO DE LA SUPERFICIE *(State of thesurface)*
SOLDADURAS EN BRUTO

OBSERVACIONES *(Observations)*

ACEPTADOS *(Accepted)*	RECHAZADOS *(Rejected)*
1 PIEZA	--

PROCEDIMIENTO *(Specification)*	GRADO DE EXIGENCIA *(Demand grade)*
EN ISO 23277	3X

Certificamos que los datos contenidos en este registro son correctos y que el examen ha sido realizado de acuerdo con el procedimiento especificado.
(We certify that the statements in this record are correct and the examination has been realized according to specified procedure)

EL INSPECTOR NIVEL 2	FECHA
E-A-002024-PT-2-S3 INTEC Inspección Técnica email: intecsne@gmail.com tl: 695 320 618 / Lazkao Gipuzkoa	01/03/2022

05 – PT – IT – M

Gehäuse_housing_material certificates_PART-057561

Juan Lasa steel-works	HOJA DE CONTROL DIMENSIONAL *DIMENSIONAL CONTROL SHEET*	Rev: 3	Página 1 de 1
		P 8.5-2/10	
		Preparado: Izaskun Ruiz	
		Aprobado: Xabier Jauregui	

CLIENTE: *Customer:*	PEKRUN	Pedido cliente / *Customer Order*	4.500.058.885
PLANO Nº *Drawing Nº:*	PART-057669	OF TJL / *Manufacturing Order TJL*	8619

Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*	Cota Nº *Measure Nº*	Valor s/plano *Measure drawing*	Valor medido *Measured Value* Montador *Assembler*	Control Final *Final control*	Observaciones *Observations*
1	550+D		567		22				
2	485+D		498		23				
3	185		183		24				
4	65		65		25				
5	330		330		26				
6	Ø360-D		Ø338		27				
7	Ø330-D		Ø308		28				
8	520		524		29				
9	770		779		30				
10	290		291		31				
11	Ø300-D		Ø278		32				
12	Ø300-D		Ø278		33				
13	20+D		25		34				
14					35				
15					36				
16					37				
17					38				
18					39				
19					40				
20					41				
21					42				

Firma y Fecha / *Signature and Date*

Montador / *Assembler*

	SI	NO
PARALELISMO acorde al plano s/EN 13920-BF		
PERPENDICULARIDAD acorde al plano s/EN 13920-BF		

*D: Indica si debe de tener demasía de mecanizado

**D: Indicates if it should have excess machining*

Responsable control final/ *Final Control responsable*

1-3-22

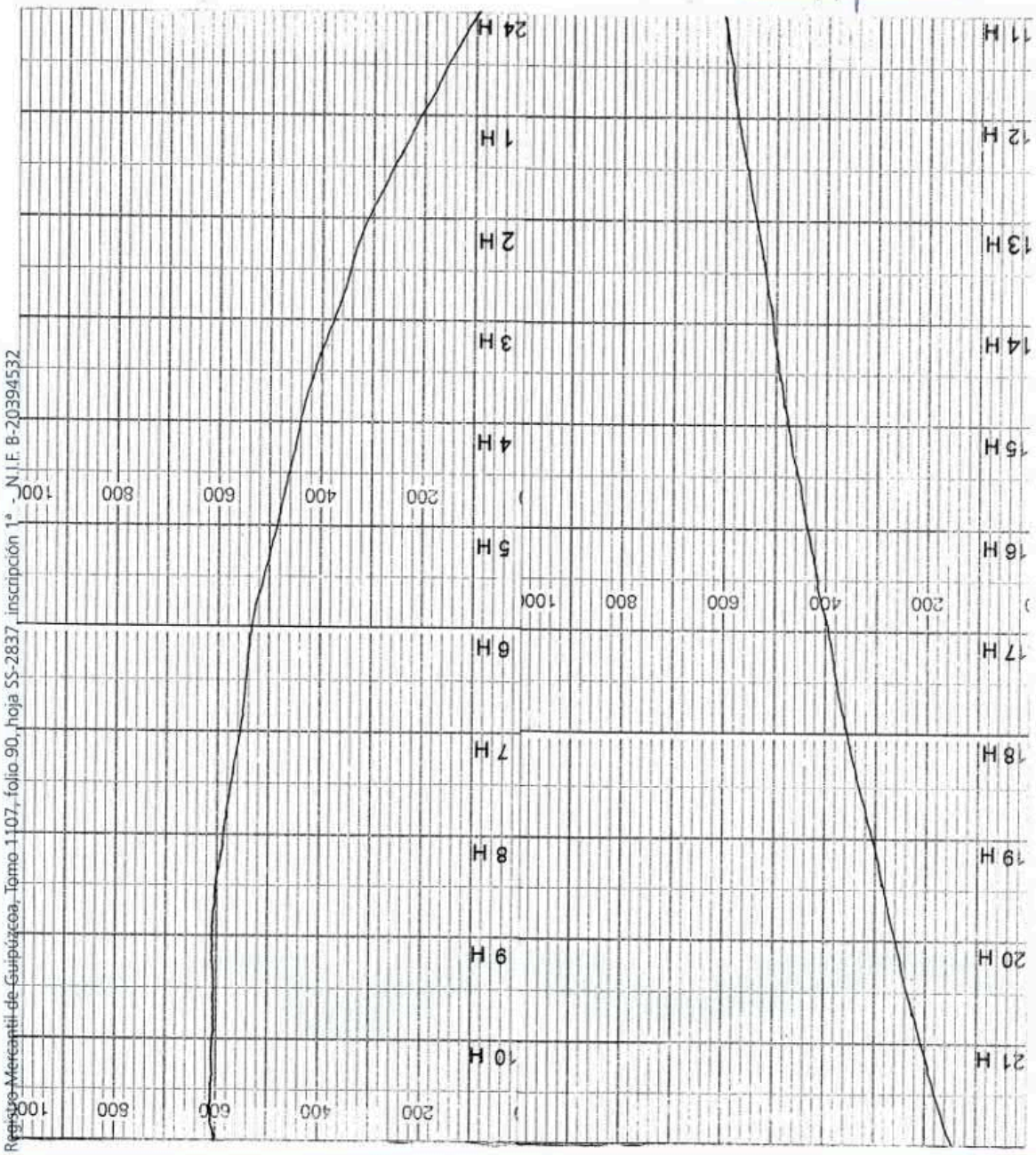
www.juanlasa.com

Gehäuse_housing_material certificates_PART-057561

muñagorri S.L.
recubrimientos

Talleres Juan Lasa, S.A.
Nº Reg. 03-03-2022
Pdo. 65.525, OF 8619
1 GEHÄUSE s/p PN-00077206.000.01-0
Estabilizado 600ºC

RECUBRIMIENTOS MUÑAGORRI S.L.
Polígono Industrial Beotibar
20491 BELAUNTZA



Registro Mercantil de Guipúzcoa, Tomo 1107, folio 90, hoja SS-2837, inscripción 1ª - N.I.F. B-20394532

Polígono Industrial Beotibar, s/n Tel. 943 67 30 28 Fax 943 67 01 35 20491 BELAUNTZA (Gipuzkoa)

Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-057561
Werks-Nr.: *Works no.:*	Material No. 2000064793 TAG-No. 2.7.1.651	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002294

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Gehäuse / housing	PN-00077206.000.01

Maßprotokoll / *dimension report*

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Lagerbohrung	Ø 360 H7	+0,057 0	360,045
Lagerbohrung	Ø 360 H7	+0,057 0	360,05
Lagerbohrung	Ø 300 H7	+0,052 0	300,04
Lagerbohrung	Ø 300 H7	+0,052 0	300,05
Achshöhe	550	0 -0,2	i.O.
Ankerlöcher	Ø 42		i.O.
Lochabstand	400		i.O.
	700		i.O.
	380		i.O.
	380		

Prüfergebnis:	Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result:	*Test results comply in every aspect with the specification(s)*

58640 Iserlohn	05.05.2022	J. Linke	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060563
Werks-Nr.: *Works no.:*	Material-No.: 2000064793	Kennwort: *Code word:*	Projekt-Nr. 4000369 S/No. 10002294

Menge *Quantity*	Benennung *Designation*	Getriebetyp *Gearbox type*	Zeichnungs-Nr. *Drawing no.*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 413-R-CCW	PN-00096644.001.01

Technische Daten Getriebe / *Technical data gear unit*			
Leistung/*power*	2300 kW	Übersetzung/*ratio*	i = 2,3333:1
Ölmenge/*oil quantity*	280 l / 43,5 l/min	Drehzahl/*number of revolution*	n_1 =1493 min^{-1}
Ölviscosität/*oil viscosity*	ISO VG 320	Drehzahl/*number of revolution*	n_2 = 639,9 min^{-1}
Anordnung Antrieb *drive arrangement*	Horizontal	Anordnung Abtrieb *output arrangement*	Horizontal
Drehrichtung Abtrieb *sense of rotation (output)*	CCW	Schmierung *lubrication*	recirculation lubrication

Messprotokoll für Getriebe / *measuring data report for gear unit*

Tragbilder und Zahnspiele
meshing patterns and gear clearance of the toothing

Prüfergebnis:

Die Tragbilder und Zahnspiele der Verzahnungen wurden während der Getriebemontage nach den Zeichnungen geprüft und entsprechen den, der Konstruktion vorgegebenen, Qualitätsanforderungen.

Test result:

The meshing patterns and gear clearances of the gear toothing were checked during gear assembly according to the drawings and correspond to the quality instructions specified by the construction.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	13.05.2022	O. Schmoll	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060563
Werks-Nr.: *Works no.:*	Material-No.: 2000064793	Kennwort: *Code word:*	Projekt-Nr. 4000369 S/No. 10002294

Menge/*Quantity*	Benennung/*Designation*	Zeichnungs-Nr./*Drawing no.*
1	Stirnradgetriebe /*spur gear gearbox*	PN-00096644.001.01

Maßprotokoll der Anschlussmaße
measurement report of the connection dimensions

Beschreibung *Description*	Sollwert *Desired value*	Abmaße *Tolerance*	Istwert *Actual value*
Antriebswelle / *Input shaft*	Ø 140 m6	+0,040 +0,015	140,04
Höhe / *height*	550	0 -0,2	i.O.
Länge / length	180	+0,5 -0,5	i.O.
Abtriebswelle / Output shaft	Ø 240 m6	+0,046 +0,017	240,04
Höhe / *height*	550	0 -0,2	i.O.
Länge / *length*	292	+0,5 -0,5	i.O.
Fußlochabstand / *distance of the Housing holes*	400/220/480	+0,8 -0,8	i.O.
Fußlochabstand / *distance of the Housing holes*	380/380	+0,8 -0,8	i.O.
Fußlöcher / *housing holes*	Ø 42	+0,3 -0,3	i.O.

Bemerkung / *Remarks*:

Prüfergebnis: Die Ergebnisse der Prüfungen entsprechen den vereinbarten Lieferbedingungen
Test result: Test results comply in every aspect with the specification(s)

58640 Iserlohn	03.06.2022	J. Nenast	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 1 von 3

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	Part-060563
Serial-Nr.: *Serial- No.:*	10002294	Probelaufdatum: *Test run date::*	02.06.2022

Menge/*Quantity*	Benennung/*Designation*	Getriebe-Typ/*Gearbox type*
1	Getriebe	ASR 413-R-CCW

Technische Daten Getriebe / *Technical data gear unit*					
Leistung/ *power*	P [kW]	2300	Drehmoment/ *torque*	T [Nm]	
Übersetzung/ *ratio*	i	2,3333	Drehzahl/ *number of revolution*	n1 [1/min]	1493
Drehrichtung/ *sense of rotation*		L / CCW	Drehzahl/ *number of revolution*	n2 [1/min]	639,9
Ölviscosität/ *oil viscosity*	[cST 40°C]	320	Schmierung/ *lubrication*		Circulating oil lub.
Ölmenge / *oil quantity*	[l/min]	43,5	Ölfüllmenge/ *oil filling quantity*	[l]	280

Probelaufprotokoll / test run report

Antriebsdrehzahl beim Probelauf *drive number of revolution during test run*	n1 [1/min]	Ist / *actual value* 1493
Abtriebsdrehzahl beim Probelauf *output number of revolution during test run*	n2 [1/min]	Ist / *actual value* 43,5

Temperaturen nach Laufzeit *Temperature after running time*			Lager antriebsseitig *bearing on drive side*	Lager abtriebsseitig *bearing on output side*
Antrieb/*drive*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	53,44	55,1
Abtrieb/*output*	Soll / *nominal value*	[°C]		
	Ist / *actual value*	[°C]	52,88	54,5
Öltemperatur /*oil temperature*		[°C]	65,35	

Separate Temperaturaufzeichnung mit Datenlogger, mit „JA“ oder „NEIN“ bestätigen *Separate temperature recording with data logger, confirm with "YES" or "NO*		Ja
Laufzeit Probelauf /*running time test run*	[h]	4
Ölfüllmenge/ *oil filling quantity*	[l]	286
Ölmenge/ *oil flow rate*	[l/min]	43,5
Probelauföl/ *test run oil*	[cST 40°C]	ISO VG 320

Erfassen des Öldruckes/ *recording the oil pressure*		
Öldruck bei Probelaufstart/ *oil pressure at test run start* (mit Angabe der Öltemperatur / with indication of the oil temperature)	2,5bar @ 25C°	
Öldruck bei Beharrungstemperatur (alternativ nach Laufzeit h) *Oil pressure at steady-state temperature (alternatively after running time h)*	Soll / *nominal value* 1,5-2 bar @ 40C°	Ist / *actual value* 1,8bar @ 40C°

Öldichtigkeit des Getriebes, mit „i.O.“ oder „n.i.o.“ bestätigen *oil tightness of the gearbox, confirm with "i.O." or "n.i.o.*	i.O

Schwingungsmessung/ *vibration measurement*	
Schwingungsmessung gemäß Beschreibung, mit „JA“ oder „NEIN“ bestätigen *vibration measurement acc. to description, confirm with "YES" or "NO*	JA
Messpositionen nach Vorgaben in der Maßzeichnung, mit Angabe (x) bestätigen *measuring positions acc. to specifications in the dimensional drawing, confirm with indication (x)*	X

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 2 von 3

Funktionsprüfung von Zubehörteilen/ *functional test of accessory parts*	
Zubehör auf Funktion geprüft (Durchflusswächter, Druckwächter, etc.), mit Angabe (x) bestätigen *Accessories checked for function (flow monitor, pressure monitor, etc.), confirm with indication (x)*	-

Erfassen der Serialnummern/ *recording the serial numbers*	
Erfassen aller Serialnummern des verbauten Zubehörs am Getriebe, mit Angabe (x) bestätigen *recording of all serial numbers of the installed accessories on the gearbox,/ confirm with indication (x)*	

Prüfungen Mühlengetriebe/ *tests mill gear unit*		
Maß X/ *dimension X*	[mm]	
Anschlussflanch/ *connecting flange*		
Radialschlag/ *radial run-out*	[mm]	
Axialschlag/ *axial run-out*	[mm]	

Weitere Prüfungen/ *further tests*			
Schallpegel in 1m Entfernung *sound level at 1m distance*	[dB(A)]	Soll / *nominal value*	Ist / *Actual value*
		-	78,6 dB
Innenkonservierung, mit Angabe Konservierungsmittel *interior conservation,* with indication of preservative			VCI
Ölfilter gereinigt, mit Angabe (x) bestätigen *oil filter cleaned, confirm with indication (x)*			-

Bilder Probelaufaufbau / *pictures test run bench*

Bilder Öldruck bei Start /
pictures oil pressure at start

Bilder Öldruck bei Beharrungstemperatur /
Pictures oil pressure at steady-state temperature

Bilder Durchflusswächter bei Start /
Pictures flow monitor at start

Bilder Durchflusswächter bei Beharrungstemperatur /
Pictures Flow monitor at steady-state temperature

[pekrun]	Probelaufprotokoll Wälzlagergetriebe Abnahmeprüfzeugnis / *Inspection certificate :* 3.1 - DIN EN 10204	**FB-031** Revision 00 vom 28.02.22 Seite 3 von 3

Bilder Funktionsprüfung Instrumentierung und Zubehör /
Pictures Functional test instrumentation and accessories

Bemerkung: Probelauf ohne Last. Während des Probelaufs wurden keine Undichtigkeiten am Getriebe festgestellt.

Remark : Test run without load. During the test run, no leaks were detected at the gearbox.

Prüfer / Inspector:	F.v.Oberg
Datum / Date:	02.06.2022

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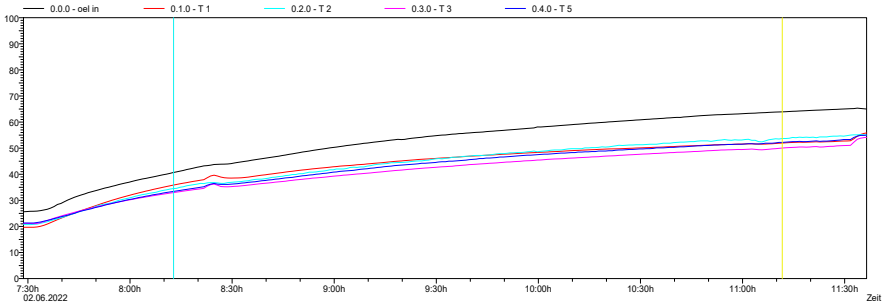
Probelaufdiagramm
test run diagram

[pekrun]

Seite/*page*: 1 / 1

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	Werks-Nr.: *Works no.:*	Mat.Nr. 20000647993	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396-30
Bestell-Nr.: *Order no.:*	4500494756	Kennwort: *Code word:*	Project-No. 4000369 S/No. 10002294	Artikel-Nr.: *Article no.:*	PART-060563

Temperaturverlauf / *temperature profile*



Messstelle	Linker Cursor		Rechter Cursor		Differenz		Mittelwert	
Zeit	02.06.2022, 08:12:47		02.06.2022, 11:11:39		02:58:51			
0.0.0 - oel in	40,65	°C	63,92	°C	23,27	°C	54,887	°C
0.1.0 - T 1	35,84	°C	51,96	°C	16,12	°C	46,041	°C
0.2.0 - T 2	34,5	°C	53,7	°C	19,2	°C	46,05	°C
0.3.0 - T 3	32,94	°C	50,05	°C	17,11	°C	43,069	°C
0.4.0 - T 5	33,4	°C	52,2	°C	18,8	°C	44,79	°C

	58640 Iserlohn	02.06.2022	F. v. Oberg
	ORT / *INSPECTION LOCATION*	DATUM / *DATE*	PRÜFER / *INSPECTOR*

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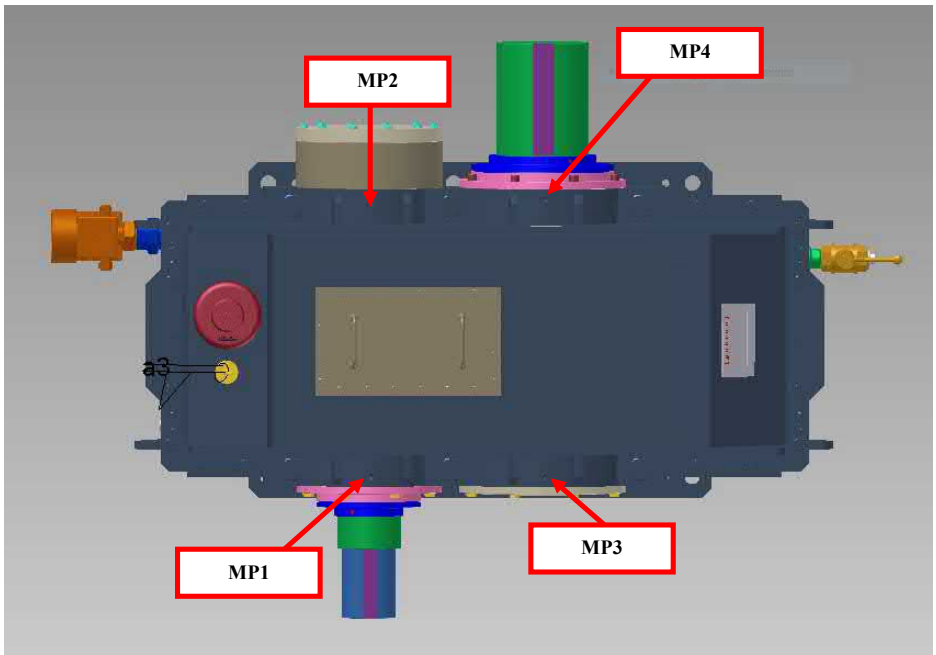
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Auftraggeber: customer:	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: PEKRUN com.-no.:	19396/30
Bestell-Nr.: order no.:	4500494756	Zeichnungs-Nr.: drawing no.:	PART-060563
Auftrags-Nr.: works no.:	Material-No.: 2000064793	Kennwort: code word:	Projekt-Nr. 4000369 S/No. 10002294

Menge/quantity	Benennung/designation	Getriebe-Typ/gear unit type
1	Stirnradgetriebe / *spur gear gearbox*	ASR 413-R-CCW

Gearbox overview



Remarks:
Measuring points acc. to dimensional drawing.

Test result:
The results of the test run comply with the Pekrun quality specifications. The test results are listed on the second page.

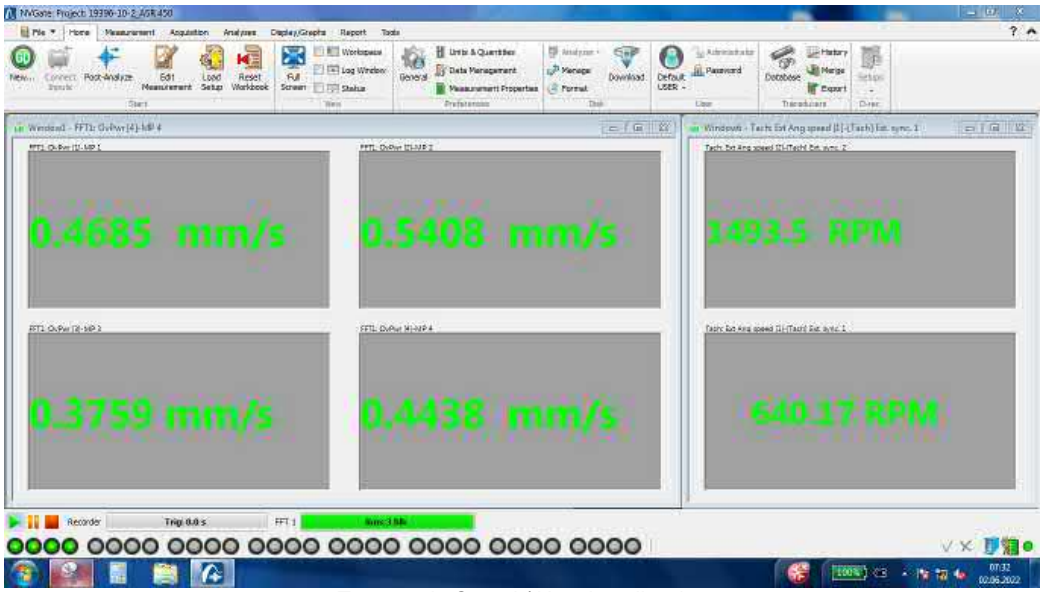
J. Nenast

Datum: 02.06.2022

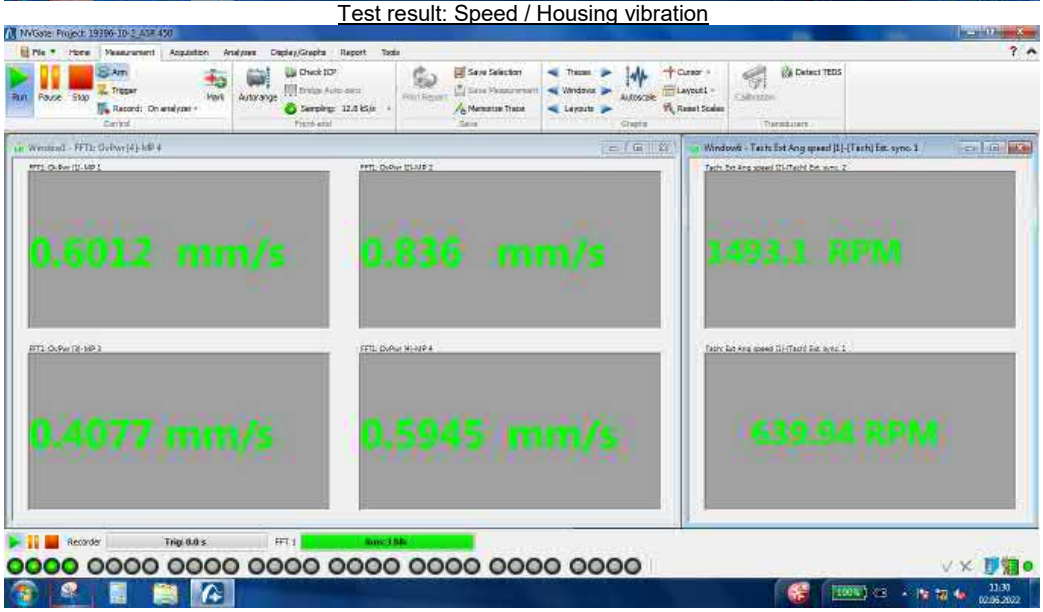
[pekrun]

ABNAHME – PRÜFBERICHT
ACCEPTANCE REPORT

Test result: Speed / Housing vibration



Test result: Speed / Housing vibration



Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Seite/*page*: 1 / 2

Auftraggeber: *Customer:*	Aerzener Maschinenfabrik GmbH	PEKRUN Kom.-Nr.: *PEKRUN Com.-no.:*	19396/30
Bestell-Nr.: *Order no.:*	4500494756	Artikel-Nr.: *Article no.:*	PART-060563
Werks-Nr.: *Works no.:*	Material-No.: 2000064793	Kennwort: *Code word:*	S/No. 10002294

Menge *Quantity*	Benennung *Designation*	Getriebe-Typ *Gearbox type:*
1	Stirnradgetriebe / *spur gear gearbox*	ASR 413-R-CCW

Anstrichprüfung / *coat of paint report*

Anforderungen / ***requirements:***			
Spezifikation (PEKRUN oder Kunden-Nr.): *Specification (PEKRUN or customer no.):*	QH00510B_01		
Vorbehandlung nach ISO 12944-4 *Surface preparation treatment acc to EN ISO 12944-4*	Shot blasting ☐SA 2 / ☒SA 2½ / ☐SA 3		
Oberflächenreinheit *Surface cleanliness*	Acc. to ISO 8501 (free of rust, oil, tinder and other impurities)		
Oberflächenrauheit *Surface roughness*	acc. to SA 2½		
	Grundanstrich *1st. Coat (Primary coat)*	Zwischenanstrich *2nd. Coat (Intermediate coat)*	Deckanstrich *3rd. Coat (Top coat)*
Produktname Name of Product	Vestozink 2K EP Zink	VESTOPOX 2K-EP-1.Deck EG RAPID	VESTOPUR 2K-DT-Deck – ATEX
Chargen Nr.: *Charge No.*	2200964	2200193	2200781
Farbe (RAL Nr.) *Color (RAL no.)*	graumatt	RAL 7703	RAL 5001
Trockenschichtdicke *DFT (dry film thickness)*	70 µm – 95 µm	155 µm -173 µm	216 µm – 300 µm
Lufttemperatur °C *Air temperature °C*	20 °C	23 °C	23 °C
Oberflächentemperatur °C *Surface temperature °C*	22 °C	22 °C	22 °C
Relative Luftfeuchte % *Relative air humidity %*	47 %	48 %	51 %
Datum Date	14.05.2022	15.06.2022	20.06.2022
Haftfähigkeit der Farbe nach ISO 2409 Gitterschnittkennwert: *Adhesion test acc. to ISO 2409 Parameter of grid cut test:*	ISO GT (1)		

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Abnahmeprüfzeugnis 3.1 - DIN EN 10204
Inspection certificate 3.1 - DIN EN 10204

[pekrun]

Bemerkungen	Schichtdickenangaben nach DIN EN ISO 12944-5

Die Sollschichtdicke gilt auch als erreicht, wenn Einzelmesswerte den Sollwert um höchstens 20% unterschreiten und der Mittelwert aller Einzelmessungen gleich oder größer der Sollschichtdicke ist.

Remarks: Layer thickness information according to DIN EN ISO 12944-5

The nominal layer thickness is also complied, to be achieved if individual measured values fall below the setpoint value by at most 20% and the mean value of all individual measurements is equal to or greater than the nominal layer thickness.

Prüfergebnis:	Die Anforderungen sind erfüllt.
Test result:	*The requirements are complied*

58640 Iserlohn	29.06.2022	Z. Acikgöz	P. Redder
ORT *INSPECTION LOCATION*	DATUM *DATE*	PRÜFER *INSPECTOR*	ABNAHMEBEAUFTRAGTER INSPECTOR REPRESENTATIVE

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E Coupling

Name	Data
Designation	Flexibel pin-type coupling
Type	KWN 22014 (BOKU-N 12500 / BOKU-N A10000S)
Number	
Type of manual	*Technical documentation*
Manufacturer	Kupplungswerk Dresden GmbH

E.1 Operating instructions

For operating instruction see "Part 1"

Blower stage / Gearbox

Blower stage	Place of installation
4002784	Stage 1
	Stage 1
	Stage 1
4113138	Stage 2
	Stage 2
4113561	Cooling gas stage

E.1.1 Test documentation

KUPPLUNGSWERK DRESDEN
GmbH

KWD Kupplungswerk Dresden GmbH · Löbtauer Straße 45 · D-01159 Dresden

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

Nach / according to EN10204

Postfach 27 01 44
D-01171 Dresden
Telefon: (03 51) 49 99-0
Telefax: (03 51) 49 99-2 33
E-Mail: kwd@kupplungswerk-dresden.de
Internet: http://www.kupplungswerk-dresden.de

St.-Nr. 203/112/02694
USt-Id-Nr.: DE153976681

Seite / page 1 von 2

Erzeugnis / Stückzahl : 3,00 Stück
Product / Qty.

Elast. Bolzenkupplung KWN22014
BOKU-N A10000S /240H7P1-240H7P1
4500531573-20

Art.Nr.: BK70A.047
Revision: A3*336/19* vom 21.08.2019
Ihre Art.Nr.: 2000065320

Seriennummer(n) : 2022AU01231/2-001, 2022AU01231/2-002, 2022AU01231/2-003
Serial number(s)

Erzeugnis / Stückzahl : 2,00 Stück
Product / Qty.

Elast. Bolzenkupplung KWN22014
BOKU-N A10000S /240H7P1-240H7P1
4500531573-40

Art.Nr.: BK70A.047
Revision: A3*336/19* vom 21.08.2019
Ihre Art.Nr.: 2000065353

Seriennummer(n) : 2022AU01231/4-001, 2022AU01231/4-002
Serial number(s)

Besteller : Aerzener Maschinenfabrik GmbH
customer

Reherweg 28
31855 Aerzen

Ihre Bestellung Your order no	:	4500531573	Vom : dated	13.04.2022
Unsere Auftrags-Nr. Our order no	:	2022AU01231	Vom : dated	27.04.2022
Lieferscheinnr. Delivery note no	:	2022WA06423	Vom : dated	21.10.2022
Zeugnis-Nr. certifacte note no	:	2022WA06423	Vom : dated	21.10.2022

Das o.g. Erzeugnis wurde vor Verlassen des Betriebes einer Prüfung auf zeichnungs- und standardgerechte Ausführung unterzogen.
The product mentioned above has been inspected prior to shipment for compliance with the drawings and standards.

Die in der technischen Dokumentation angegebenen Abmessungen wurden eingehalten.
The dimensions given in the technical documentation have been duly kept.

Die gültigen Datenschutzhinweise auf Grundlage der EU-Datenschutzgrundverordnung (EU-DSGVO) können Sie hier einsehen:
https://www.kupplungswerk-dresden.de/de/kontakt/datenschutzerklaerung.html

Geschäftsführer:
Dr.-Ing. Jörg Brückner

Eingetragen:
Amtsgericht Dresden
HRB 95 75

Bankverbindungen:

Deutsche Bank AG
Filiale Dresden
Kto.-Nr. 517 500 500
(BLZ 870 700 00)
IBAN:
DE73870700000517500500
BIC: DEUTDE8C870

Commerzbank AG
Filiale Dresden
Kto.-Nr. 454 942 900
(BLZ 850 800 00)
IBAN:
DE70850800000454942900
BIC: DRESDEFF850

Commerzbank AG
Filiale Dresden
Kto.-Nr. 800 371 700
(BLZ 850 400 00)
IBAN:
DE19850400000800371700
BIC: COBADEFF850

Hypo- und Vereinsbank AG
Filiale Dresden
Kto.-Nr. 327 748 343
(BLZ 850 200 86)
IBAN:
DE75850200860327748343
BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

Nach / according to EN10204

Lieferschein-Nr./delivery note: 2022WA06423

Seite / page 2 von 2

Dresden, 21.10.2022

Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:15:17

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Die gültigen Datenschutzhinweise auf Grundlage der EU-Datenschutzgrundverordnung (EU-DSGVO) können Sie hier einsehen:
https://www.kupplungswerk-dresden.de/de/kontakt/datenschutzerklaerung.html

Geschäftsführer:
Dr.-Ing. Jörg Brückner

Eingetragen:
Amtsgericht Dresden
HRB 95 75

Bankverbindungen:

Deutsche Bank AG
Filiale Dresden
Kto.-Nr. 517 500 500
(BLZ 870 700 00)
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DE73870700000517500500
BIC: DEUTDE8C870

Commerzbank AG
Filiale Dresden
Kto.-Nr. 454 942 900
(BLZ 850 800 00)
IBAN:
DE70850800000454942900
BIC: DRESDEFF850

Commerzbank AG
Filiale Dresden
Kto.-Nr. 800 371 700
(BLZ 850 400 00)
IBAN:
DE19850400000800371700
BIC: COBADEFF850

Hypo- und Vereinsbank AG
Filiale Dresden
Kto.-Nr. 327 748 343
(BLZ 850 200 86)
IBAN:
DE75850200860327748343
BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

KWD Kupplungswerk Dresden GmbH · Löbtauer Straße 45 · D-01159 Dresden

Wuchtprotokoll
Balancing-protocol
Nach / according to EN 10204

Postfach 27 01 44
D-01171 Dresden

Telefon: (03 51) 49 99-0
Telefax: (03 51) 49 99-2 33
E-Mail: kwd@kupplungswerk-dresden.de
Internet: http://www.kupplungswerk-dresden.de

St.-Nr. 203/112/02694
USt-Id-Nr.: DE153976681

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	1521/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Bolzenteil BOKU-N A10000	Auftr. – Nr. Nr. of order:	2022AU01231-2-001
Zeichnungs – Nr.: Number of drawing:	02 770 0552403	Test – Nr. Nr. of test:	1
Kupplungstyp: Typ of coupling:	Elastische Bolzenkupplung BOKU-N A10000S	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	318 kg		
Zul. Restunwucht: Permissible residual unbalance:	7591 gmm/kg	Wuchtgüte: Balancing quality:	Q 2,5 / 1000min^{-1}

Zul. Restunwucht: Permissible residual unbalance:	Ebene I (Plane I):	10,5 g	Ebene II (Plane II):	20,5 g
Istwert Restunwucht: Actual residual unbalance:	Ebene I (Plane I):	9,5 g	Ebene II (Plane II):	14,9 g

Dresden, 2022-10-24

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:15:36

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:
Dr. Ing. Jörg Brückner

Eingetragen:
Amtsgericht Dresden
HRB 95 75

Bankverbindungen:

Deutsche Bank AG
Filiale Dresden
Kto.-Nr. 517 500 500
(BLZ 870 700 00)
IBAN:
DE73870700000517500500
BIC: DEUTDE8C870

Commerzbank AG
Filiale Dresden
Kto.-Nr. 454 942 900
(BLZ 850 800 00)
IBAN:
DE70850800000454942900
BIC: DRESDEFF850

Commerzbank AG
Filiale Dresden
Kto.-Nr. 800 371 700
(BLZ 850 400 00)
IBAN:
DE19850400000800371700
BIC: COBADEFF850

Hypo- und Vereinsbank AG
Filiale Dresden
Kto.-Nr. 327 748 343
(BLZ 850 200 86)
IBAN:
DE75850200860327748343
BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 20221WA06423
Seite /page 2 / 10

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	1522/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Pufferteil BOKU-N A10000	Auftr. – Nr. Nr. of order:	2022AU01231-2-001
Zeichnungs – Nr.: Number of drawing:	02 770 0562403	Test – Nr. Nr. of test:	1
Kupplungstyp: Typ of coupling:	Elastische Bolzenkupplung BOKU-N A10000S	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	404 kg		
Zul. Restunwucht: Permissible residual unbalance:	9644 gmm/kg	Wuchtgüte: Balancing quality:	Q 2,5 / 1000min^{-1}

Zul. Restunwucht: Permissible residual unbalance:	Ebene I (Plane I):	13,3 g	Ebene II (Plane II):	26,0 g
Istwert Restunwucht: Actual residual unbalance:	Ebene I (Plane I):	7,4 g	Ebene II (Plane II):	17,1 g

Dresden, 2022-10-24

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:15:59

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:	Eingetragen:	Bankverbindungen:			
Dr. Ing. Jörg Brückner	Amtsgericht Dresden HRB 95 75	Deutsche Bank AG Filiale Dresden Kto.-Nr. 517 500 500 (BLZ 870 700 00) IBAN: DE73870700000517500500 BIC: DEUTDE8C870	Commerzbank AG Filiale Dresden Kto.-Nr. 454 942 900 (BLZ 850 800 00) IBAN: DE70850800000454942900 BIC: DRESDEFF850	Commerzbank AG Filiale Dresden Kto.-Nr. 800 371 700 (BLZ 850 400 00) IBAN: DE19850400000800371700 BIC: COBADEFF850	Hypo- und Vereinsbank AG Filiale Dresden Kto.-Nr. 327 748 343 (BLZ 850 200 86) IBAN: DE75850200860327748343 BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 20221WA06423
Seite /page 3 / 10

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	1523/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Bolzenteil BOKU-N A10000	Auftr. – Nr. Nr. of order:	2022AU01231-2-002
Zeichnungs – Nr.: Number of drawing:	02 770 0552403	Test – Nr. Nr. of test:	1
Kupplungstyp: Typ of coupling:	Elastische Bolzenkupplung BOKU-N A10000S	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	318 kg		
Zul. Restunwucht: Permissible residual unbalance:	7591 gmm/kg	Wuchtgüte: Balancing quality:	Q 2,5 / 1000min^{-1}

Zul. Restunwucht: Permissible residual unbalance:	Ebene I (Plane I):	10,5 g	Ebene II (Plane II):	20,5 g
Istwert Restunwucht: Actual residual unbalance:	Ebene I (Plane I):	8,1 g	Ebene II (Plane II):	14,6 g

Dresden, 2022-10-24

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:18:55

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:	Eingetragen:	Bankverbindungen:			
Dr. Ing. Jörg Brückner	Amtsgericht Dresden HRB 95 75	Deutsche Bank AG Filiale Dresden Kto.-Nr. 517 500 500 (BLZ 870 700 00) IBAN: DE73870700000517500500 BIC: DEUTDE8C870	Commerzbank AG Filiale Dresden Kto.-Nr. 454 942 900 (BLZ 850 800 00) IBAN: DE70850800000454942900 BIC: DRESDEFF850	Commerzbank AG Filiale Dresden Kto.-Nr. 800 371 700 (BLZ 850 400 00) IBAN: DE19850400000800371700 BIC: COBADEFF850	Hypo- und Vereinsbank AG Filiale Dresden Kto.-Nr. 327 748 343 (BLZ 850 200 86) IBAN: DE75850200860327748343 BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 20221WA06423
Seite /page 4 / 10

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	1524/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Pufferteil BOKU-N A10000	Auftr. – Nr. Nr. of order:	2022AU01231-2-002
Zeichnungs – Nr.: Number of drawing:	02 770 0562403	Test – Nr. Nr. of test:	1
Kupplungstyp: Typ of coupling:	Elastische Bolzenkupplung BOKU-N A10000S	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	404 kg		
Zul. Restunwucht: Permissible residual unbalance:	9644 gmm/kg	Wuchtgüte: Balancing quality:	Q 2,5 / 1000min^{-1}

Zul. Restunwucht: Permissible residual unbalance:	Ebene I (Plane I):	13,3 g	Ebene II (Plane II):	26,0 g
Istwert Restunwucht: Actual residual unbalance:	Ebene I (Plane I):	12,0 g	Ebene II (Plane II):	24,2 g

Dresden, 2022-10-24

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:19:08

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:	Eingetragen:	Bankverbindungen:			
Dr. Ing. Jörg Brückner	Amtsgericht Dresden HRB 95 75	Deutsche Bank AG Filiale Dresden Kto.-Nr. 517 500 500 (BLZ 870 700 00) IBAN: DE73870700000517500500 BIC: DEUTDE8C870	Commerzbank AG Filiale Dresden Kto.-Nr. 454 942 900 (BLZ 850 800 00) IBAN: DE70850800000454942900 BIC: DRESDEFF850	Commerzbank AG Filiale Dresden Kto.-Nr. 800 371 700 (BLZ 850 400 00) IBAN: DE19850400000800371700 BIC: COBADEFF850	Hypo- und Vereinsbank AG Filiale Dresden Kto.-Nr. 327 748 343 (BLZ 850 200 86) IBAN: DE75850200860327748343 BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 20221WA06423
Seite /page 5 / 10

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	1525/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Bolzenteil BOKU-N A10000	Auftr. – Nr. Nr. of order:	2022AU01231-2-003
Zeichnungs – Nr.: Number of drawing:	02 770 0552403	Test – Nr. Nr. of test:	1
Kupplungstyp: Typ of coupling:	Elastische Bolzenkupplung BOKU-N A10000S	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	318 kg		
Zul. Restunwucht: Permissible residual unbalance:	7591 gmm/kg	Wuchtgüte: Balancing quality:	Q 2,5 / 1000min^{-1}

Zul. Restunwucht: Permissible residual unbalance:	Ebene I (Plane I):	10,5 g	Ebene II (Plane II):	20,5 g
Istwert Restunwucht: Actual residual unbalance:	Ebene I (Plane I):	9,2 g	Ebene II (Plane II):	17,6 g

Dresden, 2022-10-24

KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:19:30

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:	Eingetragen:	Bankverbindungen:			
Dr. Ing. Jörg Brückner	Amtsgericht Dresden HRB 95 75	Deutsche Bank AG Filiale Dresden Kto.-Nr. 517 500 500 (BLZ 870 700 00) IBAN: DE73870700000517500500 BIC: DEUTDE8C870	Commerzbank AG Filiale Dresden Kto.-Nr. 454 942 900 (BLZ 850 800 00) IBAN: DE70850800000454942900 BIC: DRESDEFF850	Commerzbank AG Filiale Dresden Kto.-Nr. 800 371 700 (BLZ 850 400 00) IBAN: DE19850400000800371700 BIC: COBADEFF850	Hypo- und Vereinsbank AG Filiale Dresden Kto.-Nr. 327 748 343 (BLZ 850 200 86) IBAN: DE75850200860327748343 BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 20221WA06423
Seite /page 6 / 10

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	1526/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Pufferteil BOKU-N A10000	Auftr. – Nr. Nr. of order:	2022AU01231-2-003
Zeichnungs – Nr.: Number of drawing:	02 770 0562403	Test – Nr. Nr. of test:	1
Kupplungstyp: Typ of coupling:	Elastische Bolzenkupplung BOKU-N A10000S	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	404 kg		
Zul. Restunwucht: Permissible residual unbalance:	9644 gmm/kg	Wuchtgüte: Balancing quality:	Q 2,5 / 1000min^{-1}

Zul. Restunwucht: Permissible residual unbalance:	Ebene I (Plane I):	13,3 g	Ebene II (Plane II):	26,0 g
Istwert Restunwucht: Actual residual unbalance:	Ebene I (Plane I):	10,5 g	Ebene II (Plane II):	22,1 g

Dresden, 2022-10-24

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:19:43

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:	Eingetragen:	Bankverbindungen:			
Dr. Ing. Jörg Brückner	Amtsgericht Dresden HRB 95 75	Deutsche Bank AG Filiale Dresden Kto.-Nr. 517 500 500 (BLZ 870 700 00) IBAN: DE73870700000517500500 BIC: DEUTDE8C870	Commerzbank AG Filiale Dresden Kto.-Nr. 454 942 900 (BLZ 850 800 00) IBAN: DE70850800000454942900 BIC: DRESDEFF850	Commerzbank AG Filiale Dresden Kto.-Nr. 800 371 700 (BLZ 850 400 00) IBAN: DE19850400000800371700 BIC: COBADEFF850	Hypo- und Vereinsbank AG Filiale Dresden Kto.-Nr. 327 748 343 (BLZ 850 200 86) IBAN: DE75850200860327748343 BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 20221WA06423
Seite /page 7 / 10

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	1527/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Bolzenteil BOKU-N A10000	Auftr. – Nr. Nr. of order:	2022AU01231-4-001
Zeichnungs – Nr.: Number of drawing:	02 770 0552403	Test – Nr. Nr. of test:	1
Kupplungstyp: Typ of coupling:	Elastische Bolzenkupplung BOKU-N A10000S	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	318 kg		
Zul. Restunwucht: Permissible residual unbalance:	7591 gmm/kg	Wuchtgüte: Balancing quality:	Q 2,5 / 1000min^{-1}

Zul. Restunwucht: Permissible residual unbalance:	Ebene I (Plane I):	10,5 g	Ebene II (Plane II):	20,5 g
Istwert Restunwucht: Actual residual unbalance:	Ebene I (Plane I):	4,5 g	Ebene II (Plane II):	12,7 g

Dresden, 2022-10-24

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:19:59

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:	Eingetragen:	Bankverbindungen:			
Dr. Ing. Jörg Brückner	Amtsgericht Dresden HRB 95 75	Deutsche Bank AG Filiale Dresden Kto.-Nr. 517 500 500 (BLZ 870 700 00) IBAN: DE73870700000517500500 BIC: DEUTDE8C870	Commerzbank AG Filiale Dresden Kto.-Nr. 454 942 900 (BLZ 850 800 00) IBAN: DE70850800000454942900 BIC: DRESDEFF850	Commerzbank AG Filiale Dresden Kto.-Nr. 800 371 700 (BLZ 850 400 00) IBAN: DE19850400000800371700 BIC: COBADEFF850	Hypo- und Vereinsbank AG Filiale Dresden Kto.-Nr. 327 748 343 (BLZ 850 200 86) IBAN: DE75850200860327748343 BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 20221WA06423
Seite /page 8 / 10

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	1528/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Pufferteil BOKU-N A10000	Auftr. – Nr. Nr. of order:	2022AU01231-4-001
Zeichnungs – Nr.: Number of drawing:	02 770 0562403	Test – Nr. Nr. of test:	1
Kupplungstyp: Typ of coupling:	Elastische Bolzenkupplung BOKU-N A10000S	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	404 kg		
Zul. Restunwucht: Permissible residual unbalance:	9644 gmm/kg	Wuchtgüte: Balancing quality:	Q 2,5 / 1000min^{-1}

Zul. Restunwucht: Permissible residual unbalance:	Ebene I (Plane I):	13,3 g	Ebene II (Plane II):	26,0 g
Istwert Restunwucht: Actual residual unbalance:	Ebene I (Plane I):	10,7 g	Ebene II (Plane II):	23,2 g

Dresden, 2022-10-24

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:20:10

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:	Eingetragen:	Bankverbindungen:			
Dr. Ing. Jörg Brückner	Amtsgericht Dresden HRB 95 75	Deutsche Bank AG Filiale Dresden Kto.-Nr. 517 500 500 (BLZ 870 700 00) IBAN: DE73870700000517500500 BIC: DEUTDE8C870	Commerzbank AG Filiale Dresden Kto.-Nr. 454 942 900 (BLZ 850 800 00) IBAN: DE70850800000454942900 BIC: DRESDEFF850	Commerzbank AG Filiale Dresden Kto.-Nr. 800 371 700 (BLZ 850 400 00) IBAN: DE19850400000800371700 BIC: COBADEFF850	Hypo- und Vereinsbank AG Filiale Dresden Kto.-Nr. 327 748 343 (BLZ 850 200 86) IBAN: DE75850200860327748343 BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 20221WA06423
Seite /page 9 / 10

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	1529/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Bolzenteil BOKU-N A10000	Auftr. – Nr. Nr. of order:	2022AU01231-4-002
Zeichnungs – Nr.: Number of drawing:	02 770 0552403	Test – Nr. Nr. of test:	1
Kupplungstyp: Typ of coupling:	Elastische Bolzenkupplung BOKU-N A10000S	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	318 kg		
Zul. Restunwucht: Permissible residual unbalance:	7591 gmm/kg	Wuchtgüte: Balancing quality:	Q 2,5 / 1000min^{-1}

Zul. Restunwucht: Permissible residual unbalance:	Ebene I (Plane I):	10,5 g	Ebene II (Plane II):	20,5 g
Istwert Restunwucht: Actual residual unbalance:	Ebene I (Plane I):	8,8 g	Ebene II (Plane II):	16,2 g

Dresden, 2022-10-24

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:20:23

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:	Eingetragen:	Bankverbindungen:			
Dr. Ing. Jörg Brückner	Amtsgericht Dresden HRB 95 75	Deutsche Bank AG Filiale Dresden Kto.-Nr. 517 500 500 (BLZ 870 700 00) IBAN: DE73870700000517500500 BIC: DEUTDE8C870	Commerzbank AG Filiale Dresden Kto.-Nr. 454 942 900 (BLZ 850 800 00) IBAN: DE70850800000454942900 BIC: DRESDEFF850	Commerzbank AG Filiale Dresden Kto.-Nr. 800 371 700 (BLZ 850 400 00) IBAN: DE19850400000800371700 BIC: COBADEFF850	Hypo- und Vereinsbank AG Filiale Dresden Kto.-Nr. 327 748 343 (BLZ 850 200 86) IBAN: DE75850200860327748343 BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 20221WA06423
Seite /page 10 / 10

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	1530/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Pufferteil BOKU-N A10000	Auftr. – Nr. Nr. of order:	2022AU01231-4-002
Zeichnungs – Nr.: Number of drawing:	02 770 0562403	Test – Nr. Nr. of test:	1
Kupplungstyp: Typ of coupling:	Elastische Bolzenkupplung BOKU-N A10000S	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	404 kg		
Zul. Restunwucht: Permissible residual unbalance:	9644 gmm/kg	Wuchtgüte: Balancing quality:	Q 2,5 / 1000min^{-1}

Zul. Restunwucht: Permissible residual unbalance:	Ebene I (Plane I):	13,3 g	Ebene II (Plane II):	26,0 g
Istwert Restunwucht: Actual residual unbalance:	Ebene I (Plane I):	8,4 g	Ebene II (Plane II):	21,5 g

Dresden, 2022-10-24

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022-10-24 11:20:35

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:	Eingetragen:	Bankverbindungen:			
Dr. Ing. Jörg Brückner	Amtsgericht Dresden HRB 95 75	Deutsche Bank AG Filiale Dresden Kto.-Nr. 517 500 500 (BLZ 870 700 00) IBAN: DE73870700000517500500 BIC: DEUTDE8C870	Commerzbank AG Filiale Dresden Kto.-Nr. 454 942 900 (BLZ 850 800 00) IBAN: DE70850800000454942900 BIC: DRESDEFF850	Commerzbank AG Filiale Dresden Kto.-Nr. 800 371 700 (BLZ 850 400 00) IBAN: DE19850400000800371700 BIC: COBADEFF850	Hypo- und Vereinsbank AG Filiale Dresden Kto.-Nr. 327 748 343 (BLZ 850 200 86) IBAN: DE75850200860327748343 BIC: HYVEDEMM496

E.2 Gearbox / Drive motor

Blower stage	Place of installation
4002784	Stage 1
	Stage 1
	Stage 1
4113138	Stage 2
	Stage 2
4113561	Cooling gas stage

E.3 Operating instructions

For operating instruction see "Part 1"

E.4 Test documentation

KUPPLUNGSWERK DRESDEN
GmbH

KWD Kupplungswerk Dresden GmbH · Löbtauer Straße 45 · D-01159 Dresden

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

Nach / according to EN10204

Postfach 27 01 44
D-01171 Dresden
Telefon: (03 51) 49 99-0
Telefax: (03 51) 49 99-2 33
E-Mail: kwd@kupplungswerk-dresden.de
Internet: http://www.kupplungswerk-dresden.de

St.-Nr. 203/112/02694
USt-Id-Nr.: DE153976681

Seite / page 1 von 2

Erzeugnis / Stückzahl :
Product / Qty.
3,00 Stück
Ganzmetallkupplung KWN 21016
GMK 4300-6DE-AA-300/200H7P1-140H7P1
4500531573-10
Art.Nr.: 9303660020031403
Revision: A1 vom 07.08.2019
Ihre Art.Nr.: 2000065341

Seriennummer(n) :
Serial number(s)
2022AU01231/1-08/22-001, 2022AU01231/1-08/22-002, 2022AU01231/1-08/22-003

Erzeugnis / Stückzahl :
Product / Qty.
2,00 Stück
Ganzmetallkupplung KWN 21016
GMK 4300-6DE-AA-300/200H7P1-140H7P1
4500531573-30
Art.Nr.: 9303660020031403
Revision: A1 vom 07.08.2019
Ihre Art.Nr.: 2000065371

Seriennummer(n) :
Serial number(s)
2022AU01231/3-08/22-001, 2022AU01231/3-08/22-002

Erzeugnis / Stückzahl :
Product / Qty.
1,00 Stück
Ganzmetallkupplung KWN 21016
GMK 4300-6DE-AA-300/200H7P1-140H7P1
4500531573-50
Art.Nr.: 9303660020031403
Revision: A1 vom 07.08.2019
Ihre Art.Nr.: 2000065382

Seriennummer(n) :
Serial number(s)
2022AU01231/5-08/22-001

Besteller :
customer
Aerzener Maschinenfabrik GmbH

Reherweg 28
31855 Aerzen

Ihre Bestellung : 4500531573 Vom : 13.04.2022
Your order no dated
Unsere Auftrags-Nr. : 2022AU01231 Vom : 27.04.2022
Our order no dated

Die gültigen Datenschutzhinweise auf Grundlage der EU-Datenschutzgrundverordnung (EU-DSGVO) können Sie hier einsehen:
https://www.kupplungswerk-dresden.de/de/kontakt/datenschutzerklaerung.html

Geschäftsführer:
Dr.-Ing. Jörg Brückner

Eingetragen:
Amtsgericht Dresden
HRB 95 75

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BIC: DRESDEFF850

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Kto.-Nr. 327 748 343
(BLZ 850 200 86)
IBAN:
DE75850200860327748343
BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Abnahmeprüfzeugnis 3.1
Inspection certificate 3.1

Nach / according to EN10204

Lieferschein-Nr./delivery note: 2022WA05847

Seite / page 2 von 2

Lieferscheinnr. Delivery note no	:	2022WA05847	Vom : dated	16.09.2022
Zeugnis-Nr. certifacte note no	:	2022WA05847	Vom : dated	16.09.2022

Das o.g. Erzeugnis wurde vor Verlassen des Betriebes einer Prüfung auf zeichnungs- und standardgerechte Ausführung unterzogen.
The product mentioned above has been inspected prior to shipment for compliance with the drawings and standards.

Die in der technischen Dokumentation angegebenen Abmessungen wurden eingehalten.
The dimensions given in the technical documentation have been duly kept.

Dresden, 20.09.2022

KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022.09.20 14:24:20 +02'00'

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Die gültigen Datenschutzhinweise auf Grundlage der EU-Datenschutzgrundverordnung (EU-DSGVO) können Sie hier einsehen:
https://www.kupplungswerk-dresden.de/de/kontakt/datenschutzerklaerung.html

Geschäftsführer:
Dr.-Ing. Jörg Brückner

Eingetragen:
Amtsgericht Dresden
HRB 95 75

Bankverbindungen:

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Commerzbank AG
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(BLZ 850 400 00)
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BIC: COBADEFF850

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IBAN:
DE75850200860327748343
BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN GmbH

KWD Kupplungswerk Dresden GmbH · Löbtauer Straße 45 · D-01159 Dresden

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Postfach 27 01 44
D-01171 Dresden

Telefon: (03 51) 49 99-0
Telefax: (03 51) 49 99-2 33
E-Mail: kwd@kupplungswerk-dresden.de
Internet: http://www.kupplungswerk-dresden.de

St.-Nr. 203/112/02694
USt-Id-Nr.: DE153976681

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	18603/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Flanschnabe GMK 4300-6	Auftr. – Nr. Nr. of order:	2022AU01231
Zeichnungs – Nr.: Number of drawing:	02 442 0131403	Test – Nr. Nr. of test:	01-06
Kupplungstyp: Typ of coupling:	Ganzmetallkupplung GMK 4300-6DE-AA-300/ 200H7P1-140H7P1	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	73,5 kg		
Zul. Restunwucht: Permissible residual unbalance:	1169 gmm	Wuchtgüte: Balancing quality:	Q 2,5 / 1500 min^{-1}

Zul. Restunwucht: Permissible residual unbalance:		Ebene I (Plane I):	2,75 g	Ebene II (Plane II):	4,65 g
Istwert Restunwucht: Actual residual unbalance:	Teil 1:	Ebene I (Plane I):	2,0 g	Ebene II (Plane II):	2,8 g
	Teil 2:	Ebene I (Plane I):	0,6 g	Ebene II (Plane II):	0,6 g
	Teil 3:	Ebene I (Plane I):	0,9 g	Ebene II (Plane II):	4,4 g
	Teil 4:	Ebene I (Plane I):	2,4 g	Ebene II (Plane II):	3,0 g
	Teil 5	Ebene I (Plane I)	2,1 g	Ebene II (Plane II):	2,0 g
	Teil 6	Ebene I (Plane I)	2,4 g	Ebene II (Plane II):	3,8 g

Dresden, 20.09.2022

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
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2022.09.20 14:25:21
+02'00'

Dr. Manfred Thomas
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Dr. Ing. Jörg Brückner

Eingetragen:
Amtsgericht Dresden
HRB 95 75

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(BLZ 850 800 00)
IBAN:
DE70850800000454942900
BIC: DRESDEFF850

Commerzbank AG
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Kto.-Nr. 800 371 700
(BLZ 850 400 00)
IBAN:
DE19850400000800371700
BIC: COBADEFF850

Hypo- und Vereinsbank AG
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(BLZ 850 200 86)
IBAN:
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BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN
GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 2020WA06676
Seite /page 2 / 3

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	18604/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Flanschnabe GMK 4300-6	Auftr. – Nr. Nr. of order:	2022AU01231
Zeichnungs – Nr.: Number of drawing:	02 442 0122003	Test – Nr. Nr. of test:	01-06
Kupplungstyp: Typ of coupling:	Ganzmetallkupplung GMK 4300-6DE-AA-300/ 200H7P1-140H7P1	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	71,0 kg		
Zul. Restunwucht: Permissible residual unbalance:	1130 gmm	Wuchtgüte: Balancing quality:	Q 2,5 / 1500 min^{-1}

Zul. Restunwucht: Permissible residual unbalance:		Ebene I (Plane I):	2,65 g	Ebene II (Plane II):	4,5 g
Istwert Restunwucht: Actual residual unbalance:	Teil 1:	Ebene I (Plane I):	1,5 g	Ebene II (Plane II):	3,8 g
	Teil 2:	Ebene I (Plane I):	2,2 g	Ebene II (Plane II):	3,6 g
	Teil 3:	Ebene I (Plane I):	2,4 g	Ebene II (Plane II):	4,0 g
	Teil 4:	Ebene I (Plane I):	2,2 g	Ebene II (Plane II):	3,1 g
	Teil 5:	Ebene I (Plane I):	2,0 g	Ebene II (Plane II):	3,8 g
	Teil 6:	Ebene I (Plane I):	1,8 g	Ebene II (Plane II):	3,4 g

Dresden, 20.09.2022

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022.09.20 14:26:30
+02'00'

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:	Eingetragen:	Bankverbindungen:			
Dr. Ing. Jörg Brückner	Amtsgericht Dresden HRB 95 75	Deutsche Bank AG Filiale Dresden Kto.-Nr. 517 500 500 (BLZ 870 700 00) IBAN: DE73870700000517500500 BIC: DEUTDE8C870	Commerzbank AG Filiale Dresden Kto.-Nr. 454 942 900 (BLZ 850 800 00) IBAN: DE70850800000454942900 BIC: DRESDEFF850	Commerzbank AG Filiale Dresden Kto.-Nr. 800 371 700 (BLZ 850 400 00) IBAN: DE19850400000800371700 BIC: COBADEFF850	Hypo- und Vereinsbank AG Filiale Dresden Kto.-Nr. 327 748 343 (BLZ 850 200 86) IBAN: DE75850200860327748343 BIC: HYVEDEMM496

KUPPLUNGSWERK DRESDEN GmbH

Wuchtprotokoll
Balancing-protocol

Nach / according to EN 10204

Lieferschein-Nr./delivery note: 2020WA06676

Seite /page 3 / 3

KWD-Auswuchtprotokoll-Nr.: Balancing-protocol:	18605/2022	PV KWN: Inspection instruction:	49003
Teile – Bezeichnung: Part signature:	Zwischenstück GMK 4300-6	Auftr. – Nr. Nr. of order:	2022AU01231
Zeichnungs – Nr.: Number of drawing:	06 442 3060000	Test – Nr. Nr. of test:	01-06
Kupplungstyp: Typ of coupling:	Ganzmetallkupplung GMK 4300-6DE-AA-300/ 200H7P1-140H7P1	Werkstoff: Material:	42CrMo4+QT
Gewicht Wuchtkörper: Weight of bodys for balancing:	48,8 kg		
Zul. Restunwucht: Permissible residual unbalance:	771 gmm	Wuchtgüte: Balancing quality:	Q 2,5 / 1500 min^{-1}

Zul. Restunwucht: Permissible residual unbalance:		Ebene I (Plane I):	1,8 g	Ebene II (Plane II):	1,8 g
Istwert Restunwucht: Actual residual unbalance:	Teil 1:	Ebene I (Plane I):	1,4 g	Ebene II (Plane II):	1,6 g
	Teil 2:	Ebene I (Plane I):	1,7 g	Ebene II (Plane II):	0,6 g
	Teil 3:	Ebene I (Plane I):	1,4 g	Ebene II (Plane II):	1,2 g
	Teil 4:	Ebene I (Plane I):	0,9 g	Ebene II (Plane II):	1,2 g
	Teil 5:	Ebene I (Plane I):	0,5 g	Ebene II (Plane II):	0,8 g
	Teil 6:	Ebene I (Plane I):	1,4 g	Ebene II (Plane II):	0,9 g

Dresden, 20.09.2022

KWD KUPPLUNGSWERK DRESDEN
Dr. Manfred Thomas
KWD / Dresden
2022.09.20 14:26:50
+02'00'

Dr. Manfred Thomas
Prokurist
Leiter Qualitätswesen / Quality Manager

Geschäftsführer:
Dr. Ing. Jörg Brückner

Eingetragen:
Amtsgericht Dresden
HRB 95 75

Bankverbindungen:

Deutsche Bank AG
Filiale Dresden
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Commerzbank AG
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(BLZ 850 800 00)
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DE70850800000454942900
BIC: DRESDEFF850

Commerzbank AG
Filiale Dresden
Kto.-Nr. 800 371 700
(BLZ 850 400 00)
IBAN:
DE19850400000800371700
BIC: COBADEFF850

Hypo- und Vereinsbank AG
Filiale Dresden
Kto.-Nr. 327 748 343
(BLZ 850 200 86)
IBAN:
DE75850200860327748343
BIC: HYVEDEMM496

F Oil system

Name	Data
Designation	
Type	50 L / 100 L
Number	
Type of manual	*Technical documentation*
Manufacturer	Emmerthaler Apparatebau GmbH

Blower stage All stages

F.1 Hook-up Diagram

	AERZEN	
	Page 1 of 187	

Wiring Diagram Oil Supply
For
Blower and Gearbox

4001392344

F	00	24.08.2022	For Information	Fa. ELOG	K. Schwekendiek	R. Ackmann
Status	Issue	Date	Description	Prepared by	Checked by	Approved by

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

ELOG Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH
Nordbrucher Straße 6
31559 Hohnhorst / Germany
Phone +49 (0) 5723 / 79807-0
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Auftraggeber customer

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email info@aerzen.com
homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP01	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 1 GQ gear box Unit 1

Erstellt am
Created on 16.06.2022

Bearbeitet am 16.06.2022 von
Edit date 16.06.2022 from OlMa

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200016|EAV2101709
H. Stöber

Anzahl der Seiten
Number of pages 15

1.1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Instrumentation rack Unit
			Ed.	OLMA				=
			Appr					+
Modification	Date	Name	Original		ePLAN-Version 2.9.4			2022-094-1-SP01

Page 1
Page 1 from 15

F26_ELOG_Info

Typenschild
name plate

ELOG
Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH

Nordbrucher Straße 6
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Phone +49 (0) 5723 / 79807-0
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E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP01
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

Table of contents

Column X: An automatically generated page was edited

F06_ELOG_001_Blatt_x

Page name	Page x of 15	Page description	supplementary page field	Date	Edited by	X
/1	1	Deckblatt Cover sheet		16.06.2022	OlMa	X
/1.1	2	Allgemeine Informationen general information		16.06.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
=GQ+OIL.GB/1	4	Deckblatt Cover sheet		16.06.2022	OlMa	X
=GQ+OIL.GB/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.GB/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.GB/5	7	Ölpumpe / Ölheizung Getriebe oil pump / oil heater gear box		16.06.2022	OlMa	
=GQ+OIL.GB/7	8	Differenzdruck Ölfilter Getriebe differential pressure oil filter gear box		16.06.2022	OlMa	
=GQ+OIL.GB/8	9	Öldruck Getriebe oil-pressure gear box		16.06.2022	OlMa	
=GQ+OIL.GB/9	10	Öltemperatur Getriebe oil temperature gear box		16.06.2022	OlMa	
=GQ+OIL.GB/10	11	Durchfluss Kühlwasserauslass Ölkühler Getriebe flow cooling water outlet oil cooler gear box		16.06.2022	OlMa	
=GQ+TS/1	12	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
=GQ+TS/1.1	13	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
=GQ+BOM/1	14	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	15	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.151 - =GQ+OIL.GB-W_TIT_3.2.3.152 Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.151 - =GQ+OIL.GB-W_TIT_3.2.3.152		16.06.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

Hersteller Manufacturer

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Elektrotechnik GmbH
Schaumburg

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Auftraggeber customer

AERZEN

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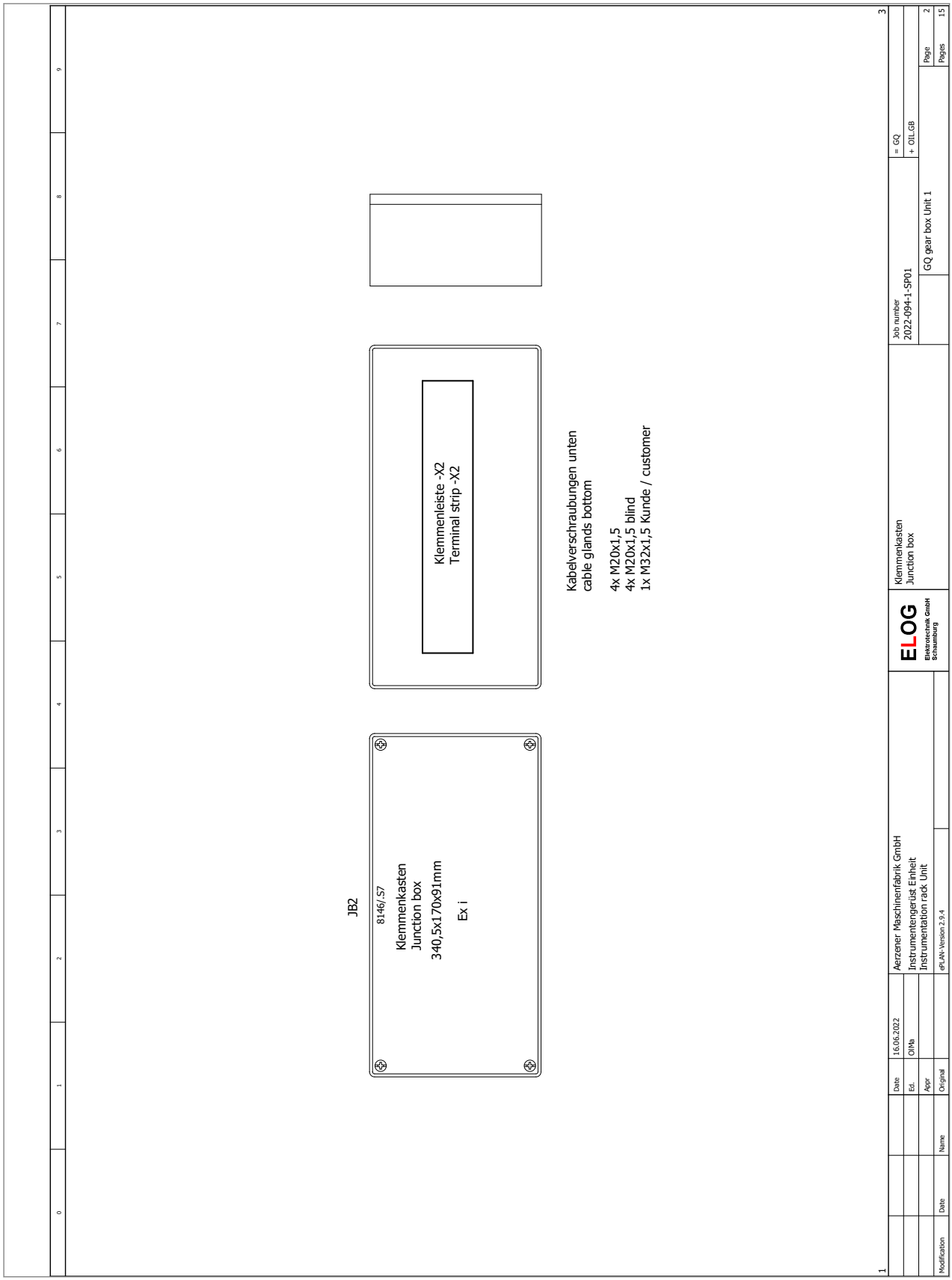
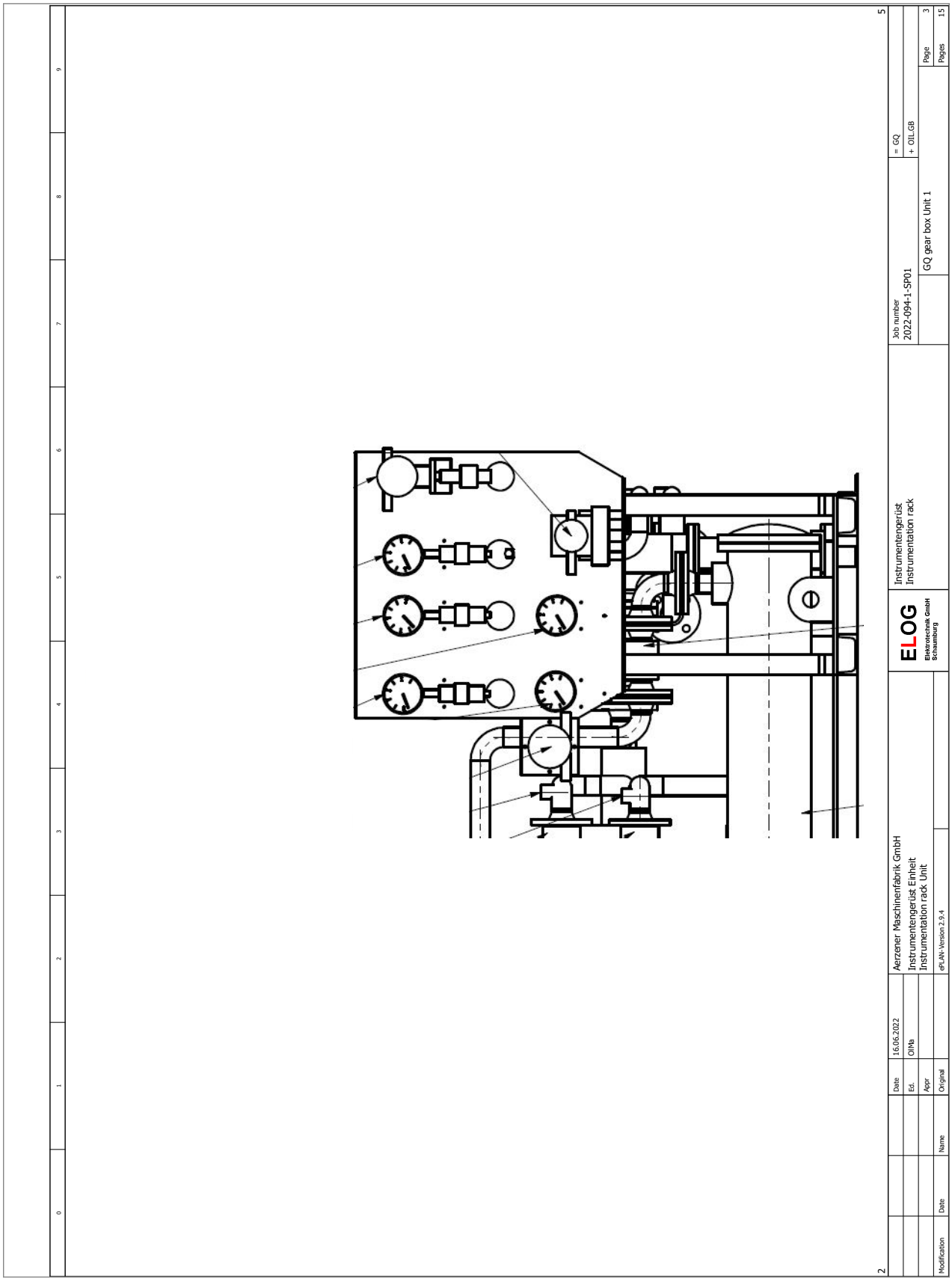
Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP01	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 1

Klemmenkasten Ölanlage 100l Getriebe Einheit 1
Junction box oil unit 100l gear box Unit 1

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH Instrumentengerüst Einheit Instrumentation rack Unit	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP01	= GQ + OIL.GB
			Ed.	OlMa				GQ gear box Unit 1	Page 1
			Appr						Pages 15
Modification	Date	Name	Original		ePLAN-Version 2.9.4				


JB2
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X2
Terminal strip -X2
Kabelverschraubungen unten
cable glands bottom
4x M20x1,5
4x M20x1,5 blind
1x M32x1,5 Kunde / customer
Date 16.06.2022
Ed. OlMa
Appr
Original
Name
Date
Modification
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schlaumburg
Klemmenkasten
Junction box
Job number
2022-094-1-SP01
GQ gear box Unit 1
= GQ
+ OIL.GB
Page 2
Pages 15


Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
16.06.2022
OlMa
Date
Name
Modification
Original
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schaumburg
Instrumentengerüst
Instrumentation rack
Job number
2022-094-1-SP01
GQ gear box Unit 1
= GQ
+ OIL.GB
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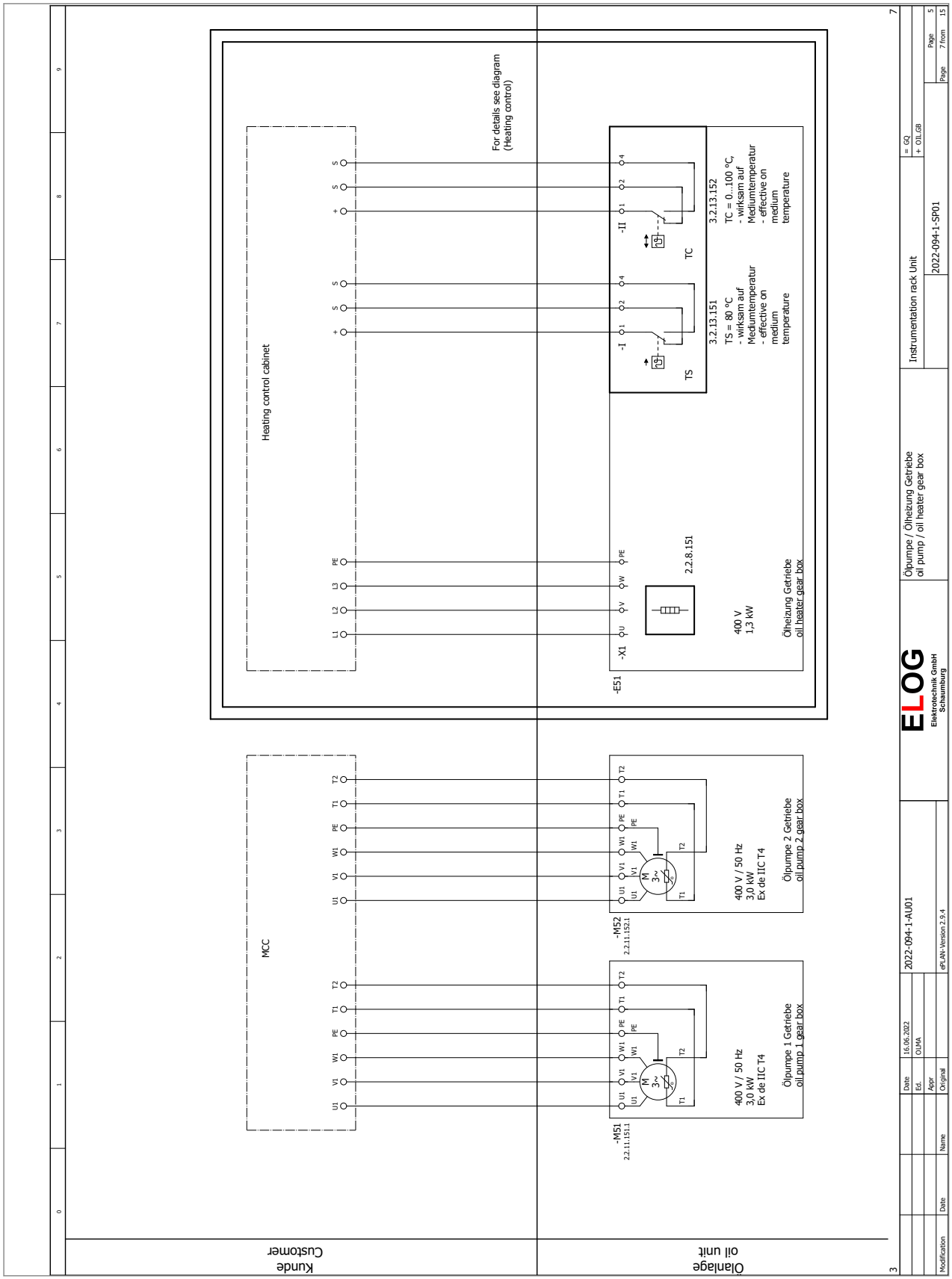
Heating control cabinet
For details see diagram
(Heating control)
L1
L2
L3
PE
S
S
+
-E51
-X1
U
V
W
PE
2.2.8.151
400 V
1,3 kW
Ölheizung Getriebe
oil heater gear box
-I
-II
TS
TC
3.2.13.151
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.152
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
MCC
U1
V1
W1
PE
T1
T2
-M51
2.2.11.151.1
-M52
2.2.11.152.1
400 V / 50 Hz
3,0 kW
Ex de IIC T4
Ölpumpe 1 Getriebe
oil pump 1 gear box
Ölpumpe 2 Getriebe
oil pump 2 gear box
Kunde
Customer
Olanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
Ölpumpe / Ölheizung Getriebe
oil pump / oil heater gear box
Instrumentation rack Unit
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= GQ
+ OIL.GB
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Date
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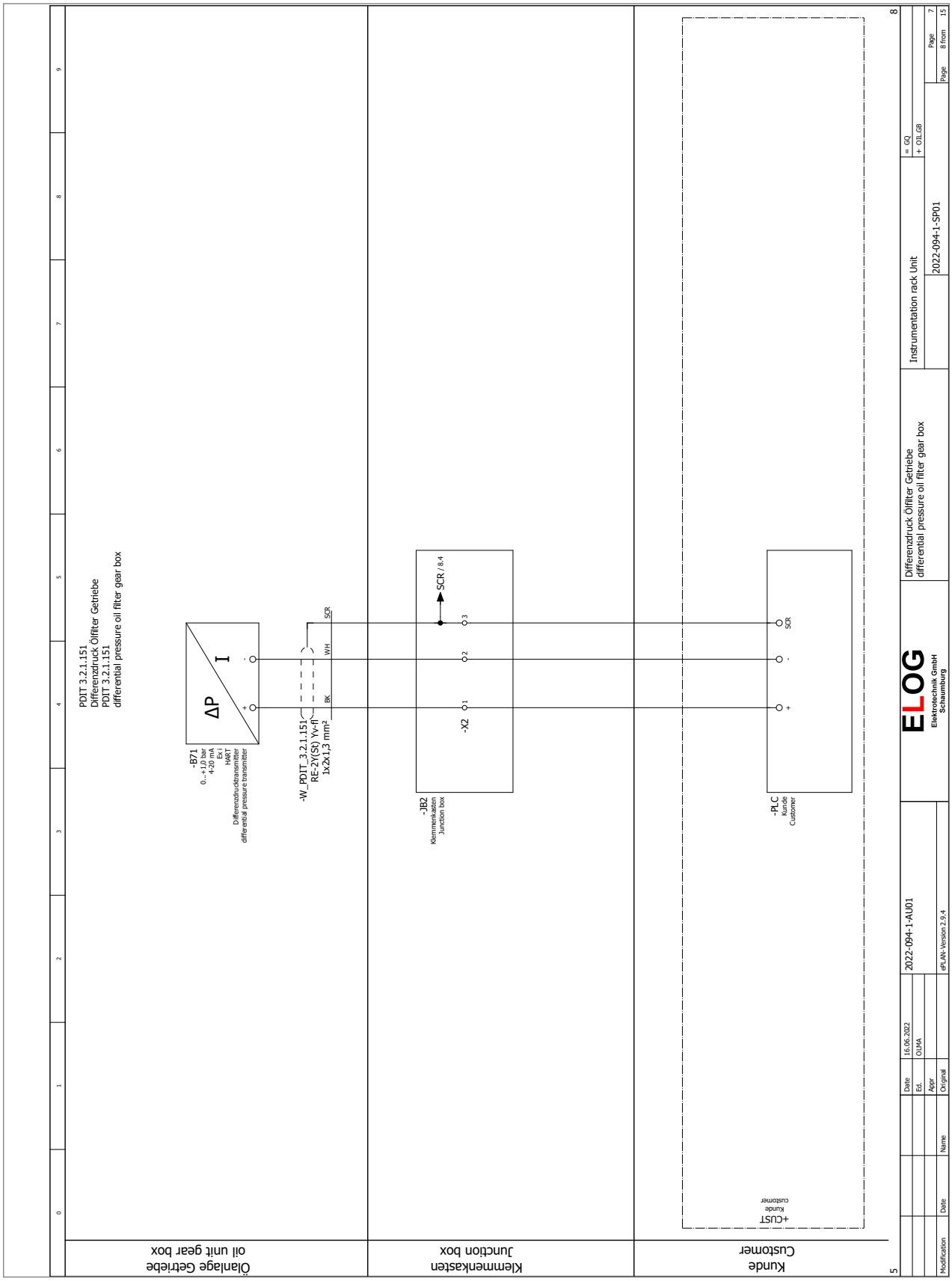
eP-AN-Version 2.9.4


PDIT 3.2.1.151
Differenzdruck Ölfilter Getriebe
PDIT 3.2.1.151
differential pressure oil filter gear box
-B71
0...+10 bar
4-20 mA
Ex i
HART
Differenzdruckstransmitter
differential pressure transmitter
ΔP
I
-W_PDIT_3.2.1.151
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
-X2
SCR / 8.4
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Getriebe
differential pressure oil filter gear box
Instrumentation rack Unit
2022-094-1-SP01
= GQ
+ OIL.GB
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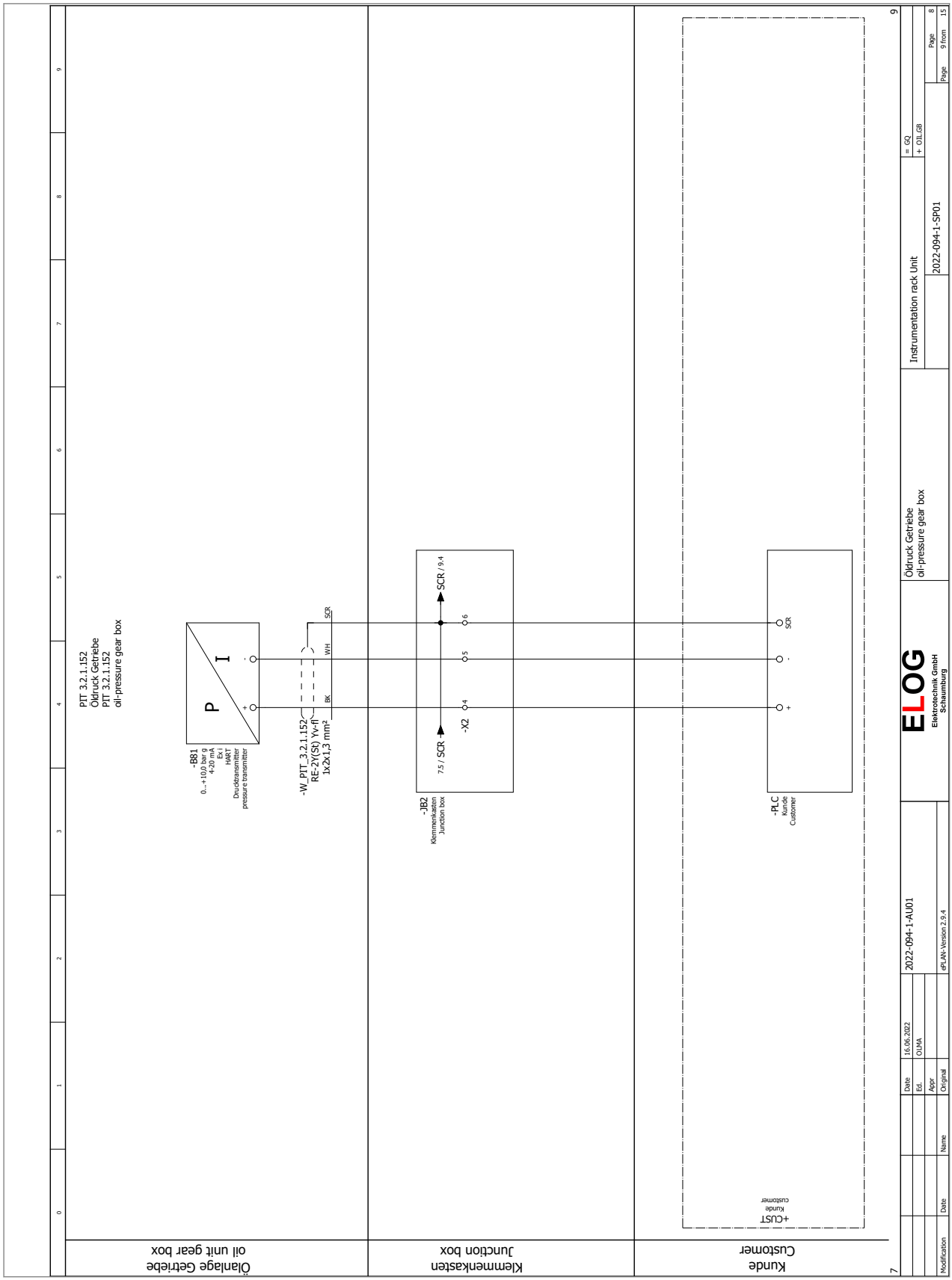
16.06.2022
OUMA
ePLAN-Version 2.9.4
Modification
Date
Name
Date
Ed.
Agpr
Original


PIT 3.2.1.152
Öldruck Getriebe
PIT 3.2.1.152
oil-pressure gear box
-BB1
0...+10,0 bar g
4-20 mA
Ex i
HART
Drucktransmitter
pressure transmitter
P
I
+
-
-W_PIT_3.2.1.152
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB2
Klemmenkasten
Junction box
7.5 / SCR
SCR / 9.4
-X2
4
5
6
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Getriebe
oil-pressure gear box
Instrumentation rack Unit
2022-094-1-SP01
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Original
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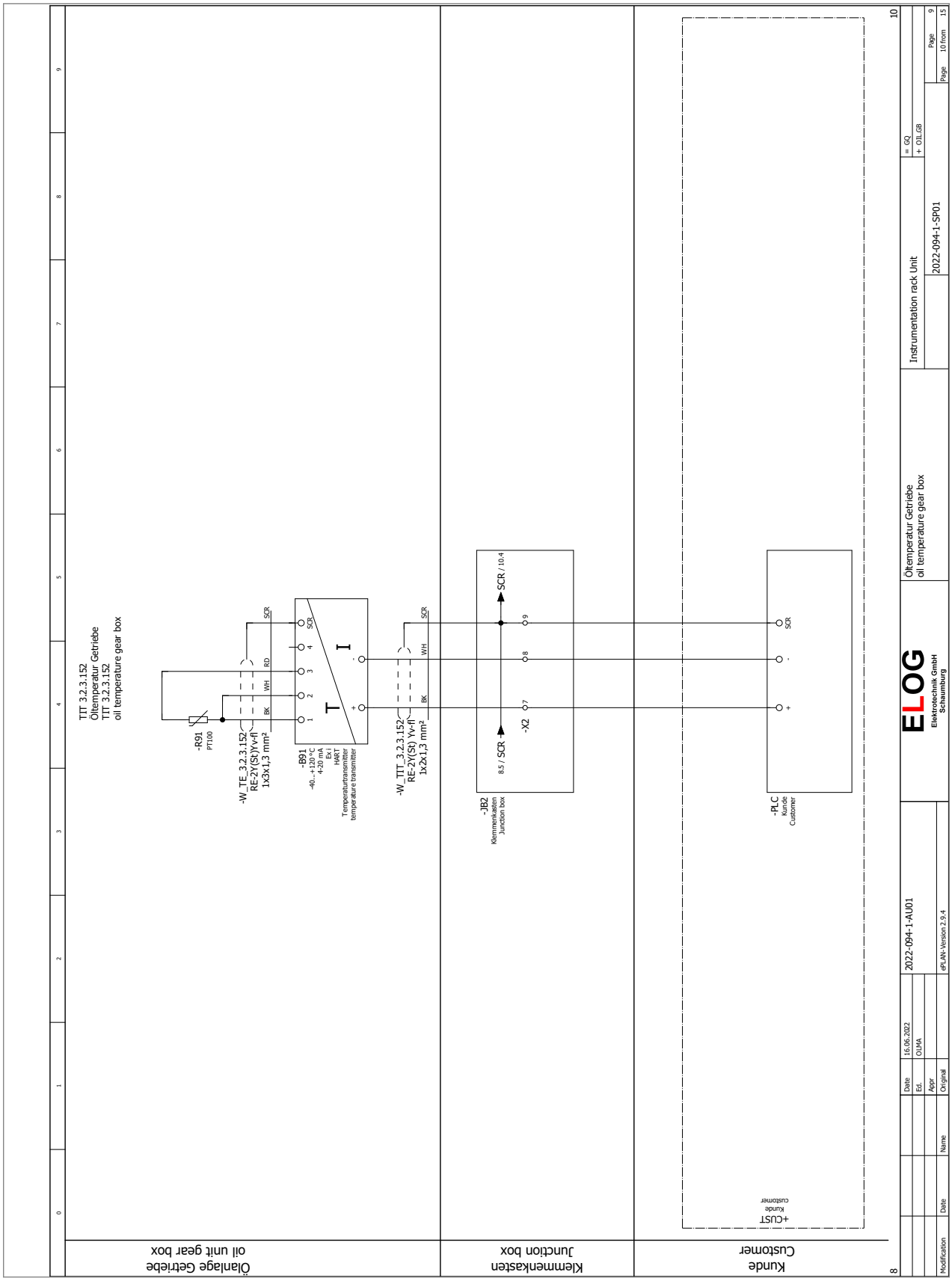
TIT 3.2.3.152
Öltemperatur Getriebe
TIT 3.2.3.152
oil temperature gear box
-R91
PT100
-W_TE_3.2.3.152
RE-2Y(St)Yv-fl
1x3x1,3 mm²
SCR
RD
WH
BK
-B91
-40...+125°C
4-20 mA
Ex i
HART
Temperaturtransmitter
temperature transmitter
-W_TTT_3.2.3.152
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB2
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X2
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öltemperatur Getriebe
oil temperature gear box
Instrumentation rack Unit
2022-094-1-SP01
= GQ
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Original
Name
Date
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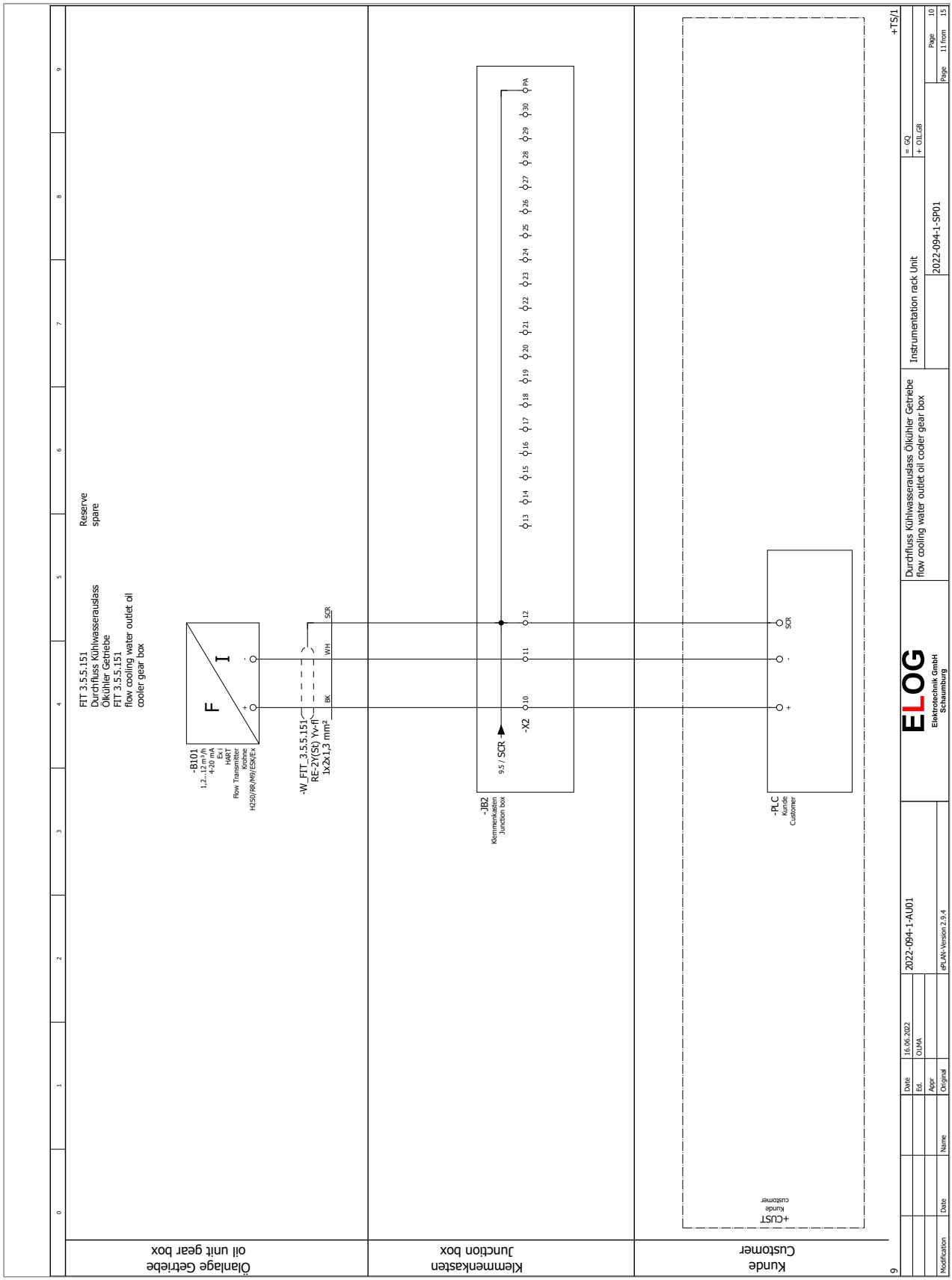
Reserve
spare
FIT 3.5.5.151
Durchfluss Kühlwasserauslass
Ölkühler Getriebe
FIT 3.5.5.151
flow cooling water outlet oil
cooler gear box
-B101
1,2...12 m³/h
4-20 mA
Ex i
HART
Flow Transmitter
Kobrhe
H250/RR/M9/ESKX2x
-W_FIT_3.5.5.151
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
9.5 / SCR
-X2
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
+TS/1
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler Getriebe
flow cooling water outlet oil cooler gear box
Instrumentation rack Unit
2022-094-1-SP01
= GQ
+ OIL.GB
2022-094-1-AU01
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Terminal diagram

F13_JODR2-OLMA

function text	-W_FIT_3.5.5.151	-W_TIT_3.2.3.152	-W_PIT_3.2.1.152	-W_PDIT_3.2.1.151	Cable name	Strip =GQ+OIL.GB-JB2-X2						Cable name					Page / column
	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	cable type					
PDIT 3.2.1.151 Differenzdruck Ölfilter Getriebe PDIT 3.2.1.151 differential pressure oil filter gear box				BK		-B71	+	1		+CUST-PLC	+						/7.4
=				WH		-B71	-	2		+CUST-PLC	-						/7.4
=				SCR				3		+CUST-PLC	SCR						/7.5
PIT 3.2.1.152 Öldruck Getriebe PIT 3.2.1.152 oil-pressure gear box			BK			-B81	+	4		+CUST-PLC	+						/8.4
=			WH			-B81	-	5		+CUST-PLC	-						/8.4
=			SCR					6		+CUST-PLC	SCR						/8.5
TIT 3.2.3.152 Öltemperatur Getriebe TIT 3.2.3.152 oil temperature gear box		BK				-B91	+	7		+CUST-PLC	+						/9.4
=		WH				-B91	-	8		+CUST-PLC	-						/9.4
=		SCR						9		+CUST-PLC	SCR						/9.5
FIT 3.5.5.151 Durchfluss Kühlwasserauslass Ölkühler Getriebe FIT 3.5.5.151 flow cooling water outlet oil cooler gear box	BK					-B101	+	10		+CUST-PLC	+						/10.4
=	WH					-B101	-	11		+CUST-PLC	-						/10.4
=	SCR							12		+CUST-PLC	SCR						/10.5
Reserve spare								13									/10.5
=								14									/10.6
=								15									/10.6
=								16									/10.6
=								17									/10.6
=								18									/10.6
=								19									/10.7
=								20									/10.7
=								21									/10.7
=								22									/10.7
=								23									/10.7
=								24									/10.8
=								25									/10.8

+OIL.GB/10

1.1

Modification	Date	Name			
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			Ed.	OLMA	
			Appr		
			Original		ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Klemmenplan =GQ+OIL.GB-JB2-X2
Terminal diagram =GQ+OIL.GB-JB2-X2

Instrumentation rack Unit

= GQ
+ TS

2022-094-1-SP01

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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.GB-JB2-X2

function text	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
Reserve spare			26				Cable name	cable type	/10.8
=			27						/10.8
=			28						/10.8
=			29						/10.8
=			30						/10.9
=			PA						/10.9

+BOM/1

Date	16.06.2022	2022-094-1-AU01	
Ed.	OLMA		
Appr			
Original		ePLAN-Version 2.9.4	
Modification	Date	Name	

ELOG
Elektrotechnik GmbH
Schaumburg

Klemmenplan =GQ+OIL.GB-JB2-X2
Terminal diagram =GQ+OIL.GB-JB2-X2

Instrumentation rack Unit

2022-094-1-SP01

= GQ
+ TS

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Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.GB-JB2	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

+CAB/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71	Instrumentation rack Unit	= GQ
			Ed.	OLMA					+ BOM
			Appr					2022-094-1-SP01	Page 1
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AERZEN

Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.GB-W_FIT_3.5.5.151	+OIL.GB-JB2-X2	+OIL.GB-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.151 flow cooling water outlet oil cooler gear box
+OIL.GB-W_PDIT_3.2.1.151	+OIL.GB-JB2-X2	+OIL.GB-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.151 differential pressure oil filter gear box
+OIL.GB-W_PIT_3.2.1.152	+OIL.GB-JB2-X2	+OIL.GB-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.152 oil-pressure gear box
+OIL.GB-W_TE_3.2.3.152	+OIL.GB-B91	+OIL.GB-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.152 oil temperature gear box
+OIL.GB-W_TIT_3.2.3.152	+OIL.GB-JB2-X2	+OIL.GB-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.151 - =GQ+OIL.GB-W_TIT_3.2.3.152	Instrumentation rack Unit	= GQ
			Ed.	OLMA			Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.151 - =GQ+OIL.GB-W_TIT_3.2.3.152		+ CAB
			Appr					2022-094-1-SP01	Page 1
Modification	Date	Name	Original		ePLAN-Version 2.9.4				Page 15 from 15

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

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Elektrotechnik GmbH
Schaumburg

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Auftraggeber customer

AERZEN

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Fax +49 (0)5154 / 81-9191
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homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP02	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 2 GQ gear box Unit 2

Erstellt am
Created on 16.06.2022

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200017|EAV2101709
H. Stöber

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Anzahl der Seiten
Number of pages 15

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			Ed.	OLMA				=
			Appr					+
Modification	Date	Name	Original		ePLAN-Version 2.9.4			2022-094-1-SP02

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Typenschild
name plate

ELOG
Elektrotechnik GmbH
Schaumburg

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Fax +49 (0) 5723 / 79807-10
E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP02
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

F26_ELOG_Info

Modification	Date	Name	Original
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	Ed.	OLMA	
	Appr		

ELOG
Elektrotechnik GmbH
Schaumburg

Allgemeine Informationen
general information

Instrumentation rack Unit

2022-094-1-SP02

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Column X: An automatically generated page was edited

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/1	1	Deckblatt Cover sheet		16.06.2022	OlMa	X
/1.1	2	Allgemeine Informationen general information		16.06.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
=GQ+OIL.GB/1	4	Deckblatt Cover sheet		16.06.2022	OlMa	X
=GQ+OIL.GB/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.GB/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.GB/5	7	Ölpumpe / Ölheizung Getriebe oil pump / oil heater gear box		16.06.2022	OlMa	
=GQ+OIL.GB/7	8	Differenzdruck Ölfilter Getriebe differential pressure oil filter gear box		16.06.2022	OlMa	
=GQ+OIL.GB/8	9	Öldruck Getriebe oil-pressure gear box		16.06.2022	OlMa	
=GQ+OIL.GB/9	10	Öltemperatur Getriebe oil temperature gear box		16.06.2022	OlMa	
=GQ+OIL.GB/10	11	Durchfluss Kühlwasserauslass Ölkühler Getriebe flow cooling water outlet oil cooler gear box		16.06.2022	OlMa	
=GQ+TS/1	12	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
=GQ+TS/1.1	13	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
=GQ+BOM/1	14	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	15	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.251 - =GQ+OIL.GB-W_TIT_3.2.3.252 Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.251 - =GQ+OIL.GB-W_TIT_3.2.3.252		16.06.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

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http://www.elog-gmbh.de

Auftraggeber customer

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Fax +49 (0)5154 / 81-9191

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP02	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 2

Klemmenkasten Ölanlage 100l Getriebe Einheit 2
Junction box oil unit 100l gear box Unit 2

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP02	= GQ
			Ed.	OlMa	Instrumentengerüst Einheit Instrumentation rack Unit				+ OIL.GB
			Appr					GQ gear box Unit 2	Page 1
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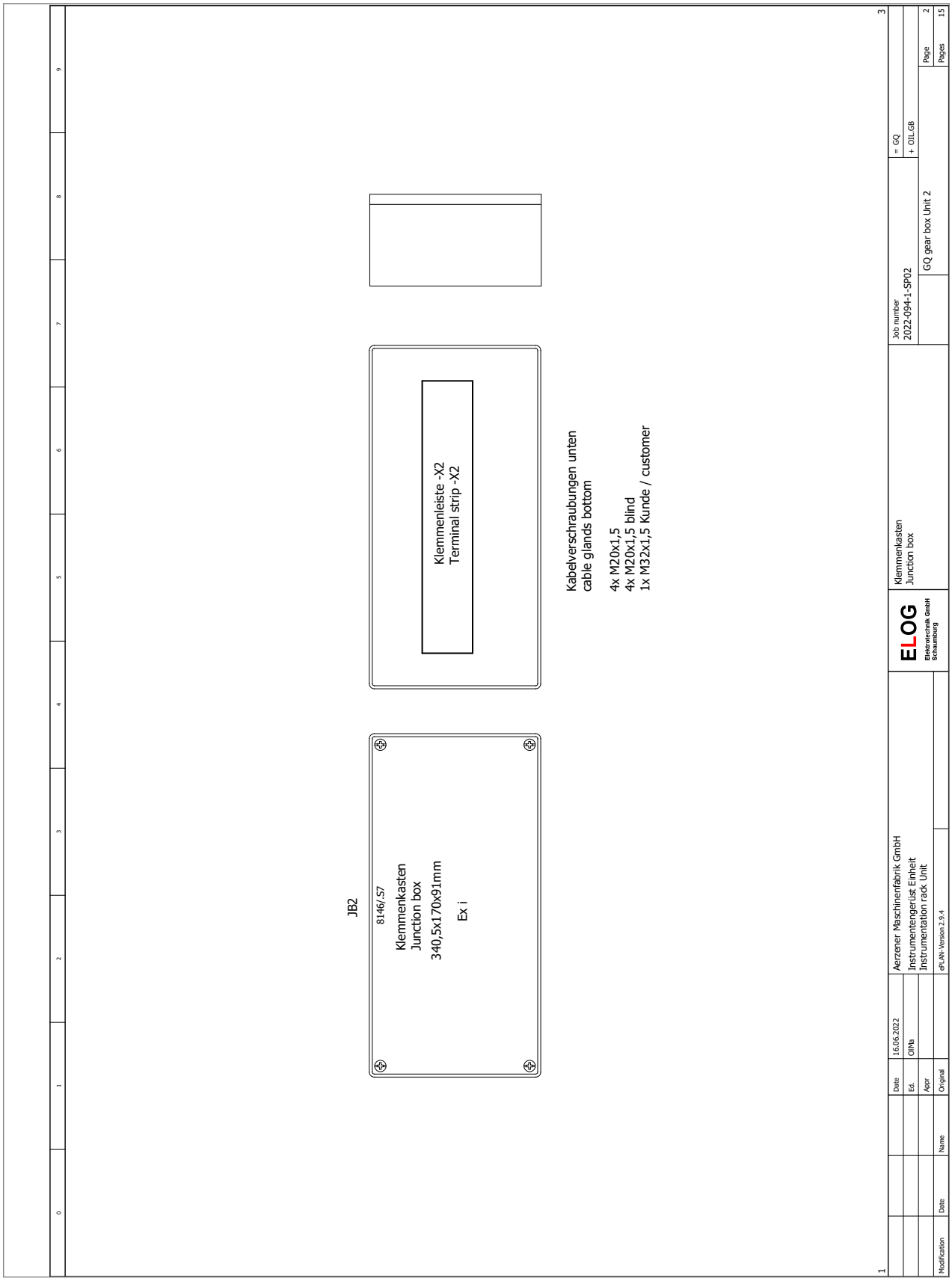
JB2
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X2
Terminal strip -X2
Kabelverschraubungen unten
cable glands bottom
4x M20x1,5
4x M20x1,5 blind
1x M32x1,5 Kunde / customer
Date
16.06.2022
Ed.
OlMa
Appr
Original
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schaumburg
Klemmenkasten
Junction box
Job number
2022-094-1-SP02
= GQ
+ OIL.GB
GQ gear box Unit 2
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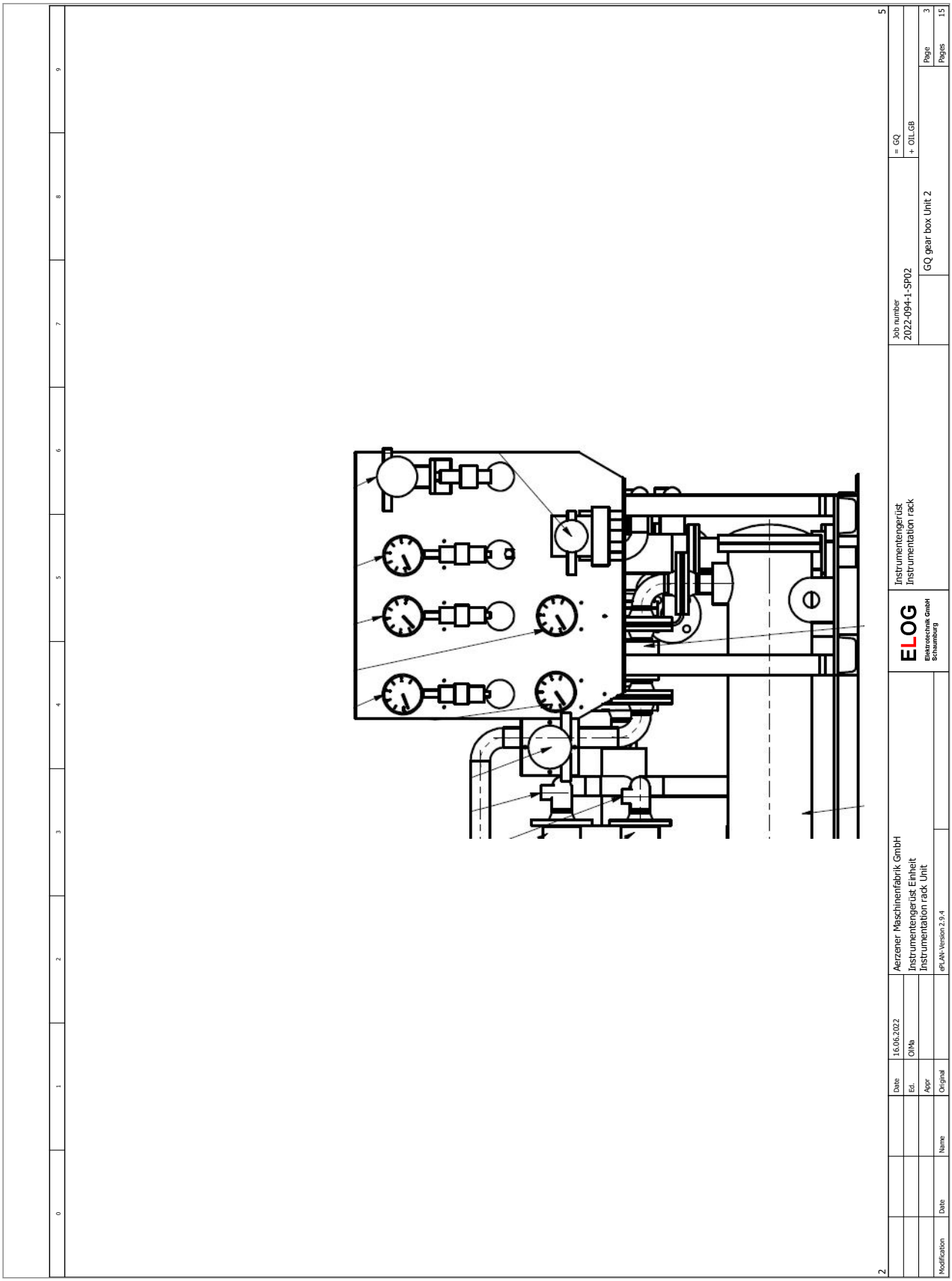
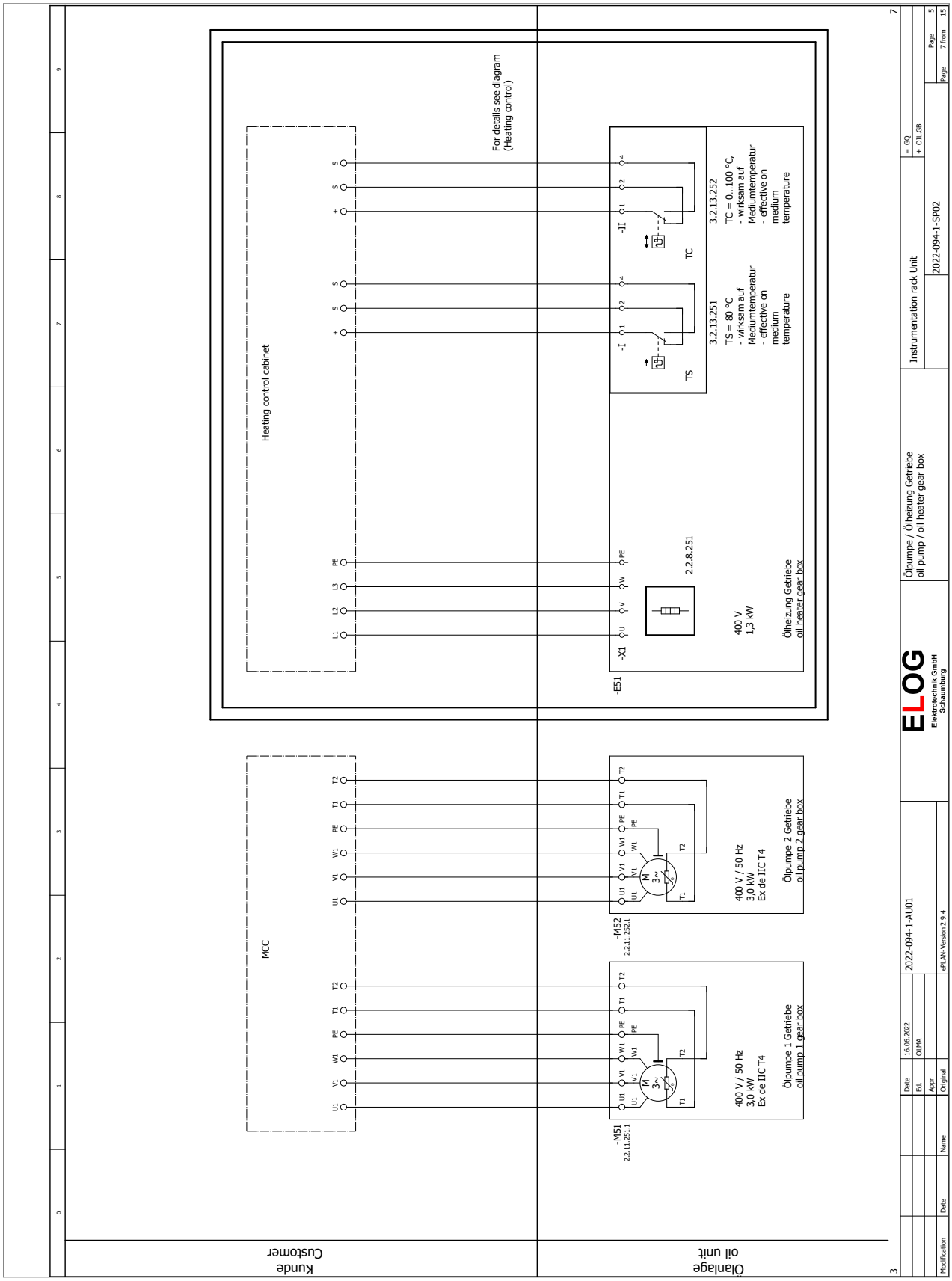
Date
Name


Instrumentengerüst
Instrumentation rack
ELOG
Elektrotechnik GmbH
Schaumburg
Job number
2022-094-1-SP02
= GQ
+ OIL.GB
GQ gear box Unit 2
Page 3
Pages 15
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
Date 16.06.2022
Ed. OlMa
Appr
Original
Modification
Date
Name


Heating control cabinet
For details see diagram
(Heating control)
-E51
-X1
L1
L2
L3
PE
U
V
W
PE
2.2.8.251
400 V
1,3 kW
Öheizung Getriebe
oil heater gear box
-I
-II
TS
TC
3.2.13.251
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.252
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
MCC
-M51
2.2.11.251.1
-M52
2.2.11.252.1
400 V / 50 Hz
3,0 kW
Ex de IIC T4
Ölpumpe 1 Getriebe
oil pump 1 gear box
Ölpumpe 2 Getriebe
oil pump 2 gear box
Kunde
Customer
Ölanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
Ölpumpe / Öleizung Getriebe
oil pump / oil heater gear box
Instrumentation rack Unit
2022-094-1-SP02
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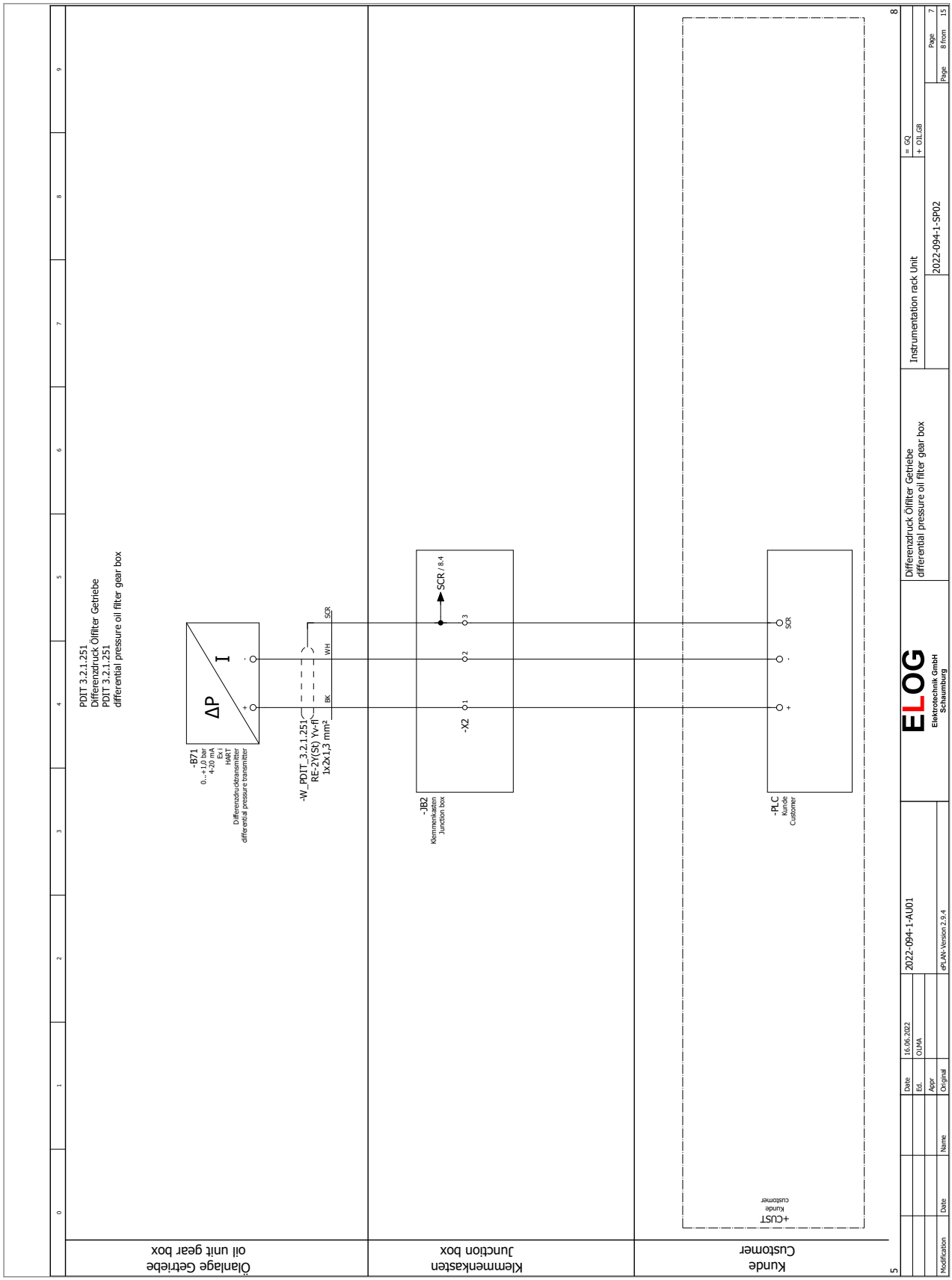
PDIT 3.2.1.251
Differenzdruck Ölfilter Getriebe
PDIT 3.2.1.251
differential pressure oil filter gear box
-B71
0...+1,0 bar
4-20 mA
Ex
HART
Differenzdrucktransmitter
differential pressure transmitter
ΔP
I
+
-
-W_PDIT_3.2.1.251
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB2
Klemmenkasten
Junction box
-X2
1
2
3
SCR / 8.4
-PLC
Kunde
Customer
SCR
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Getriebe
differential pressure oil filter gear box
Instrumentation rack Unit
2022-094-1-SP02
= GQ
+ OIL.GB
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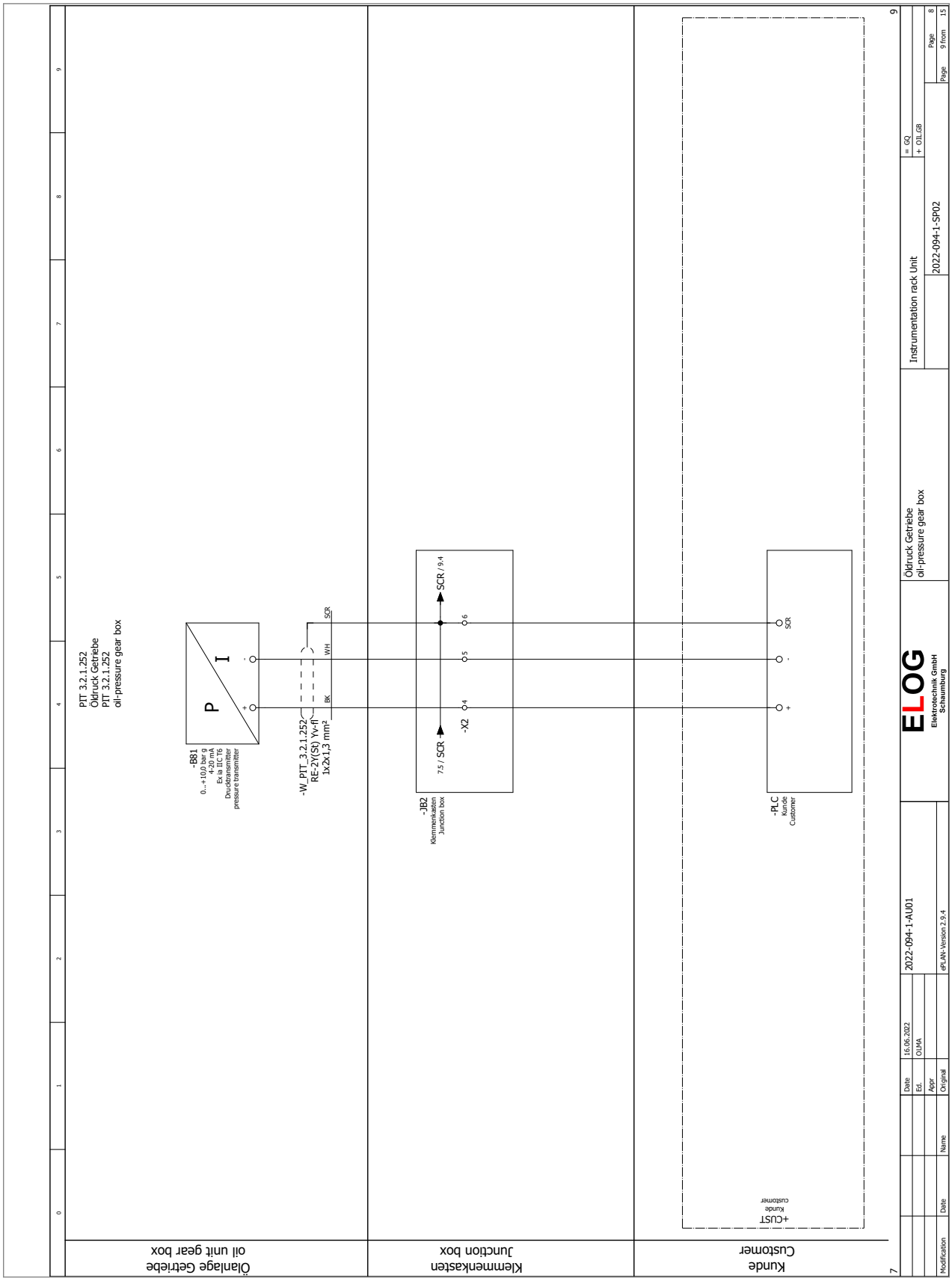
2022-094-1-AU01
Date 16.06.2022
Ed. OLMA
Appr
Original
Name
Date
Modification
ePLAN-Version 2.9.4


PIT 3.2.1.252
Öldruck Getriebe
PIT 3.2.1.252
oil-pressure gear box
-B81
0...+10,0 bar g
4-20 mA
Ex ia IIC T6
Druckmessumformer
pressure transmitter
P
I
-W_PIT_3.2.1.252
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
7.5 / SCR
SCR / 9.4
-X2
6
5
4
+CUST
Kunde
customer
-PLC
Kunde
Customer
SCR
Öldruck Getriebe
oil-pressure gear box
ELOG
Elektrotechnik GmbH
Schaumburg
Instrumentation rack Unit
2022-094-1-SP02
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+ OIL.GB
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16.06.2022
OUMA
ePLAN-Version 2.9.4
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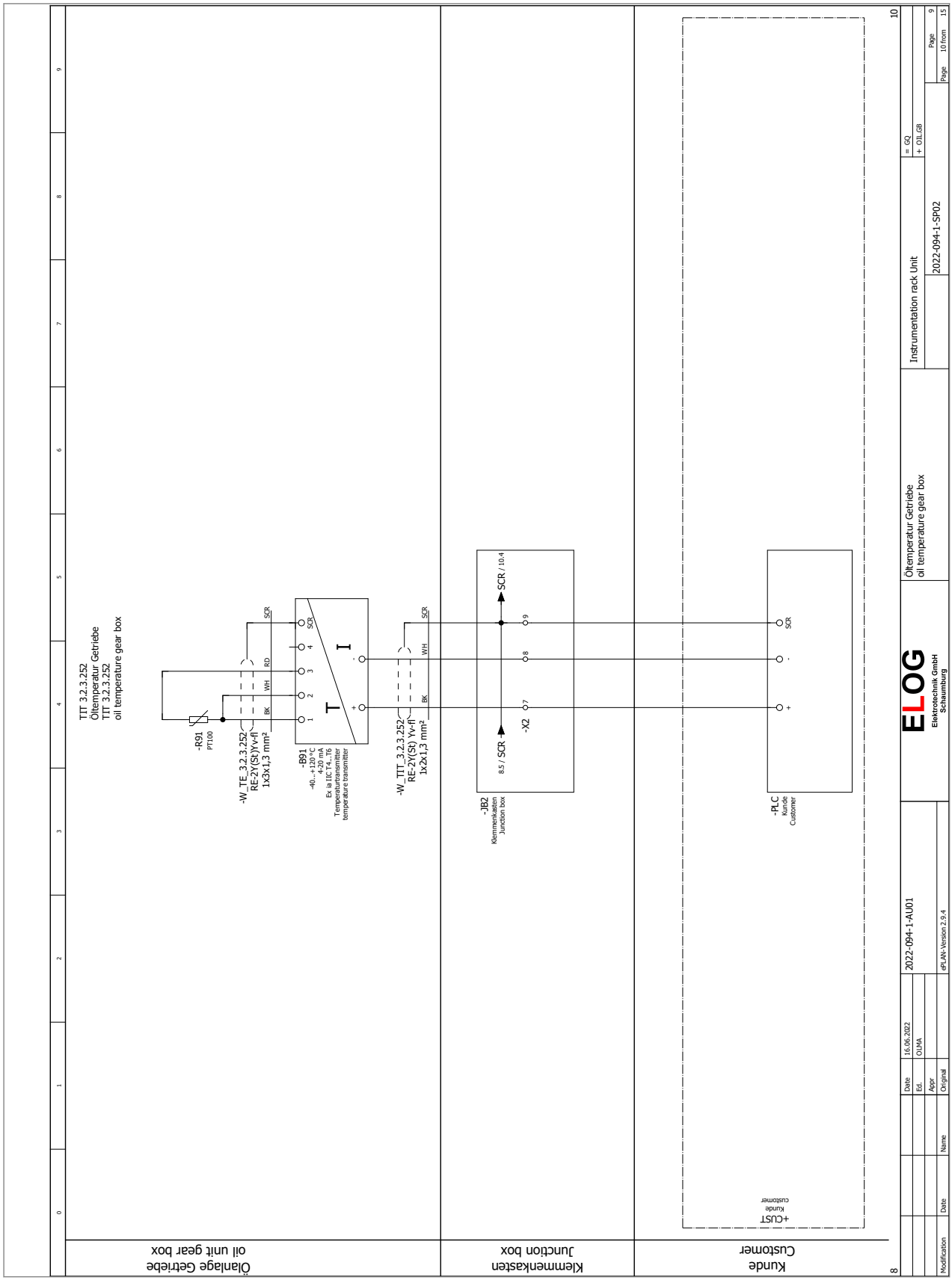
Date
Name
Original
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer


TIT 3.2.3.252
Öltemperatur Getriebe
TIT 3.2.3.252
oil temperature gear box
-R91
PT100
-W_TE_3.2.3.252
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+120 °C
4-20 mA
Ex ia IIC T4...T6
Temperaturmessumformer
temperature transmitter
-W_TIT_3.2.3.252
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB2
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X2
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öltemperatur Getriebe
oil temperature gear box
Instrumentation rack Unit
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16.06.2022
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Original
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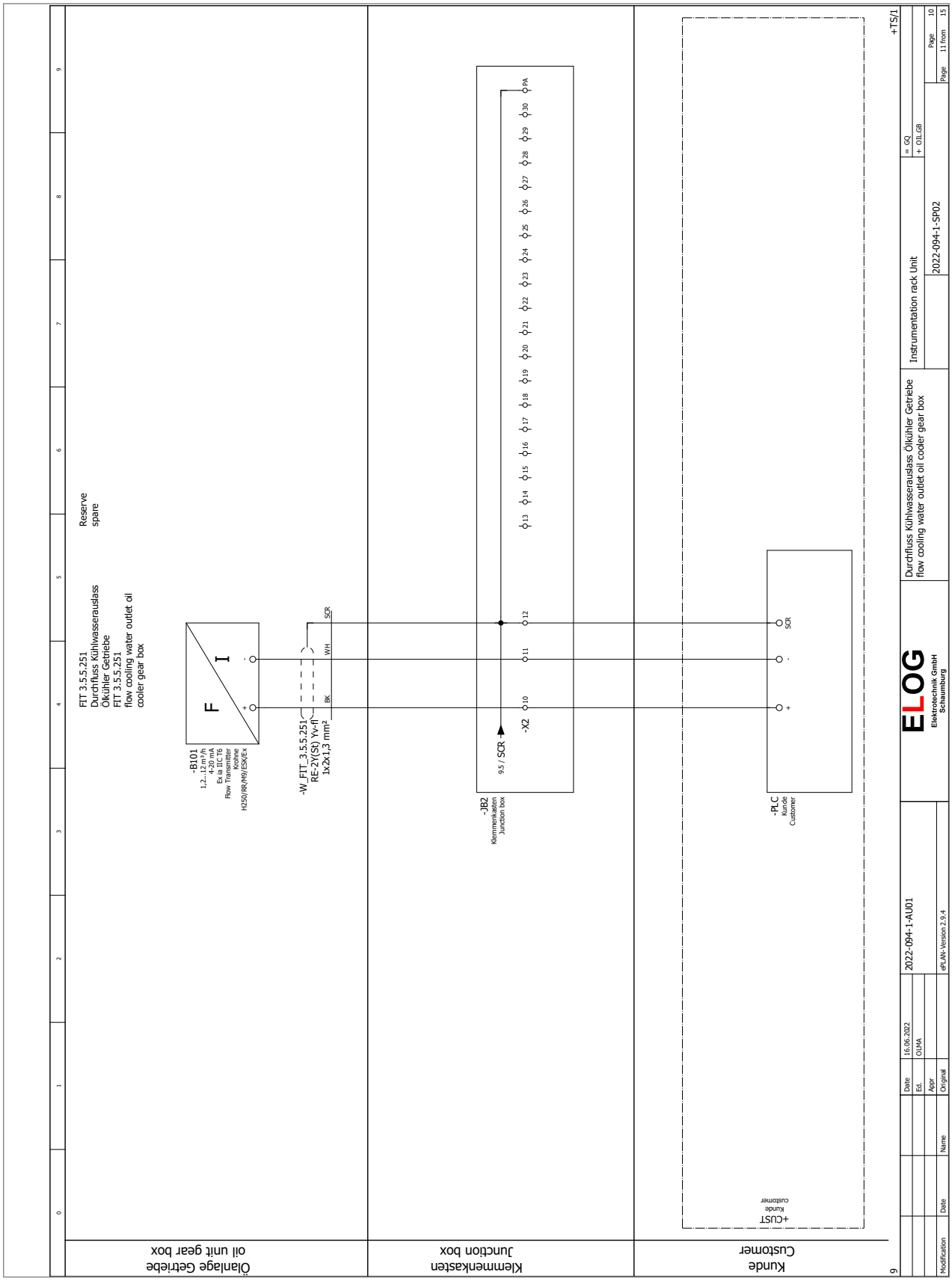
Modification
ePLAN-Version 2.9.4


Reserve
spare
FIT 3.5.5.251
Durchfluss Kühlwasserauslass
Ölkühler Getriebe
FIT 3.5.5.251
flow cooling water outlet oil
cooler gear box
-B101
1,2...12 m³/h
4-20 mA
Ex ia IIC T6
Flow Transmitter
Krohne
H250/R6/M9/ESX/Ex
-W_FIT_3.5.5.251
RE-2Y(St) Yv-fl
1x2x1.3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
9.5 / SCR
-X2
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler Getriebe
flow cooling water outlet oil cooler gear box
Instrumentation rack Unit
2022-094-1-SP02
2022-094-1-AU01
ePLAN-Version 2.9.4
Modification
Date
Name
Original
16.06.2022
OUMA
+TS/1

Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.GB-JB2-X2

function text	-W_FIT_3.5.5.251	-W_TIT_3.2.3.252	-W_PIT_3.2.1.252	-W_PDIT_3.2.1.251	Cable name	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	Page / column
	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	cable type							cable type	
PDIT 3.2.1.251 Differenzdruck Ölfilter Getriebe PDIT 3.2.1.251 differential pressure oil filter gear box				BK		-B71	+	1		+CUST-PLC	+		/7.4
=				WH		-B71	-	2		+CUST-PLC	-		/7.4
=				SCR				3		+CUST-PLC	SCR		/7.5
PIT 3.2.1.252 Öldruck Getriebe PIT 3.2.1.252 oil-pressure gear box			BK			-B81	+	4		+CUST-PLC	+		/8.4
=			WH			-B81	-	5		+CUST-PLC	-		/8.4
=			SCR					6		+CUST-PLC	SCR		/8.5
TIT 3.2.3.252 Öltemperatur Getriebe TIT 3.2.3.252 oil temperature gear box		BK				-B91	+	7		+CUST-PLC	+		/9.4
=		WH				-B91	-	8		+CUST-PLC	-		/9.4
=		SCR						9		+CUST-PLC	SCR		/9.5
FIT 3.5.5.251 Durchfluss Kühlwasserauslass Ölkühler Getriebe FIT 3.5.5.251 flow cooling water outlet oil cooler gear box	BK					-B101	+	10		+CUST-PLC	+		/10.4
=	WH					-B101	-	11		+CUST-PLC	-		/10.4
=	SCR							12		+CUST-PLC	SCR		/10.5
Reserve spare								13					/10.5
=								14					/10.6
=								15					/10.6
=								16					/10.6
=								17					/10.6
=								18					/10.6
=								19					/10.7
=								20					/10.7
=								21					/10.7
=								22					/10.7
=								23					/10.7
=								24					/10.8
=								25					/10.8

+OIL.GB/10 1.1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2	Instrumentation rack Unit	= GQ + TS
			Ed.	OLMA				2022-094-1-SP02	Page 1
			Appr						Page 12 from 15
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Terminal diagram

F13_JODR2-OLMA

0	1	2	3	4	5	6	7	8	9

function text	Cable name	cable type	Strip =GQ+OIL.GB-JB2-X2 Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
Reserve spare					26						/10.8
=					27						/10.8
=					28						/10.8
=					29						/10.8
=					30						/10.9
=					PA						/10.9

1

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2	Instrumentation rack Unit
			Ed.	OLMA				= GQ + TS
			Appr					2022-094-1-SP02
Modification	Date	Name	Original		ePLAN-Version 2.9.4			Page 1.1 Page 13 from 15

Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.GB-JB2	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

		Date	16.06.2022
		Ed.	OLMA
		Appr	
Modification	Date	Name	Original

2022-094-1-AU01

ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Artikelstückliste : STAHL.8146/2S71 - STAHL.814
6/2S71
Parts list : STAHL.8146/2S71 - STAHL.8146/2S71

Instrumentation rack Unit

2022-094-1-SP02

+CAB/1

= GQ
+ BOM

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Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.GB-W_FIT_3.5.5.251	+OIL.GB-JB2-X2	+OIL.GB-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.251 flow cooling water outlet oil cooler gear box
+OIL.GB-W_PDIT_3.2.1.251	+OIL.GB-JB2-X2	+OIL.GB-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.251 differential pressure oil filter gear box
+OIL.GB-W_PIT_3.2.1.252	+OIL.GB-JB2-X2	+OIL.GB-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.252 oil-pressure gear box
+OIL.GB-W_TE_3.2.3.252	+OIL.GB-B91	+OIL.GB-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.252 oil temperature gear box
+OIL.GB-W_TIT_3.2.3.252	+OIL.GB-JB2-X2	+OIL.GB-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.251 - =GQ+OIL.GB-W_TIT_3.2.3.252	Instrumentation rack Unit	= GQ
			Ed.	OLMA			Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.251 - =GQ+OIL.GB-W_TIT_3.2.3.252		+ CAB
			Appr					2022-094-1-SP02	Page 1
Modification	Date	Name	Original		ePLAN-Version 2.9.4				Page 15 from 15

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

ELOG Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH
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homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP03	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 3 GQ gear box Unit 3

Erstellt am
Created on 16.06.2022

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200018|EAV2101709
H. Stöber

Anzahl der Seiten
Number of pages 15

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			Ed.	OLMA	
			Appr		
Modification	Date	Name	Original		ePLAN-Version 2.9.4

ELOG Elektrotechnik GmbH Schaumburg

Deckblatt
Cover sheet

Instrumentation rack Unit

=
+

2022-094-1-SP03

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F26_ELOG_Info

Typenschild
name plate

ELOG
Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH

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31559 Hohnhorst / Germany
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Fax +49 (0) 5723 / 79807-10
E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP03
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

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Column X: An automatically generated page was edited

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Page name	Page x of 15	Page description	supplementary page field	Date	Edited by	X
/1	1	Deckblatt Cover sheet		16.06.2022	OlMa	X
/1.1	2	Allgemeine Informationen general information		16.06.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
=GQ+OIL.GB/1	4	Deckblatt Cover sheet		16.06.2022	OlMa	X
=GQ+OIL.GB/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.GB/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.GB/5	7	Ölpumpe / Ölheizung Getriebe oil pump / oil heater gear box		16.06.2022	OlMa	
=GQ+OIL.GB/7	8	Differenzdruck Ölfilter Getriebe differential pressure oil filter gear box		16.06.2022	OlMa	
=GQ+OIL.GB/8	9	Öldruck Getriebe oil-pressure gear box		16.06.2022	OlMa	
=GQ+OIL.GB/9	10	Öltemperatur Getriebe oil temperature gear box		16.06.2022	OlMa	
=GQ+OIL.GB/10	11	Durchfluss Kühlwasserauslass Ölkühler Getriebe flow cooling water outlet oil cooler gear box		16.06.2022	OlMa	
=GQ+TS/1	12	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
=GQ+TS/1.1	13	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
=GQ+BOM/1	14	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	15	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.351 - =GQ+OIL.GB-W_TIT_3.2.3.352 Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.351 - =GQ+OIL.GB-W_TIT_3.2.3.352		16.06.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

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Schaumburg

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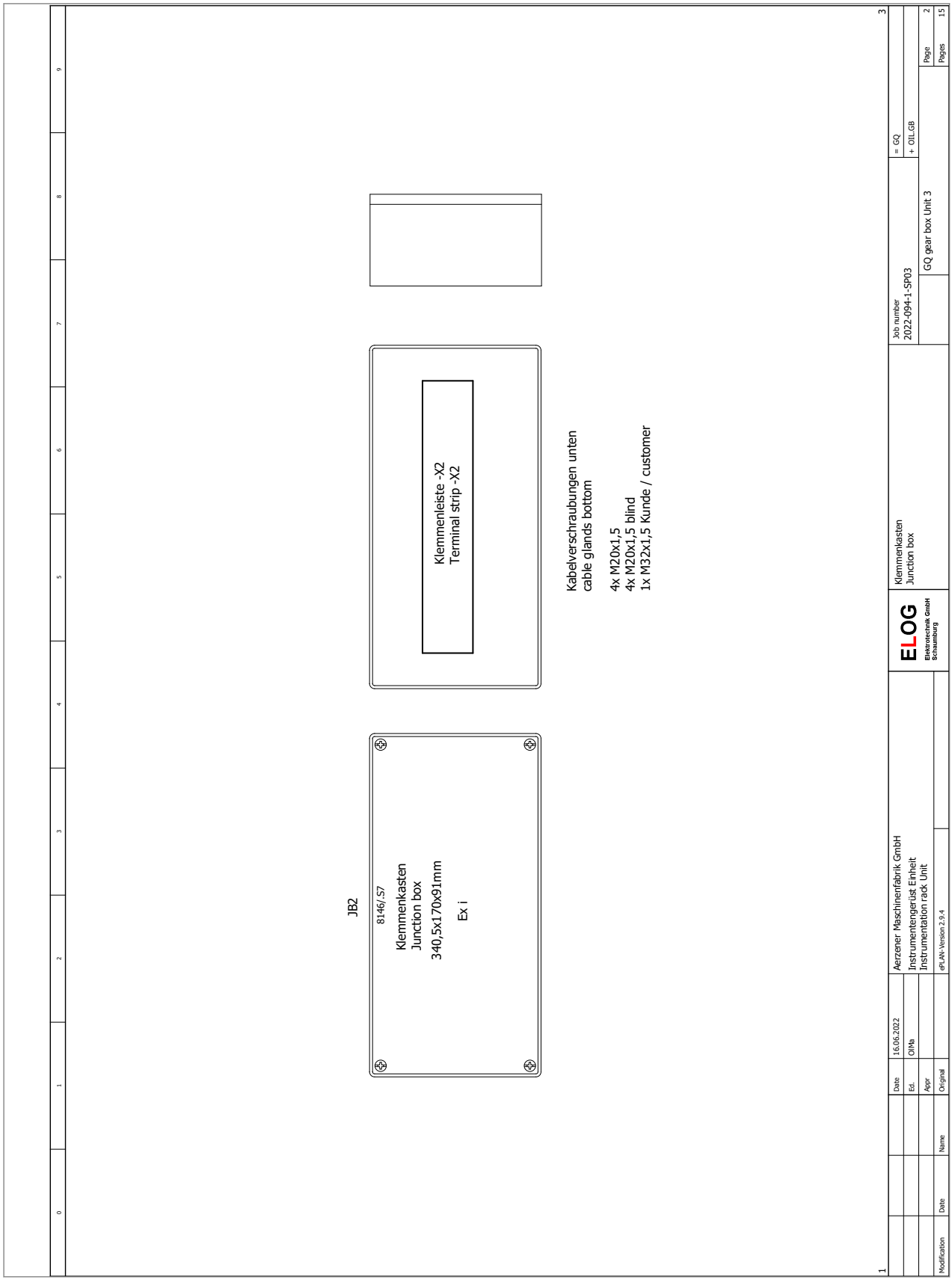
Fax +49 (0)5154 / 81-9191

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP03	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 3

Klemmenkasten Ölanlage 100l Getriebe Einheit 3
Junction box oil unit 100l gear box Unit 3

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH Instrumentengerüst Einheit Instrumentation rack Unit	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP03	= GQ + OIL.GB
			Ed.	OlMa				GQ gear box Unit 3	Page 1
			Appr						Pages 15
Modification	Date	Name	Original		ePLAN-Version 2.9.4				


JB2
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X2
Terminal strip -X2
Kabelverschraubungen unten
cable glands bottom
4x M20x1,5
4x M20x1,5 blind
1x M32x1,5 Kunde / customer
Date 16.06.2022
Ed. OlMa
Appr
Original
Name
Date
Modification
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schlaumburg
Klemmenkasten
Junction box
Job number
2022-094-1-SP03
GQ gear box Unit 3
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+ OIL.GB
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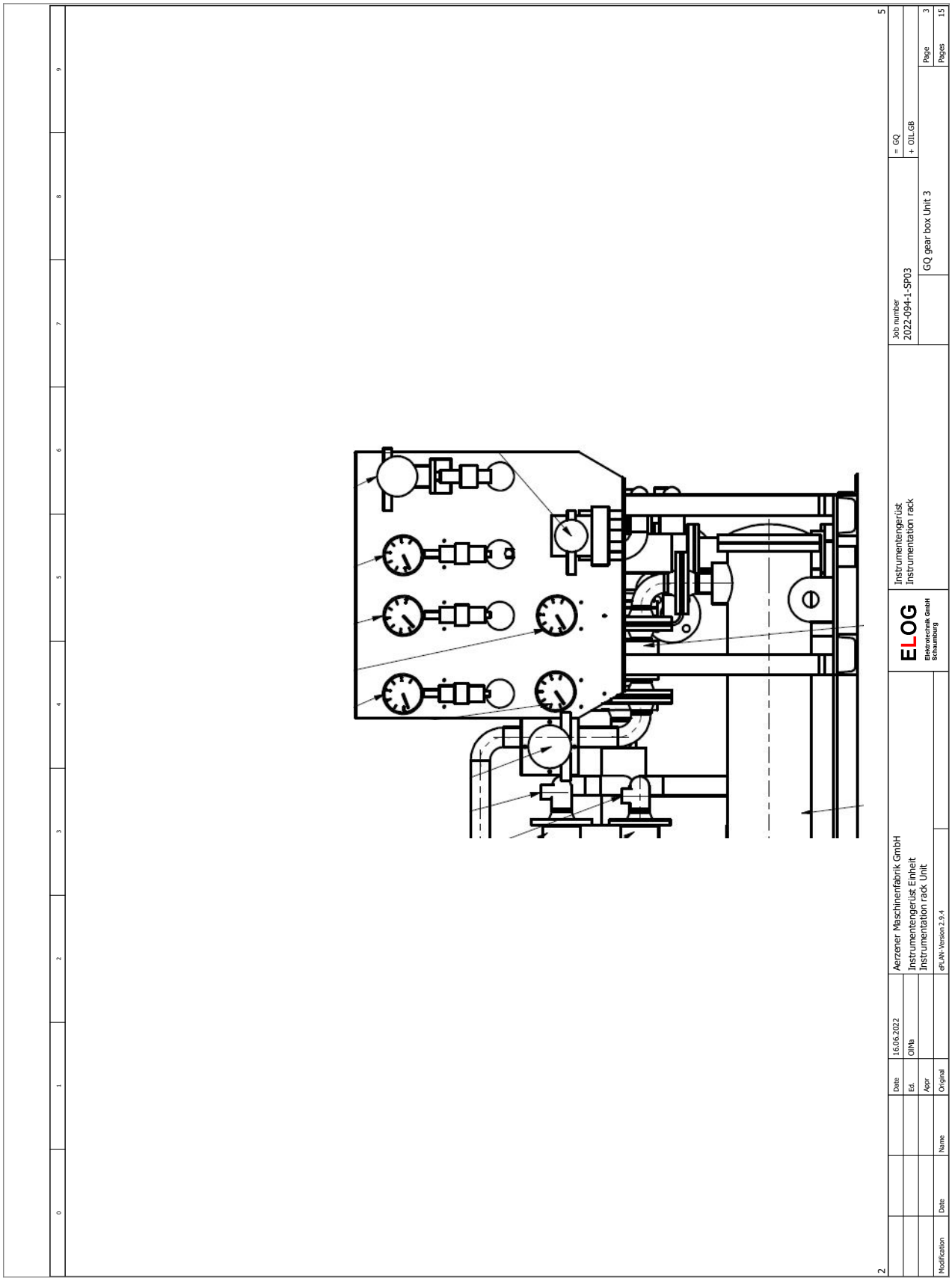
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
Date 16.06.2022
Ed. OlMa
Appr
Original
Name
Date
Modification
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schaumburg
Instrumentengerüst
Instrumentation rack
Job number
2022-094-1-SP03
GQ gear box Unit 3
= GQ
+ OIL.GB
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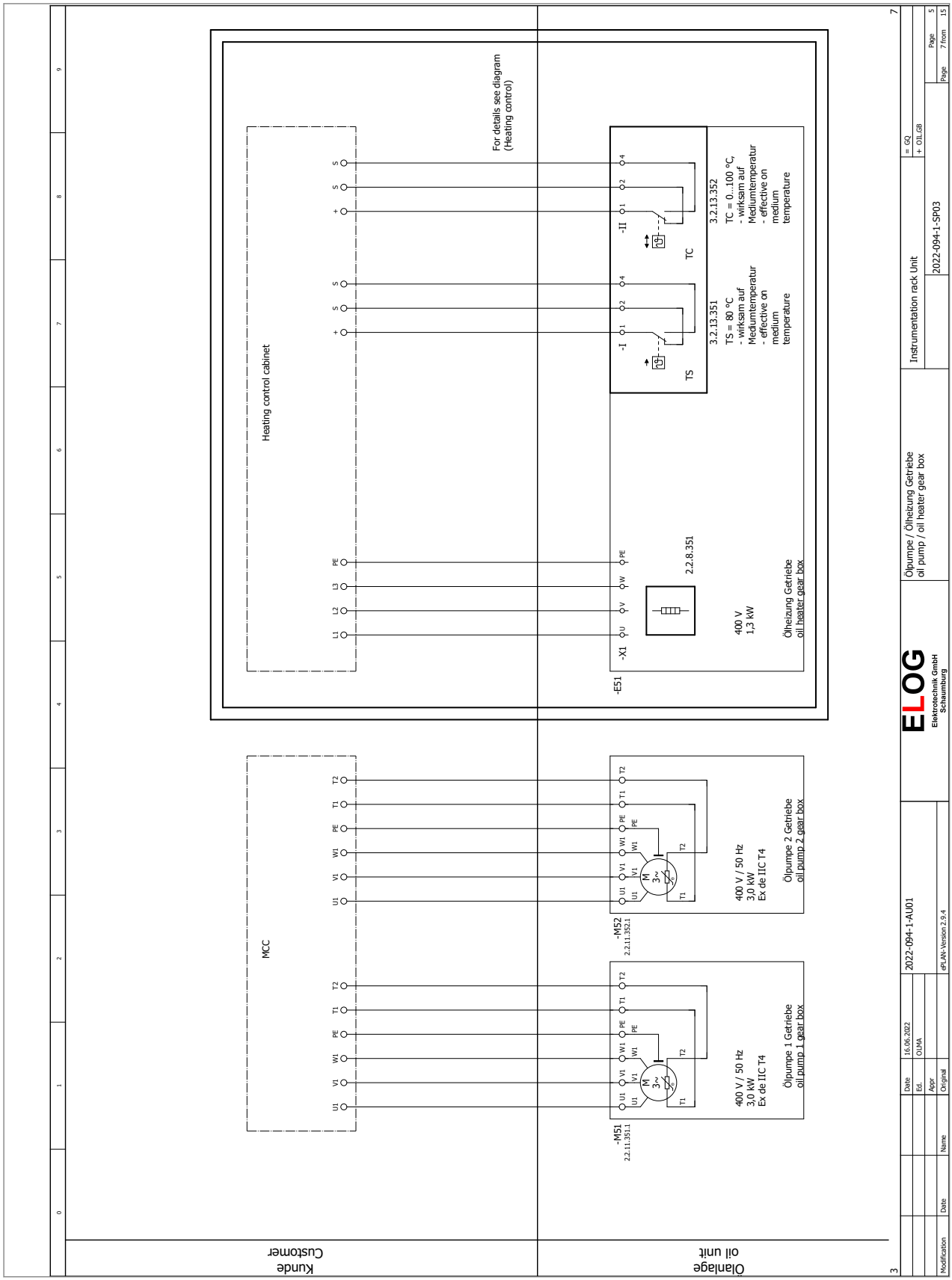
Heating control cabinet
For details see diagram
(Heating control)
L1
L2
L3
PE
S
S
+
-E51
-X1
U
V
W
PE
2.2.8.351
400 V
1,3 kW
Ölheizung Getriebe
oil heater gear box
-I
-II
TS
TC
3.2.13.351
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.352
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
MCC
U1
V1
W1
PE
T1
T2
-M51
2.2.11.351.1
-M52
2.2.11.352.1
400 V / 50 Hz
3,0 kW
Ex de IIC T4
Ölpumpe 1 Getriebe
oil pump 1 gear box
Ölpumpe 2 Getriebe
oil pump 2 gear box
Kunde
Customer
Olanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
Ölpumpe / Ölheizung Getriebe
oil pump / oil heater gear box
Instrumentation rack Unit
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= GQ
+ OIL.GB
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Original
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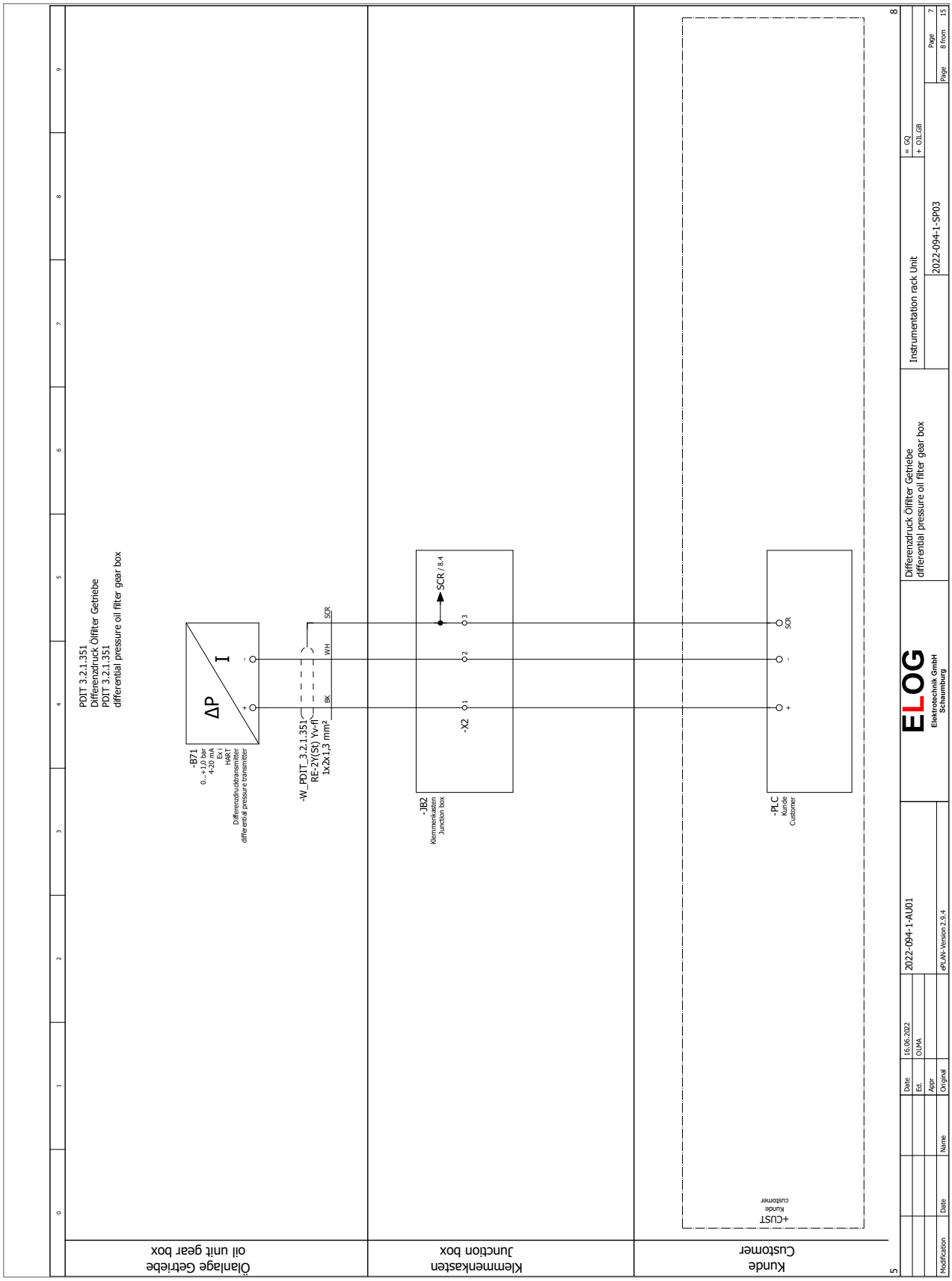
Modification
Date
Name


PDIT 3.2.1.351
Differenzdruck Ölfilter Getriebe
PDIT 3.2.1.351
differential pressure oil filter gear box
-B71
0...+10 bar
4-20 mA
Ex i
HART
Differenzdruckstransmitter
differential pressure transmitter
ΔP
I
-W_PDIT_3.2.1.351
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
-X2
SCR / 8.4
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Getriebe
differential pressure oil filter gear box
Instrumentation rack Unit
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= GQ
+ OIL.GB
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Date
16.06.2022
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OUMA
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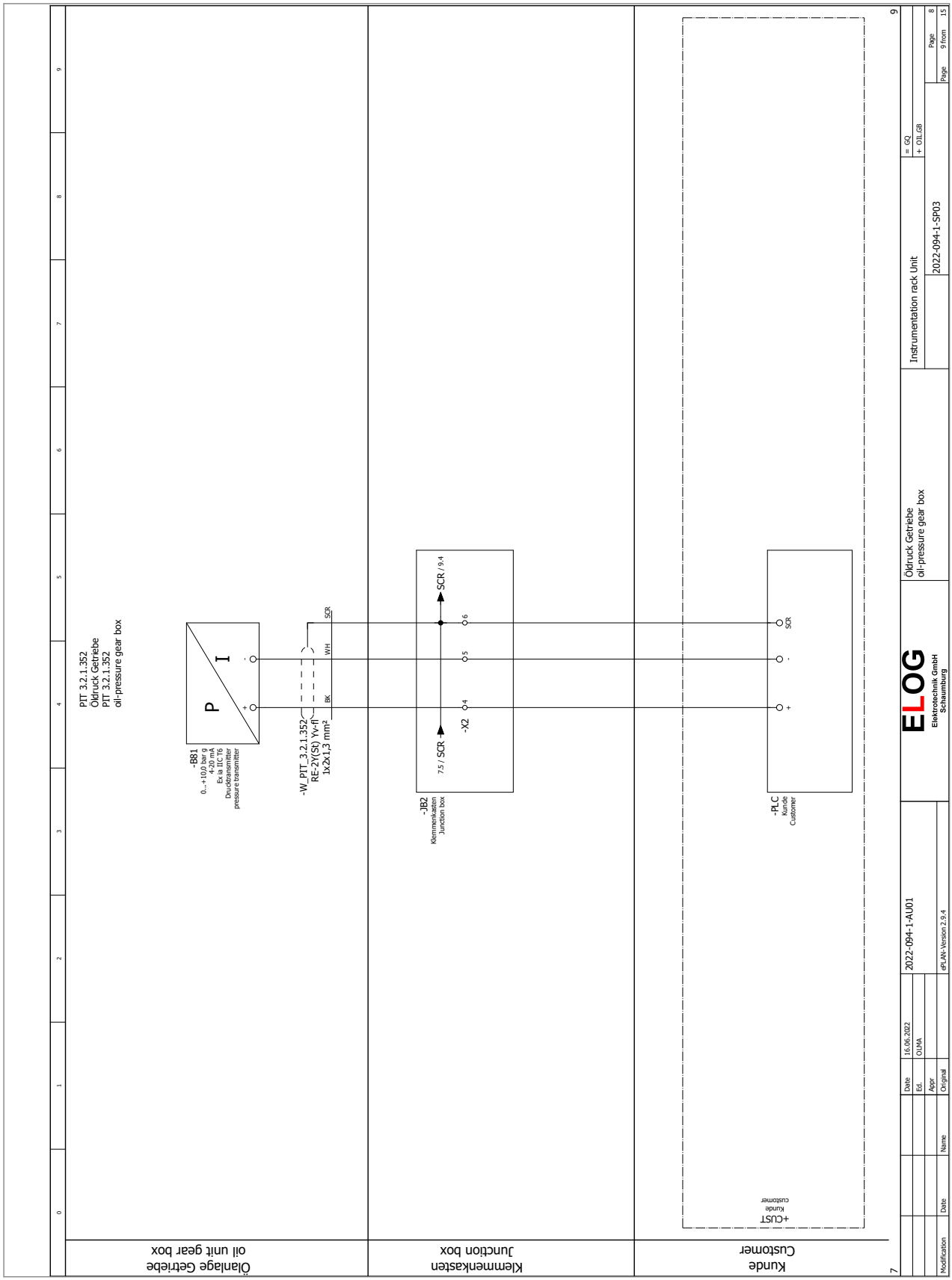
PIT 3.2.1.352
Öldruck Getriebe
PIT 3.2.1.352
oil-pressure gear box
-BB1
0...+10,0 bar g
4...20 mA
Ex ia IIC T6
Drucktransmitter
pressure transmitter
-W_PIT_3.2.1.352
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
SCR / 9.4
7.5 / SCR
-X2
-JB2
Klemmenkasten
Junction box
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Getriebe
oil-pressure gear box
Instrumentation rack Unit
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Date
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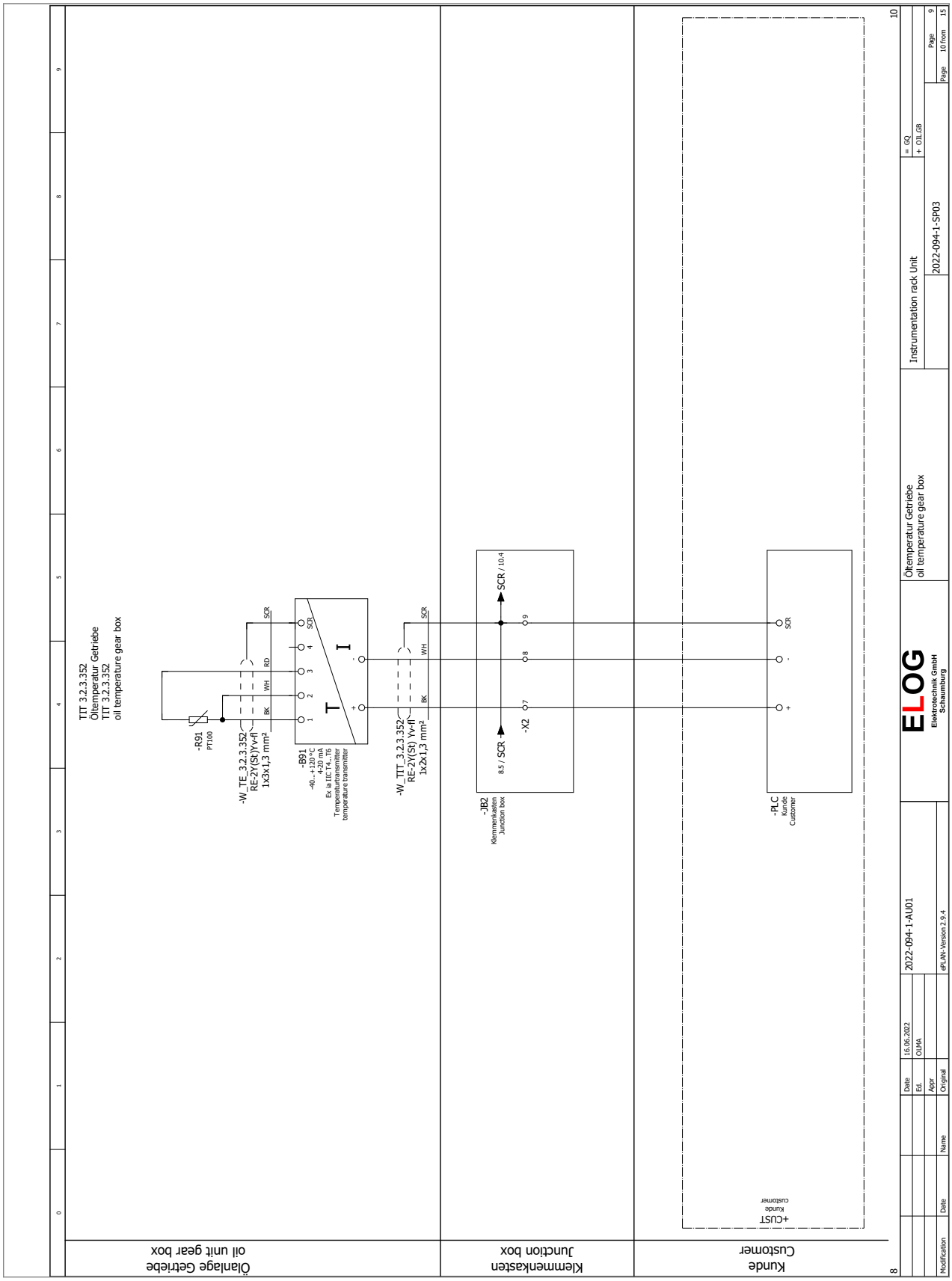
TIT 3.2.3.352
Öltemperatur Getriebe
TIT 3.2.3.352
oil temperature gear box
-R91
PT100
-W_TE_3.2.3.352
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+125°C
4-20 mA
Ex ia IIC T4...T6
Temperaturtransmitter
temperature transmitter
-W_TTT_3.2.3.352
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB2
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X2
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öltemperatur Getriebe
oil temperature gear box
Instrumentation rack Unit
2022-094-1-SP03
2022-094-1-AU01
16.06.2022
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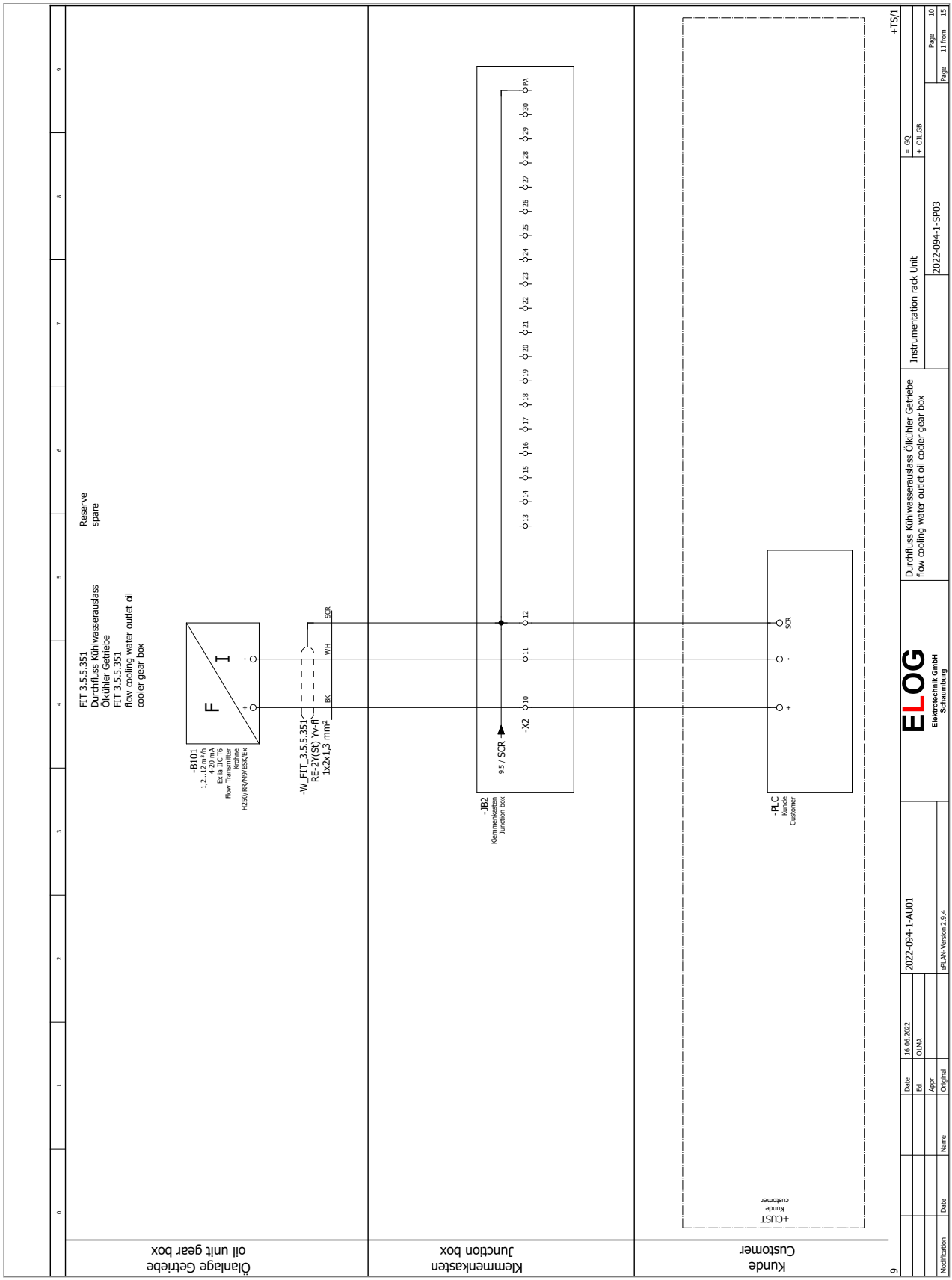
Reserve
spare
FIT 3.5.5.351
Durchfluss Kühlwasserauslass
Ölkühler Getriebe
FIT 3.5.5.351
flow cooling water outlet oil
cooler gear box
-B101
1,2...12 m³/h
4...20 mA
Ex ia IIC T6
Flow Transmitter
Krohne
H250/RR/M9/ESK/Ex
-W_FIT_3.5.5.351
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
9.5 / SCR
-X2
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
+TS/1
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler Getriebe
flow cooling water outlet oil cooler gear box
Instrumentation rack Unit
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+ OIL.GB
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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.GB-JB2-X2

function text	-W_FIT_3.5.5.351 RE-2Y(St) Yv-fl	-W_TIT_3.2.3.352 RE-2Y(St) Yv-fl	-W_PIT_3.2.1.352 RE-2Y(St) Yv-fl	-W_PDIT_3.2.1.351 RE-2Y(St) Yv-fl	Cable name / cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name / cable type	Page / column
PDIT 3.2.1.351 Differenzdruck Ölfilter Getriebe PDIT 3.2.1.351 differential pressure oil filter gear box				BK		-B71	+	1		+CUST-PLC	+		/7.4
=				WH		-B71	-	2		+CUST-PLC	-		/7.4
=				SCR				3		+CUST-PLC	SCR		/7.5
PIT 3.2.1.352 Öldruck Getriebe PIT 3.2.1.352 oil-pressure gear box			BK			-B81	+	4		+CUST-PLC	+		/8.4
=			WH			-B81	-	5		+CUST-PLC	-		/8.4
=			SCR					6		+CUST-PLC	SCR		/8.5
TIT 3.2.3.352 Öltemperatur Getriebe TIT 3.2.3.352 oil temperature gear box		BK				-B91	+	7		+CUST-PLC	+		/9.4
=		WH				-B91	-	8		+CUST-PLC	-		/9.4
=		SCR						9		+CUST-PLC	SCR		/9.5
FIT 3.5.5.351 Durchfluss Kühlwasserauslass Ölkühler Getriebe FIT 3.5.5.351 flow cooling water outlet oil cooler gear box	BK					-B101	+	10		+CUST-PLC	+		/10.4
=	WH					-B101	-	11		+CUST-PLC	-		/10.4
=	SCR							12		+CUST-PLC	SCR		/10.5
Reserve spare								13					/10.5
=								14					/10.6
=								15					/10.6
=								16					/10.6
=								17					/10.6
=								18					/10.6
=								19					/10.7
=								20					/10.7
=								21					/10.7
=								22					/10.7
=								23					/10.7
=								24					/10.8
=								25					/10.8

+OIL.GB/10 1.1

Modification	Date	Name		
			Date	16.06.2022
			Ed.	OLMA
			Appr	
			Original	

2022-094-1-AU01

ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Klemmenplan =GQ+OIL.GB-JB2-X2
Terminal diagram =GQ+OIL.GB-JB2-X2

Instrumentation rack Unit

= GQ
+ TS

2022-094-1-SP03

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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.GB-JB2-X2

function text	Target designation	Connection point	jumper	terminal	Connection point	Target designation	cable type	Cable name	Page / column
Reserve spare				26					/10.8
=				27					/10.8
=				28					/10.8
=				29					/10.8
=				30					/10.9
=				PA					/10.9

+BOM/1

Modification	Date	Name
	Date	16.06.2022
	Ed.	OLMA
	Appr	
	Original	

2022-094-1-AU01

ELOG
Elektrotechnik GmbH
Schaumburg

Klemmenplan =GQ+OIL.GB-JB2-X2
Terminal diagram =GQ+OIL.GB-JB2-X2

Instrumentation rack Unit

2022-094-1-SP03

= GQ
+ TS

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ePLAN-Version 2.9.4

Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.GB-JB2	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

+CAB/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71	Instrumentation rack Unit	= GQ
			Ed.	OLMA					+ BOM
			Appr					2022-094-1-SP03	Page 1
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AERZEN

Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.GB-W_FIT_3.5.5.351	+OIL.GB-JB2-X2	+OIL.GB-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.351 flow cooling water outlet oil cooler gear box
+OIL.GB-W_PDIT_3.2.1.351	+OIL.GB-JB2-X2	+OIL.GB-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.351 differential pressure oil filter gear box
+OIL.GB-W_PIT_3.2.1.352	+OIL.GB-JB2-X2	+OIL.GB-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.352 oil-pressure gear box
+OIL.GB-W_TE_3.2.3.352	+OIL.GB-B91	+OIL.GB-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.352 oil temperature gear box
+OIL.GB-W_TIT_3.2.3.352	+OIL.GB-JB2-X2	+OIL.GB-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.351 - =GQ+OIL.GB-W_TIT_3.2.3.352	Instrumentation rack Unit	= GQ
			Ed.	OLMA			Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.351 - =GQ+OIL.GB-W_TIT_3.2.3.352		+ CAB
			Appr					2022-094-1-SP03	Page 1
Modification	Date	Name	Original		ePLAN-Version 2.9.4				Page 15 from 15

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

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Elektrotechnik GmbH
Schaumburg

ELOG Elektrotechnik GmbH
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Homepage http://www.elog-gmbh.de

Auftraggeber customer

AERZEN

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31855 Aerzen / Germany
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Fax +49 (0)5154 / 81-9191
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homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP04	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 4 GQ gear box Unit 4

Erstellt am
Created on 16.05.2022

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200019|EAV2101709
H. Stöber

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Anzahl der Seiten
Number of pages 15

1.1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Instrumentation rack Unit
			Ed.	OLMA				=
			Appr					+
Modification	Date	Name	Original		ePLAN-Version 2.9.4			2022-094-1-SP04

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F26_ELOG_Info

Typenschild
name plate

ELOG
Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH

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E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP04
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

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/1	1	Deckblatt Cover sheet		16.06.2022	OlMa	X
/1.1	2	Allgemeine Informationen general information		16.06.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
=GQ+OIL.GB/1	4	Deckblatt Cover sheet		16.06.2022	OlMa	X
=GQ+OIL.GB/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.GB/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.GB/5	7	Ölpumpe / Ölheizung Getriebe oil pump / oil heater gear box		16.06.2022	OlMa	
=GQ+OIL.GB/7	8	Differenzdruck Ölfilter Getriebe differential pressure oil filter gear box		16.06.2022	OlMa	
=GQ+OIL.GB/8	9	Öldruck Getriebe oil-pressure gear box		16.06.2022	OlMa	
=GQ+OIL.GB/9	10	Öltemperatur Getriebe oil temperature gear box		16.06.2022	OlMa	
=GQ+OIL.GB/10	11	Durchfluss Kühlwasserauslass Ölkühler flow cooling water outlet oil cooler		16.06.2022	OlMa	
=GQ+TS/1	12	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
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=GQ+BOM/1	14	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	15	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.451 - =GQ+OIL.GB-W_TIT_3.2.3.452 Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.451 - =GQ+OIL.GB-W_TIT_3.2.3.452		16.06.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

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Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP04	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 4

Klemmenkasten Ölanlage 100l Getriebe Einheit 4
Junction box oil unit 100l gear box Unit 4

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP04	= GQ
			Ed.	OlMa	Instrumentengerüst Einheit Instrumentation rack Unit				+ OIL.GB
			Appr					GQ gear box Unit 4	Page 1
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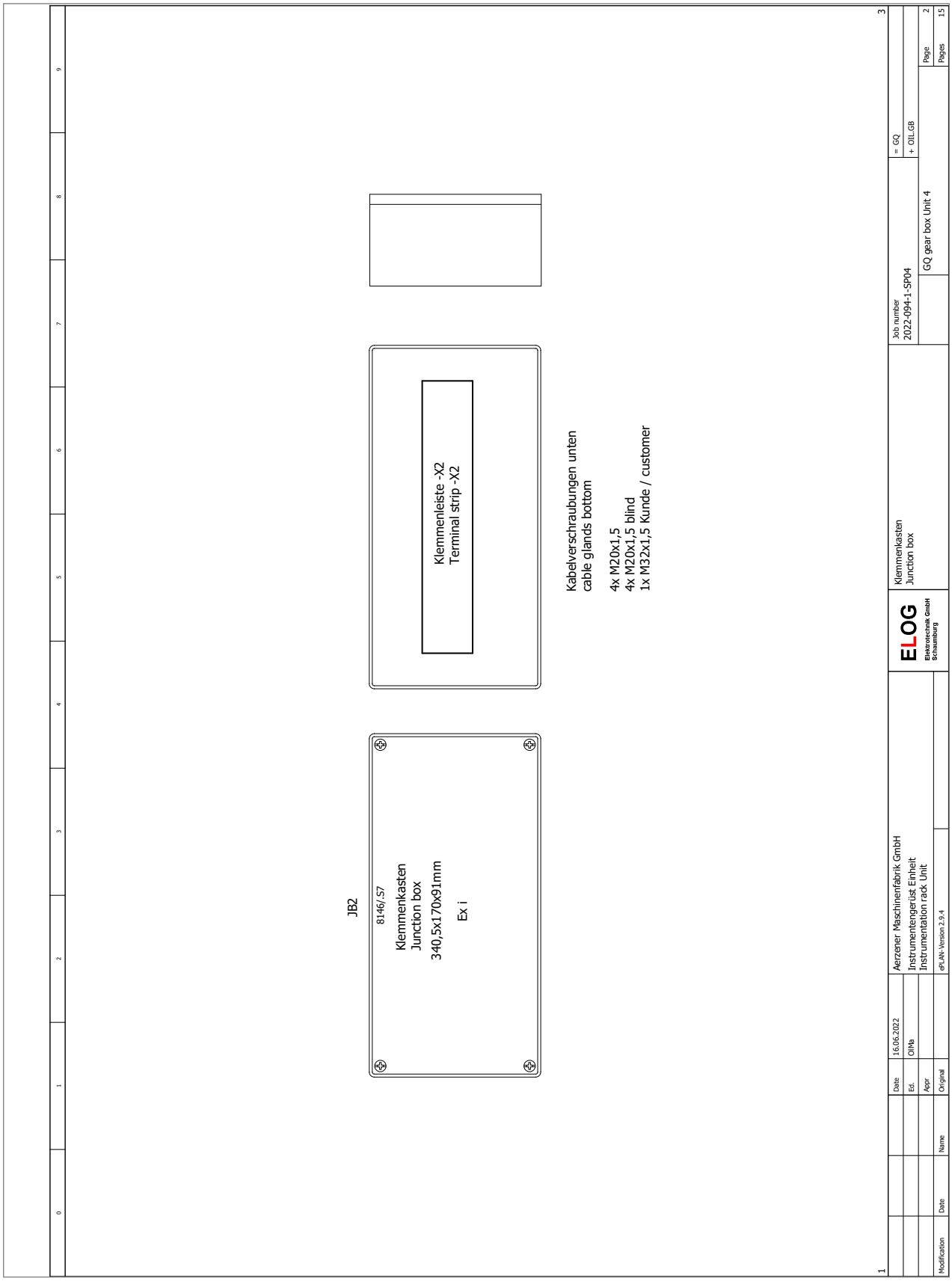
JB2
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X2
Terminal strip -X2
Kabelverschraubungen unten
cable glands bottom
4x M20x1,5
4x M20x1,5 blind
1x M32x1,5 Kunde / customer
Date
16.06.2022
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OlMa
Appr
Original
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schaumburg
Klemmenkasten
Junction box
Job number
2022-094-1-SP04
= GQ
+ OILGB
GQ gear box Unit 4
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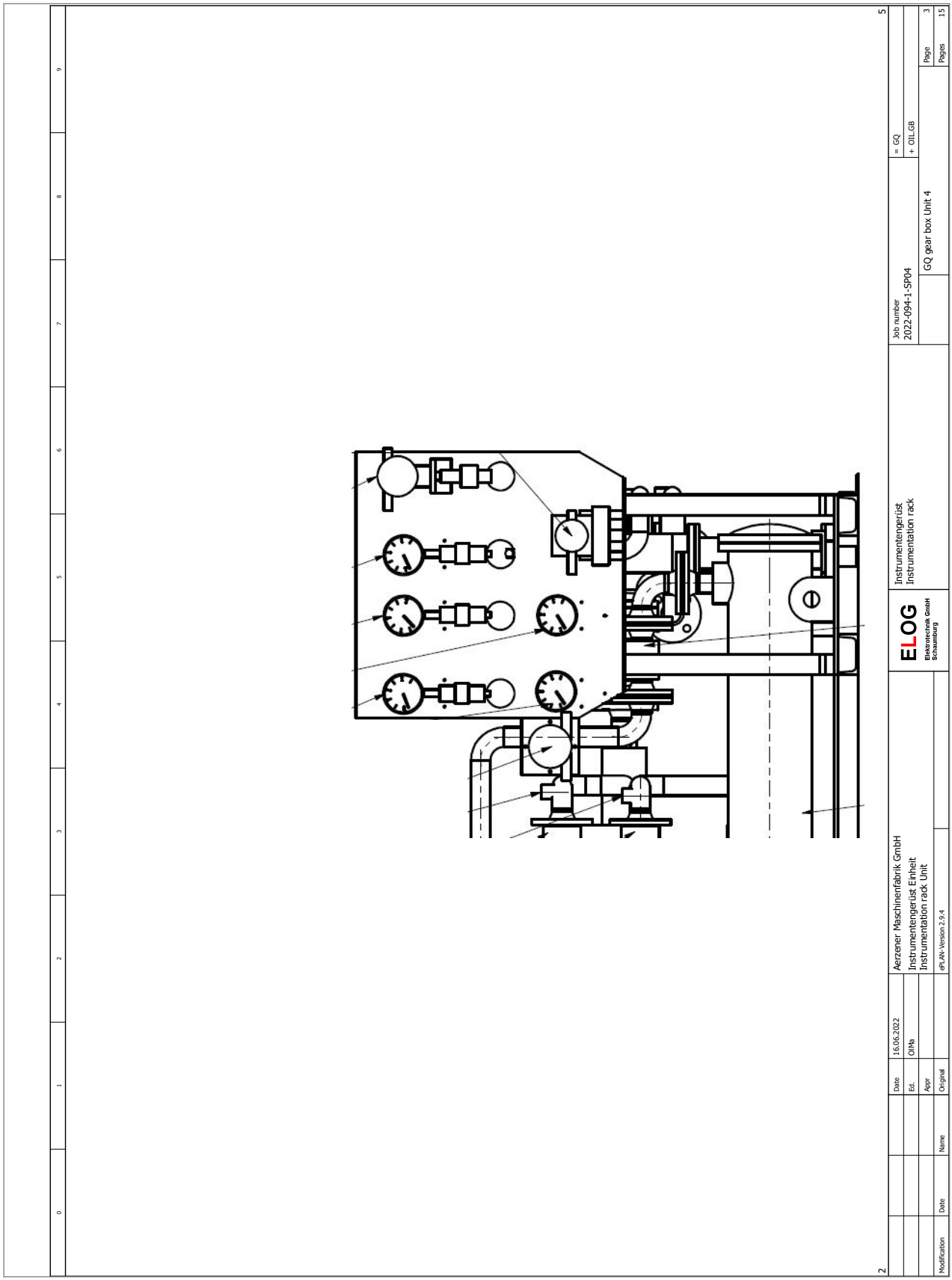
Instrumentengerüst
Instrumentation rack
ELOG
Elektrotechnik GmbH
Schaumburg
Job number
2022-094-1-SP04
= GQ
+ OIL.GB
GQ gear box Unit 4
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Instrumentengerüst Einheit
Instrumentation rack Unit
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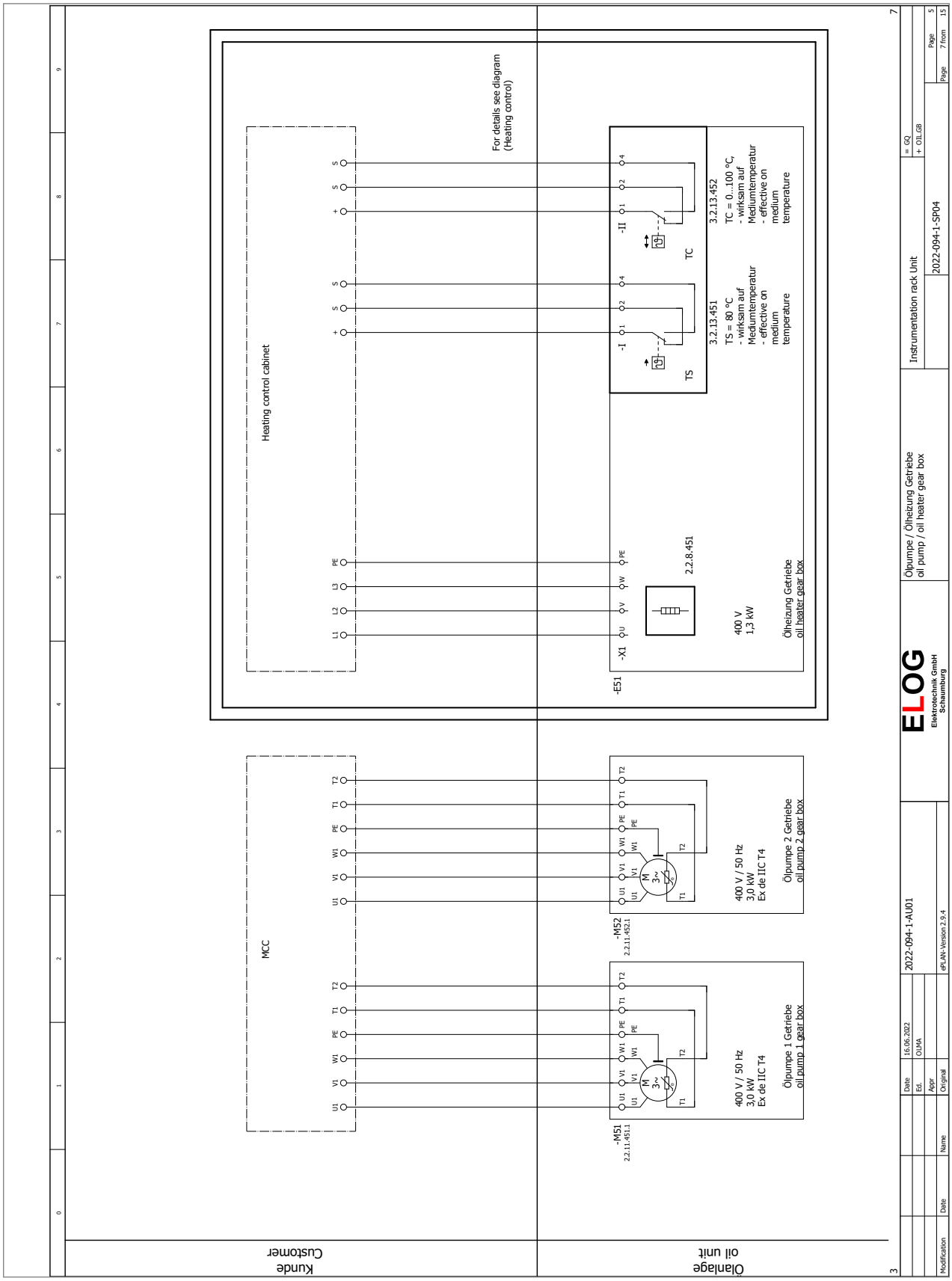
Heating control cabinet
For details see diagram
(Heating control)
-E51
-X1
L1
L2
L3
PE
U
V
W
PE
2.2.8.451
400 V
1,3 kW
Öheizung Getriebe
oil heater gear box
-I
-II
TS
TC
3.2.13.451
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.452
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
MCC
-M51
2.2.11.451.1
-M52
2.2.11.452.1
400 V / 50 Hz
3,0 kW
Ex de IIC T4
Ölpumpe 1 Getriebe
oil pump 1 gear box
Ölpumpe 2 Getriebe
oil pump 2 gear box
Kunde
Customer
Ölanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
2022-094-1-AU01
Ölpumpe / Öleizung Getriebe
oil pump / oil heater gear box
Instrumentation rack Unit
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+ OIL.GB
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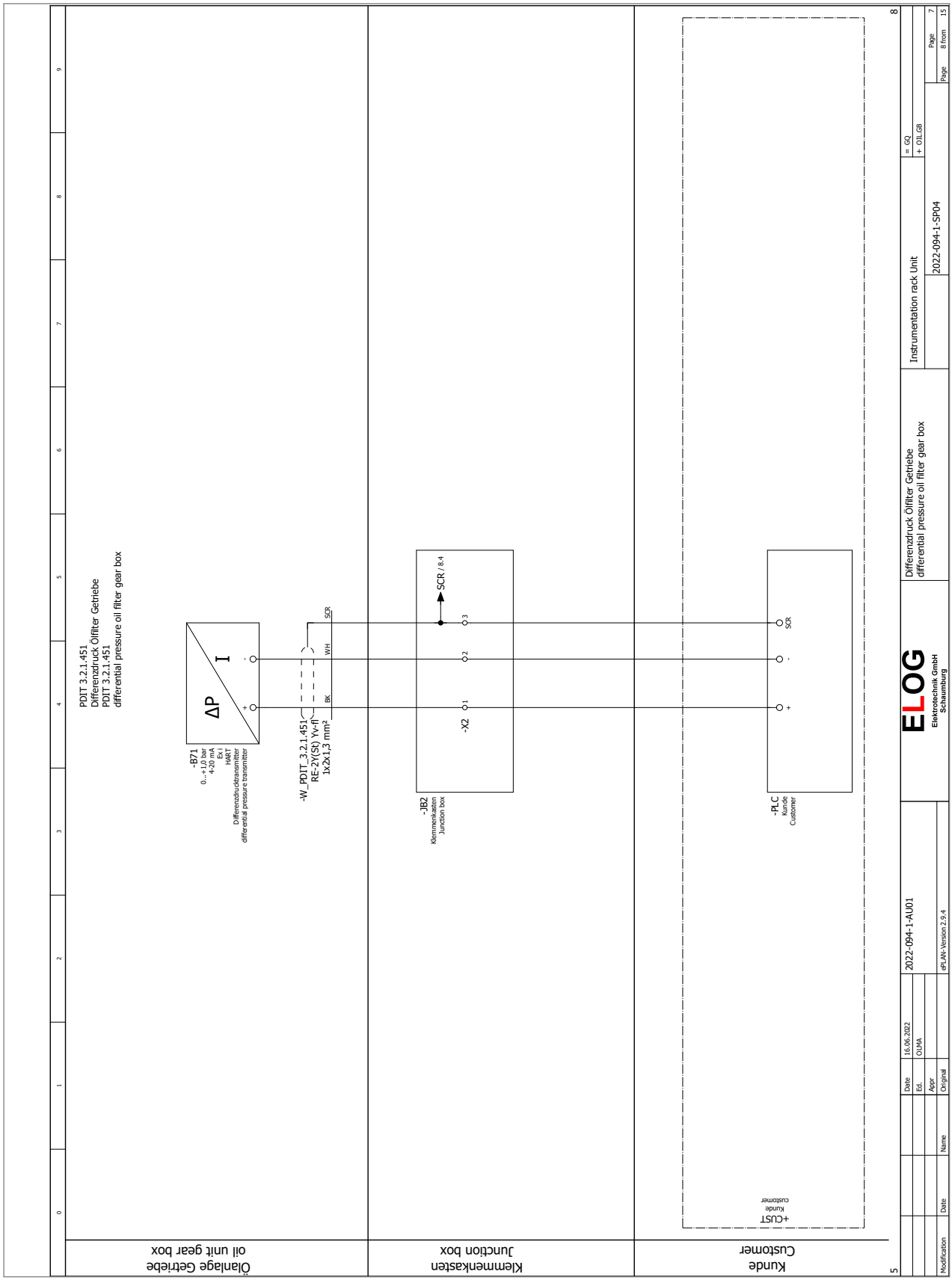
16.06.2022
eFLAN-Version 2.9.4


PDIT 3.2.1.451
Differenzdruck Ölfilter Getriebe
PDIT 3.2.1.451
differential pressure oil filter gear box
-B71
0...+1,0 bar
4-20 mA
Ex
HART
Differenzdrucktransmitter
differential pressure transmitter
ΔP
I
-W_PDIT_3.2.1.451
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
-X2
SCR / 8.4
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Getriebe
differential pressure oil filter gear box
Instrumentation rack Unit
2022-094-1-SP04
= GQ
+ OIL.GB
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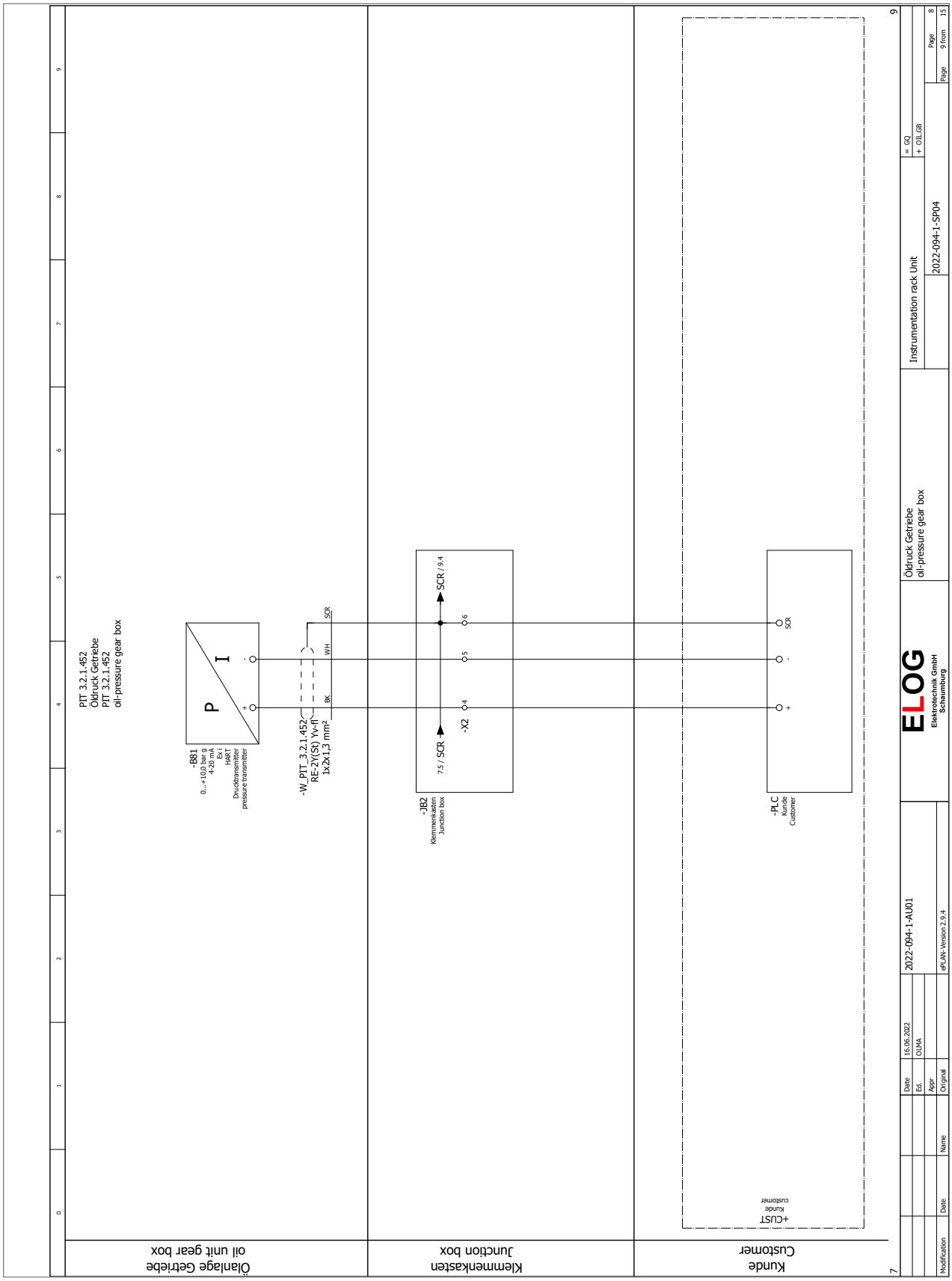
PIT 3.2.1.452
Öldruck Getriebe
PIT 3.2.1.452
oil-pressure gear box
-B81
0...+10,0 bar g
4-20 mA
Ex i
HART
Drucktransmitter
pressure transmitter
-W_PIT_3.2.1.452
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
7.5 / SCR
SCR / 9.4
-X2
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Getriebe
oil-pressure gear box
Instrumentation rack Unit
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= GQ
+ OIL.GB
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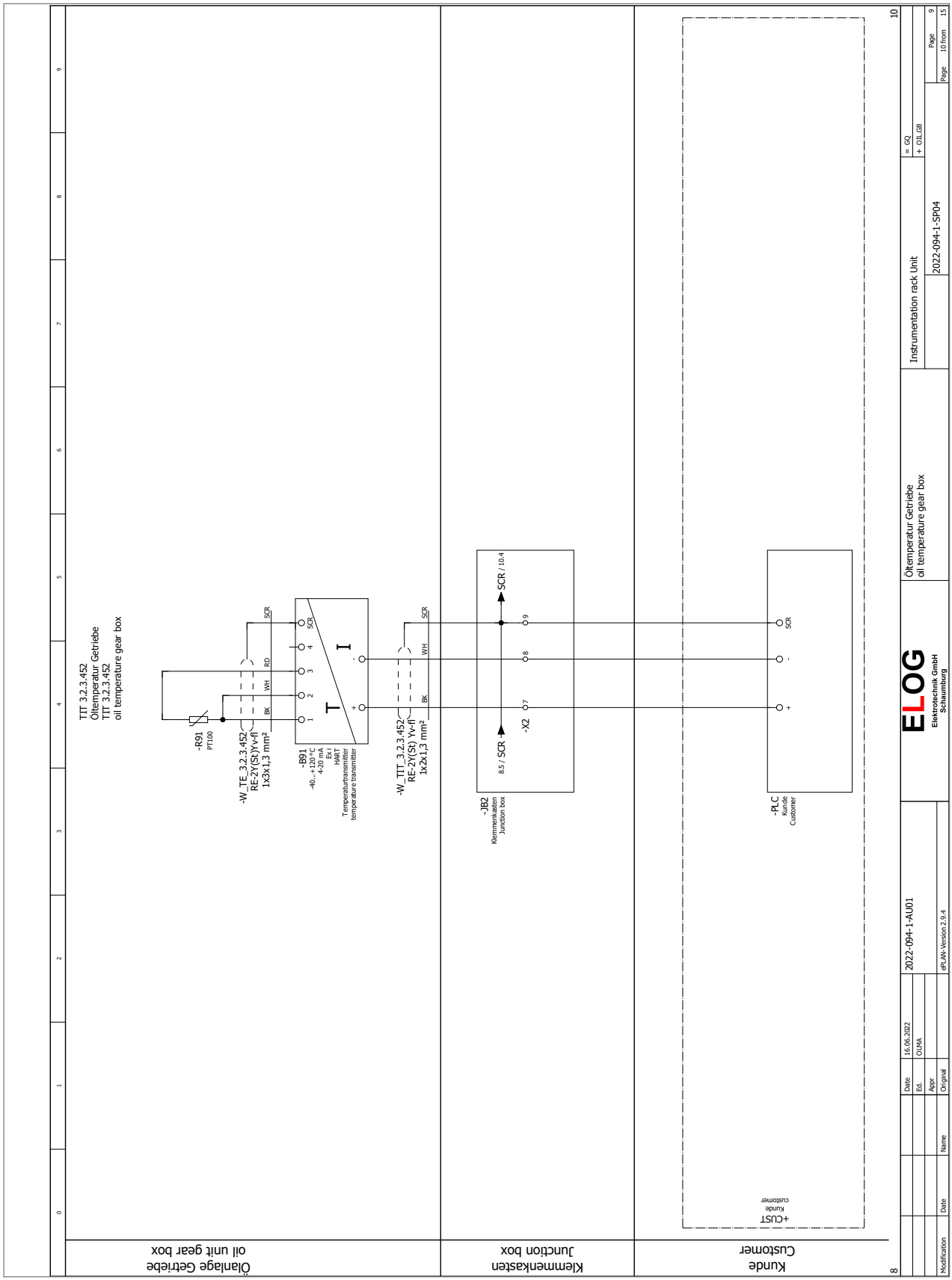
TIT 32.3.452
Öltemperatur Getriebe
TIT 32.3.452
oil temperature gear box
-R91
PT100
-W_TE_32.3.452
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+120 °C
4-20 mA
Ex i
HART
Temperaturtransmitter
temperature transmitter
-W_TIT_3.2.3.452
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB2
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X2
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öltemperatur Getriebe
oil temperature gear box
Instrumentation rack Unit
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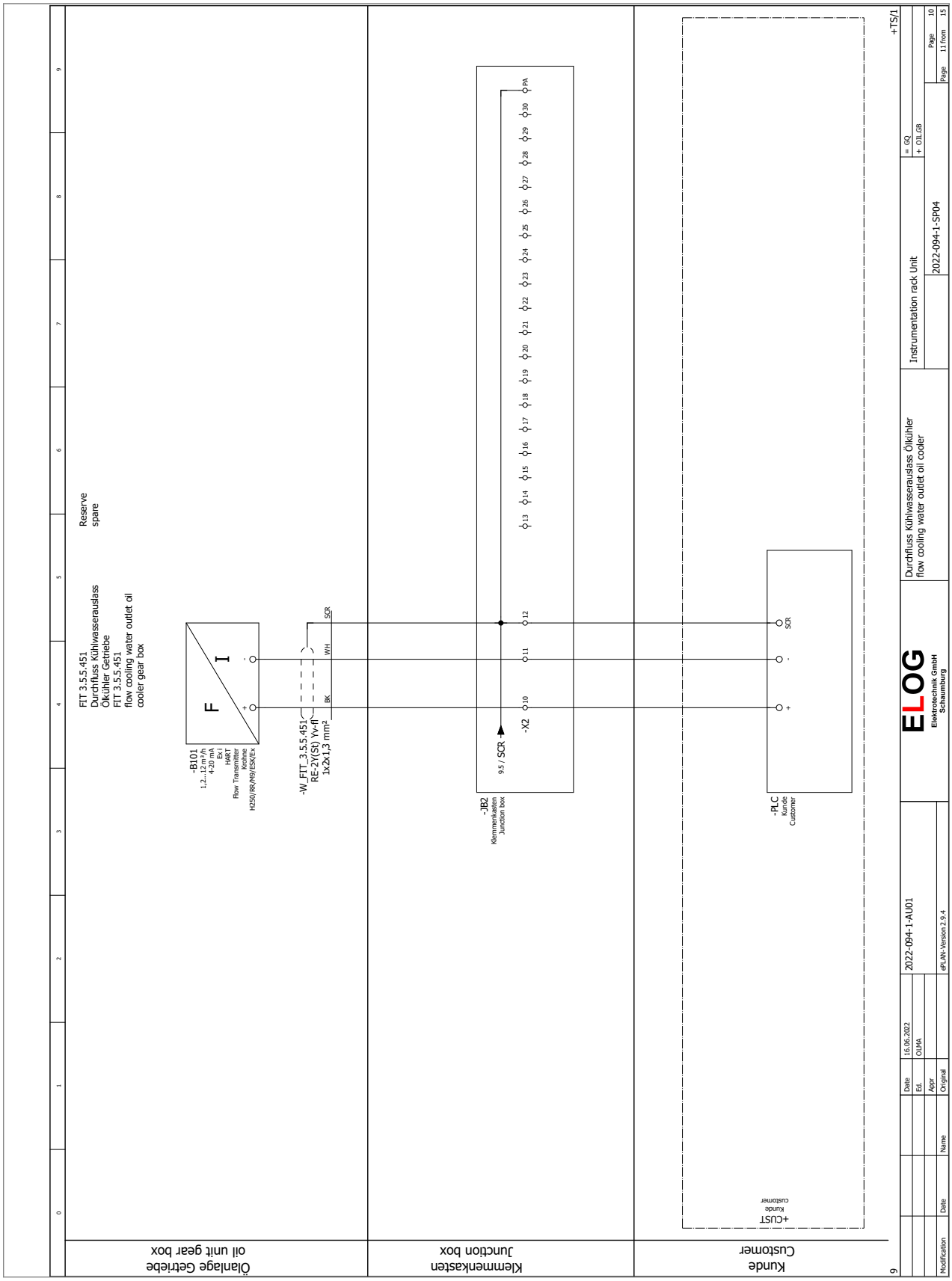
Reserve
spare
FIT 3.5.5.451
Durchfluss Kühlwasserauslass
Ölkühler Getriebe
FIT 3.5.5.451
flow cooling water outlet oil
cooler gear box
-B101
1,2...12 m³/h
4-20 mA
Ex i
HART
Flow Transmitter
Krohne
H250/R0/M9/ESK/Ex
-W_FIT_3.5.5.451
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
9.5 / SCR
-X2
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
+TS/1
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler
flow cooling water outlet oil cooler
Instrumentation rack Unit
2022-094-1-SP04
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+ OIL.GB
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Original
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Date
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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.GB-JB2-X2

function text	-W_FIT_3.5.5.451	-W_TIT_3.2.3.452	-W_PIT_3.2.1.452	-W_PDIT_3.2.1.451	Cable name	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	Page / column
	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	cable type							cable type	
PDIT 3.2.1.451 Differenzdruck Ölfilter Getriebe PDIT 3.2.1.451 differential pressure oil filter gear box				BK		-B71	+	1		+CUST-PLC	+		/7.4
=				WH		-B71	-	2		+CUST-PLC	-		/7.4
=				SCR				3		+CUST-PLC	SCR		/7.5
PIT 3.2.1.452 Öldruck Getriebe PIT 3.2.1.452 oil-pressure gear box			BK			-B81	+	4		+CUST-PLC	+		/8.4
=			WH			-B81	-	5		+CUST-PLC	-		/8.4
=			SCR					6		+CUST-PLC	SCR		/8.5
TIT 3.2.3.452 Öltemperatur Getriebe TIT 3.2.3.452 oil temperature gear box		BK				-B91	+	7		+CUST-PLC	+		/9.4
=		WH				-B91	-	8		+CUST-PLC	-		/9.4
=		SCR						9		+CUST-PLC	SCR		/9.5
FIT 3.5.5.451 Durchfluss Kühlwasserauslass Ölkühler Getriebe FIT 3.5.5.451 flow cooling water outlet oil cooler gear box	BK					-B101	+	10		+CUST-PLC	+		/10.4
=	WH					-B101	-	11		+CUST-PLC	-		/10.4
=	SCR							12		+CUST-PLC	SCR		/10.5
Reserve spare								13					/10.5
=								14					/10.6
=								15					/10.6
=								16					/10.6
=								17					/10.6
=								18					/10.6
=								19					/10.7
=								20					/10.7
=								21					/10.7
=								22					/10.7
=								23					/10.7
=								24					/10.8
=								25					/10.8

+OIL.GB/10 1.1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2	Instrumentation rack Unit	= GQ + TS
			Ed.	OLMA				2022-094-1-SP04	Page 1
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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.GB-JB2-X2

function text	Target designation	Connection point	jumper	terminal	Connection point	Target designation	Page / column
Reserve spare				26			/10.8
=				27			/10.8
=				28			/10.8
=				29			/10.8
=				30			/10.9
=				PA			/10.9

Cable name	cable type

Cable name	cable type

+BOM/1

ELOG Elektrotechnik GmbH Schaumburg

Klemmenplan =GQ+OIL.GB-JB2-X2
Terminal diagram =GQ+OIL.GB-JB2-X2

Instrumentation rack Unit

2022-094-1-SP04

= GQ
+ TS

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				OLMA	
			Appr		
			Original		

ePLAN-Version 2.9.4

AERZEN

Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.GB-JB2	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.GB-W_FIT_3.5.5.451	+OIL.GB-JB2-X2	+OIL.GB-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.451 flow cooling water outlet oil cooler gear box
+OIL.GB-W_PDIT_3.2.1.451	+OIL.GB-JB2-X2	+OIL.GB-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.451 differential pressure oil filter gear box
+OIL.GB-W_PIT_3.2.1.452	+OIL.GB-JB2-X2	+OIL.GB-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.452 oil-pressure gear box
+OIL.GB-W_TE_3.2.3.452	+OIL.GB-B91	+OIL.GB-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.452 oil temperature gear box
+OIL.GB-W_TIT_3.2.3.452	+OIL.GB-JB2-X2	+OIL.GB-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.451 - =GQ+OIL.GB-W_TIT_3.2.3.452	Instrumentation rack Unit	= GQ
			Ed.	OLMA			Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.451 - =GQ+OIL.GB-W_TIT_3.2.3.452		+ CAB
			Appr					2022-094-1-SP04	Page 1
Modification	Date	Name	Original		ePLAN-Version 2.9.4				Page 15 from 15

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

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AERZEN

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email info@aerzen.com
homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP05	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 5 GQ gear box Unit 5

Erstellt am
Created on 16.05.2022

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200020|EAV2101709
H. Stöber

Anzahl der Seiten
Number of pages 15

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			Ed.	OLMA	
			Appr		
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ELOG Elektrotechnik GmbH Schaumburg

Deckblatt
Cover sheet

Instrumentation rack Unit

2022-094-1-SP05

=
+

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F26_ELOG_Info

Typenschild
name plate

ELOG
Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH

Nordbrucher Straße 6
31559 Hohnhorst / Germany
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Fax +49 (0) 5723 / 79807-10
E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP05
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

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Column X: An automatically generated page was edited

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Page name	Page x of 15	Page description	supplementary page field	Date	Edited by	X
/1	1	Deckblatt Cover sheet		16.06.2022	OlMa	X
/1.1	2	Allgemeine Informationen general information		16.06.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
=GQ+OIL.GB/1	4	Deckblatt Cover sheet		16.06.2022	OlMa	X
=GQ+OIL.GB/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.GB/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.GB/5	7	Ölpumpe / Ölheizung Getriebe oil pump / oil heater gear box		16.06.2022	OlMa	
=GQ+OIL.GB/7	8	Differenzdruck Ölfilter Getriebe differential pressure oil filter gear box		16.06.2022	OlMa	
=GQ+OIL.GB/8	9	Öldruck Getriebe oil-pressure gear box		16.06.2022	OlMa	
=GQ+OIL.GB/9	10	Öltemperatur Getriebe oil temperature gear box		16.06.2022	OlMa	
=GQ+OIL.GB/10	11	Durchfluss Kühlwasserauslass Ölkühler flow cooling water outlet oil cooler		16.06.2022	OlMa	
=GQ+TS/1	12	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
=GQ+TS/1.1	13	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
=GQ+BOM/1	14	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	15	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.551 - =GQ+OIL.GB-W_TIT_3.2.3.552 Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.551 - =GQ+OIL.GB-W_TIT_3.2.3.552		16.06.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

Hersteller Manufacturer

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Elektrotechnik GmbH
Schaumburg

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Auftraggeber customer

AERZEN

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen / Germany
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Fax +49 (0)5154 / 81-9191

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP05	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 5

Klemmenkasten Ölanlage 100l Getriebe Einheit 5
Junction box oil unit 100l gear box Unit 5

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH Instrumentengerüst Einheit Instrumentation rack Unit	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP05	= GQ + OIL.GB
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			Appr					GQ gear box Unit 5	Page 1
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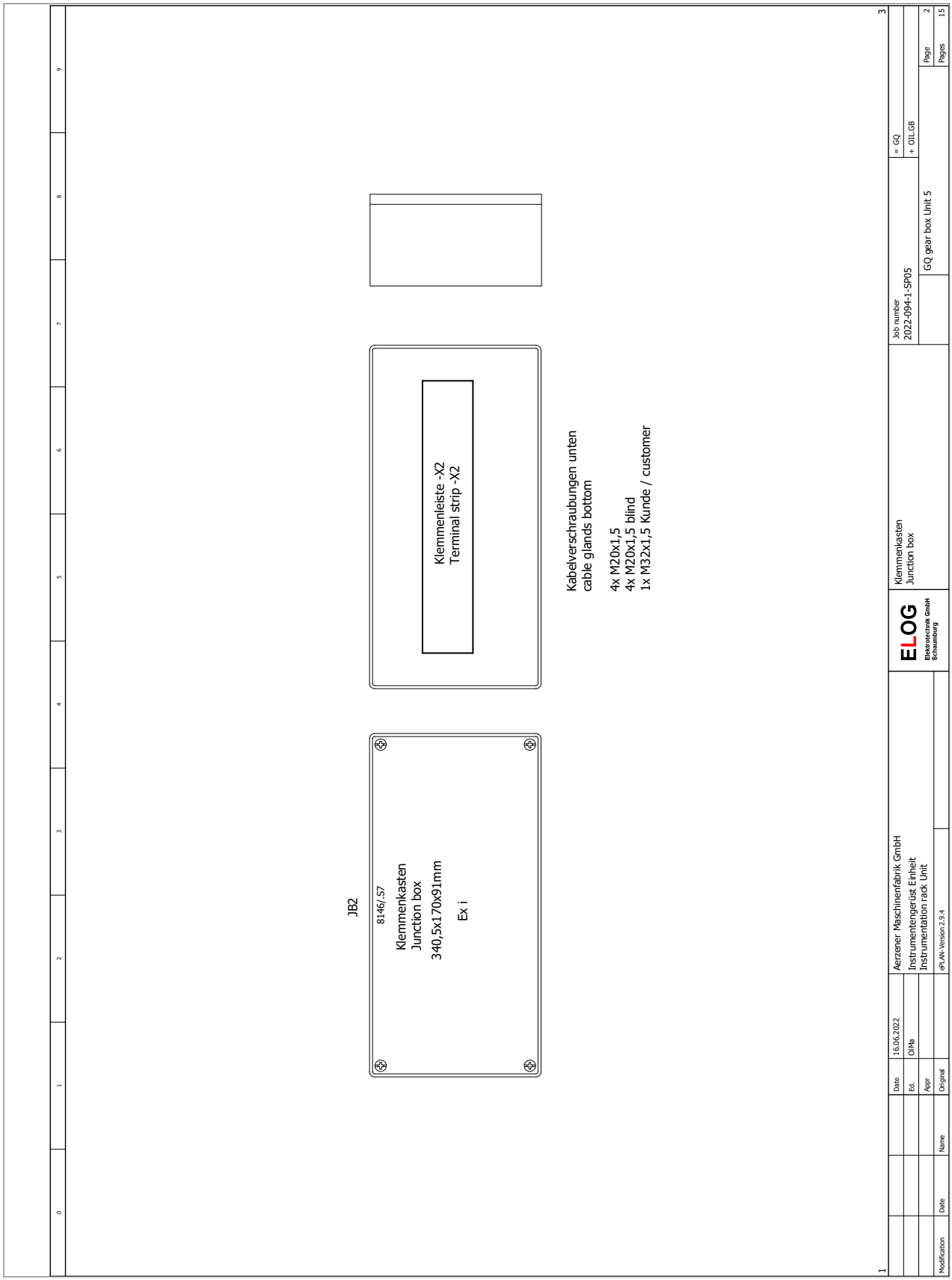
JB2
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X2
Terminal strip -X2
Kabelverschraubungen unten
cable glands bottom
4x M20x1,5
4x M20x1,5 blind
1x M32x1,5 Kunde / customer
Date 16.06.2022
Ed. OlMa
Appr
Original
Name
Date
Modification
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schlaumburg
Klemmenkasten
Junction box
Job number
2022-094-1-SP05
GQ gear box Unit 5
= GQ
+ OIL.GB
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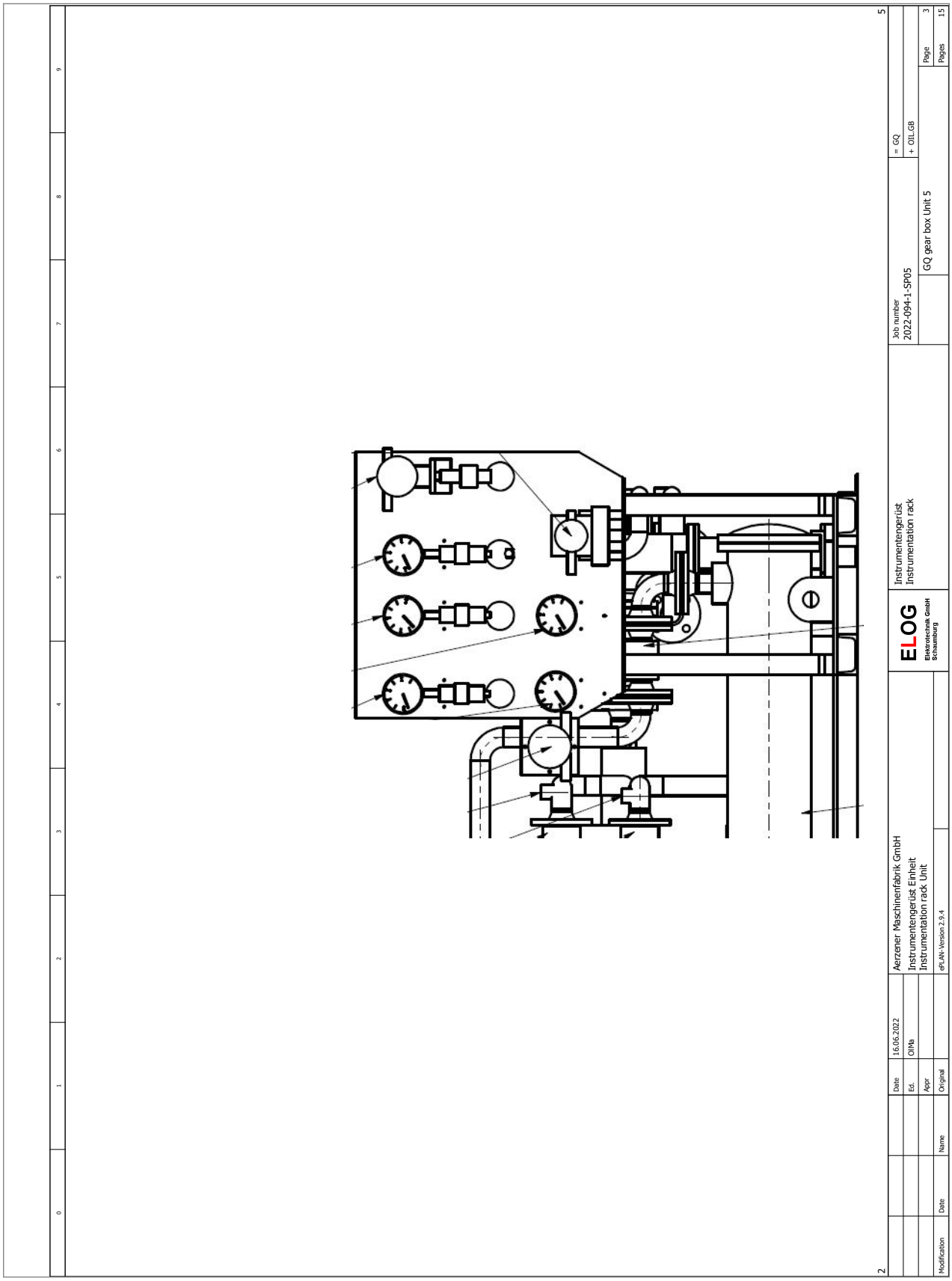
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
16.06.2022
OlPla
Date
Ed.
Appr
Original
Name
Date
Modification
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schaumburg
Instrumentengerüst
Instrumentation rack
Job number
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GQ gear box Unit 5
= GQ
+ OILGB
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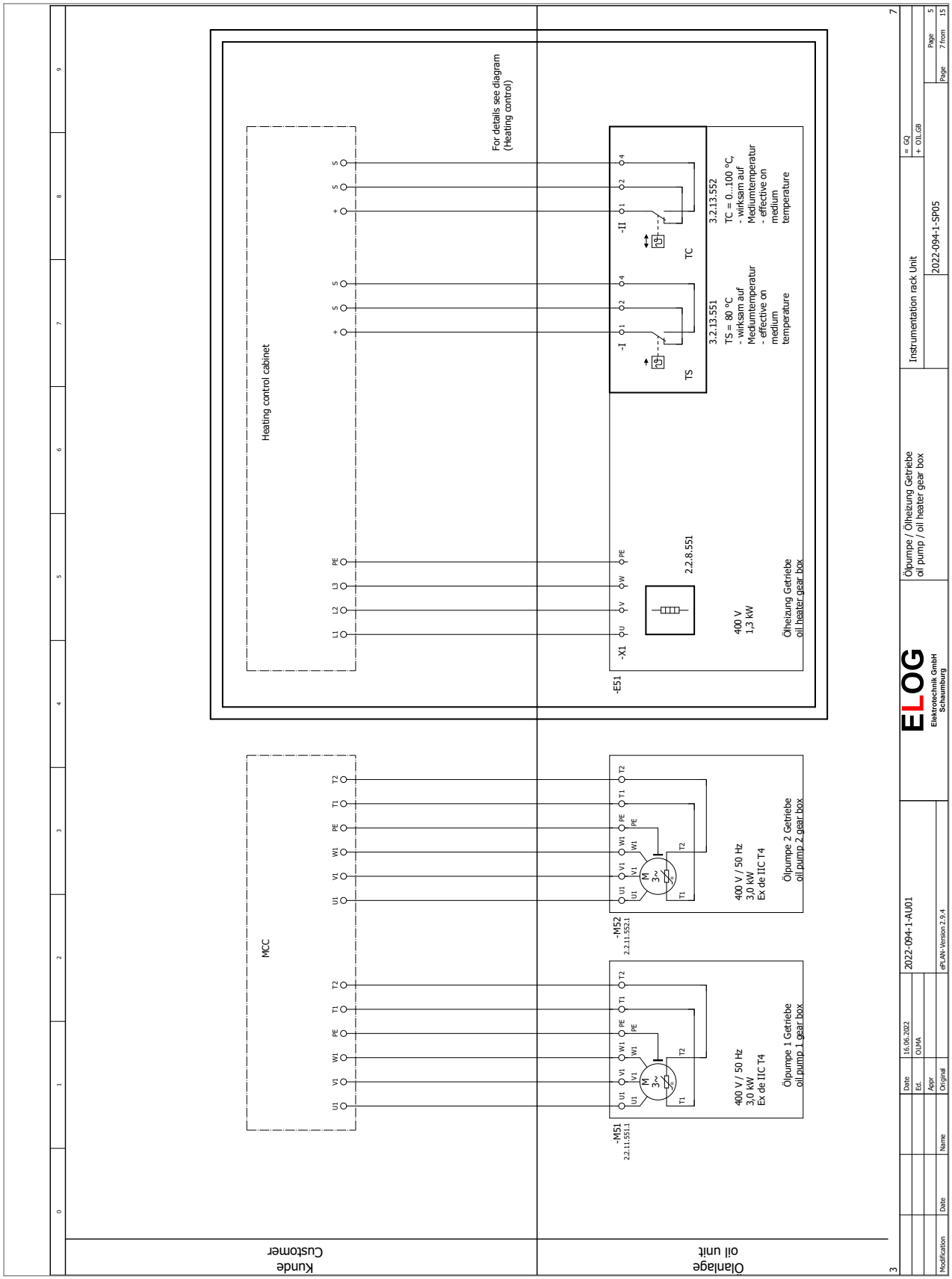
Heating control cabinet
For details see diagram
(Heating control)
L1
L2
L3
PE
S
S
+
-E51
-X1
U
V
W
PE
2.2.8.551
400 V
1,3 kW
Ölheizung Getriebe
oil heater gear box
-I
-II
TS
TC
3.2.13.551
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.552
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
MCC
U1
V1
W1
PE
T1
T2
-M51
2.2.11.551.1
-M52
2.2.11.552.1
400 V / 50 Hz
3,0 kW
Ex de IIC T4
Ölpumpe 1 Getriebe
oil pump 1 gear box
Ölpumpe 2 Getriebe
oil pump 2 gear box
Kunde
Customer
Olanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
Ölpumpe / Ölheizung Getriebe
oil pump / oil heater gear box
Instrumentation rack Unit
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+ OIL.GB
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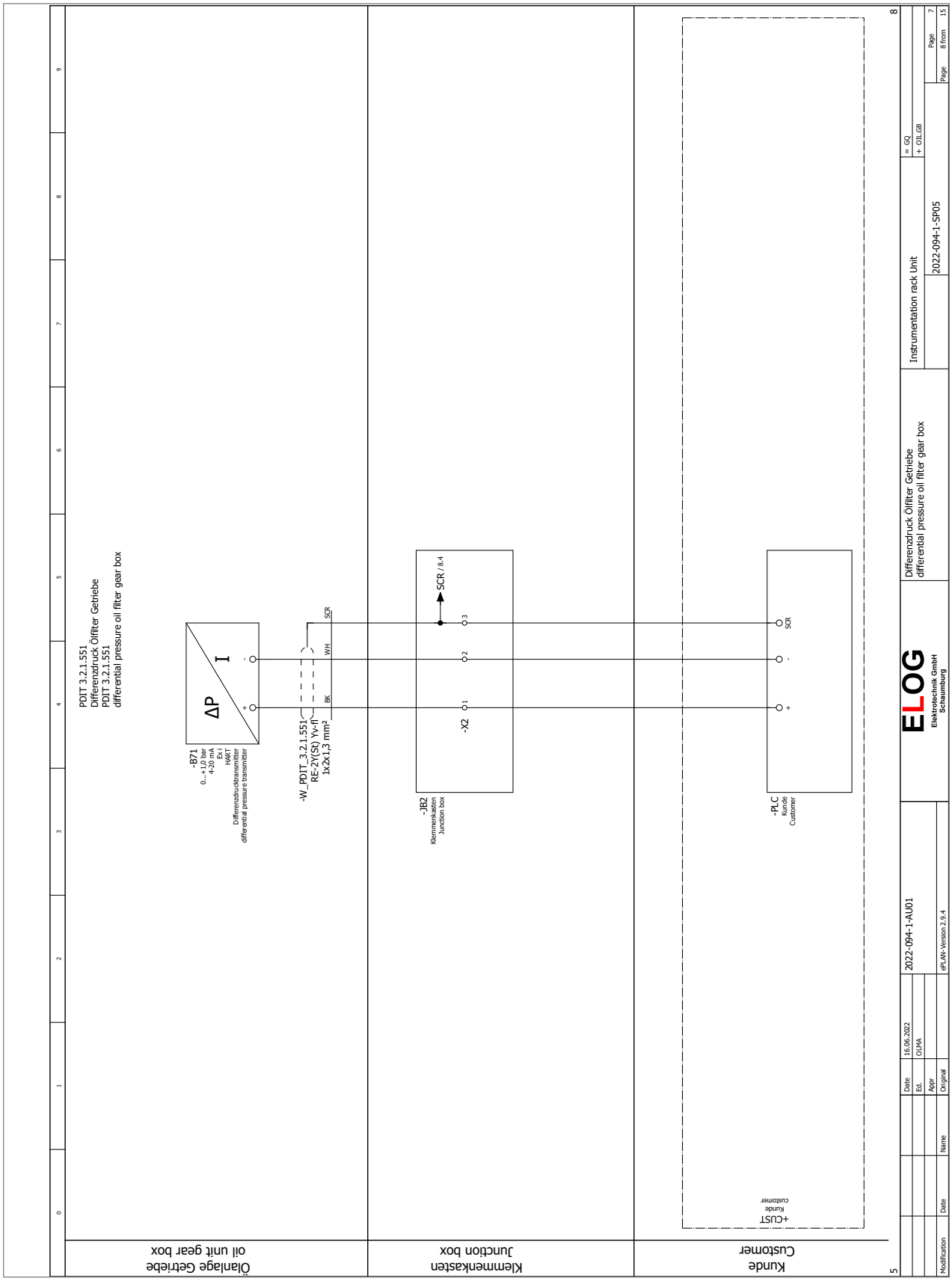
Date
Name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Differenzdruck Ölfilter Getriebe
PDIT 3.2.1.551
differential pressure oil filter gear box
-B71
0...+10 bar
4-20 mA
Ex i
HART
Differenzdruckstransmitter
differential pressure transmitter
ΔP
I
-W_PDIT_3.2.1.551
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
-X2
SCR / 8.4
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
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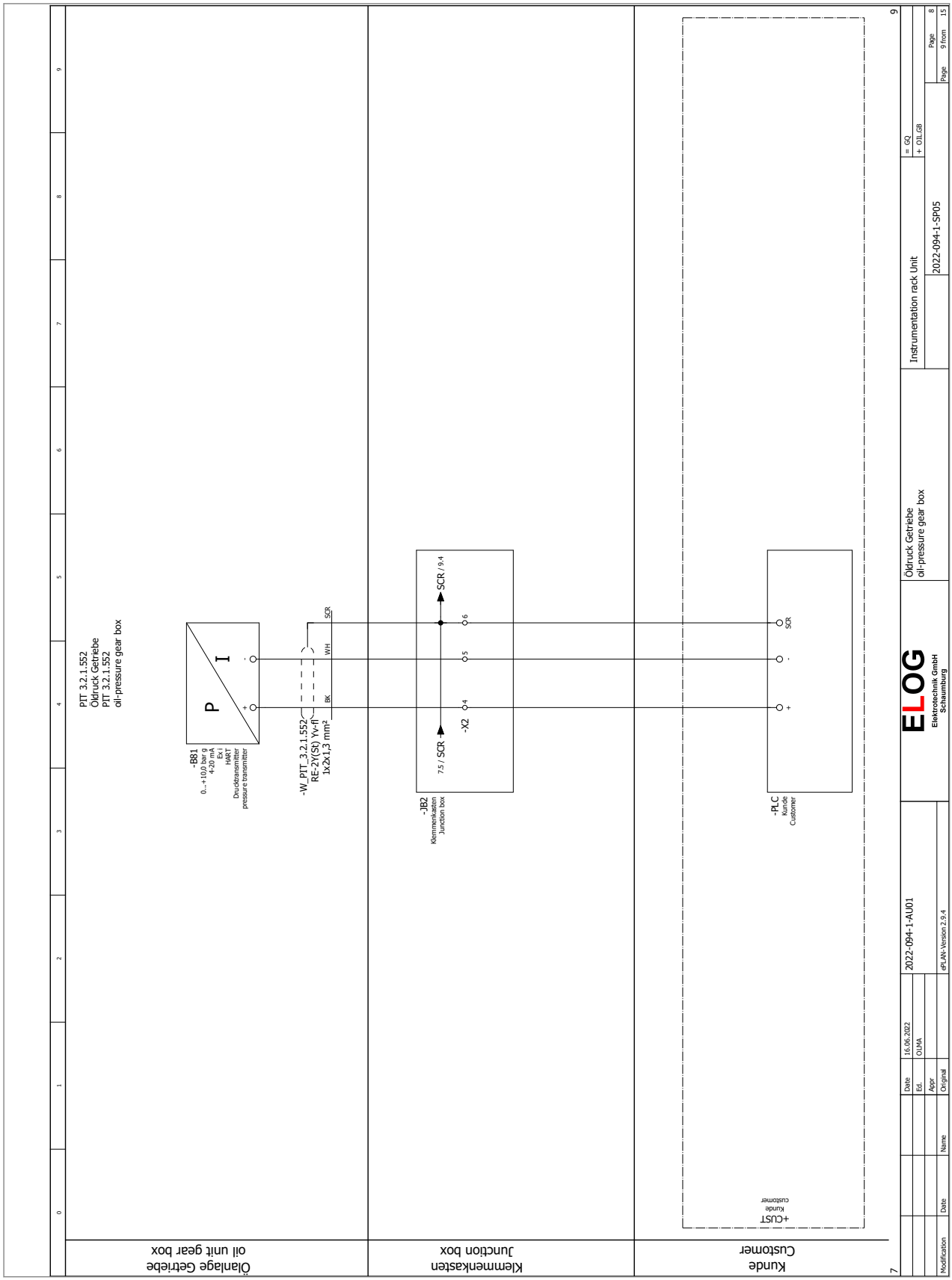
Appr
Original


PIT 3.2.1.552
Öldruck Getriebe
PIT 3.2.1.552
oil-pressure gear box
-BB1
0...+10,0 bar g
4-20 mA
Ex i
HART
Drucktransmitter
pressure transmitter
-W_PIT_3.2.1.552
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
SCR / 9.4
7.5 / SCR
-X2
-JB2
Klemmenkasten
Junction box
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Getriebe
oil-pressure gear box
Instrumentation rack Unit
2022-094-1-SP05
= GQ
+ OIL.GB
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Date 16.06.2022
Ed. OLMA
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Name
Date
Modification
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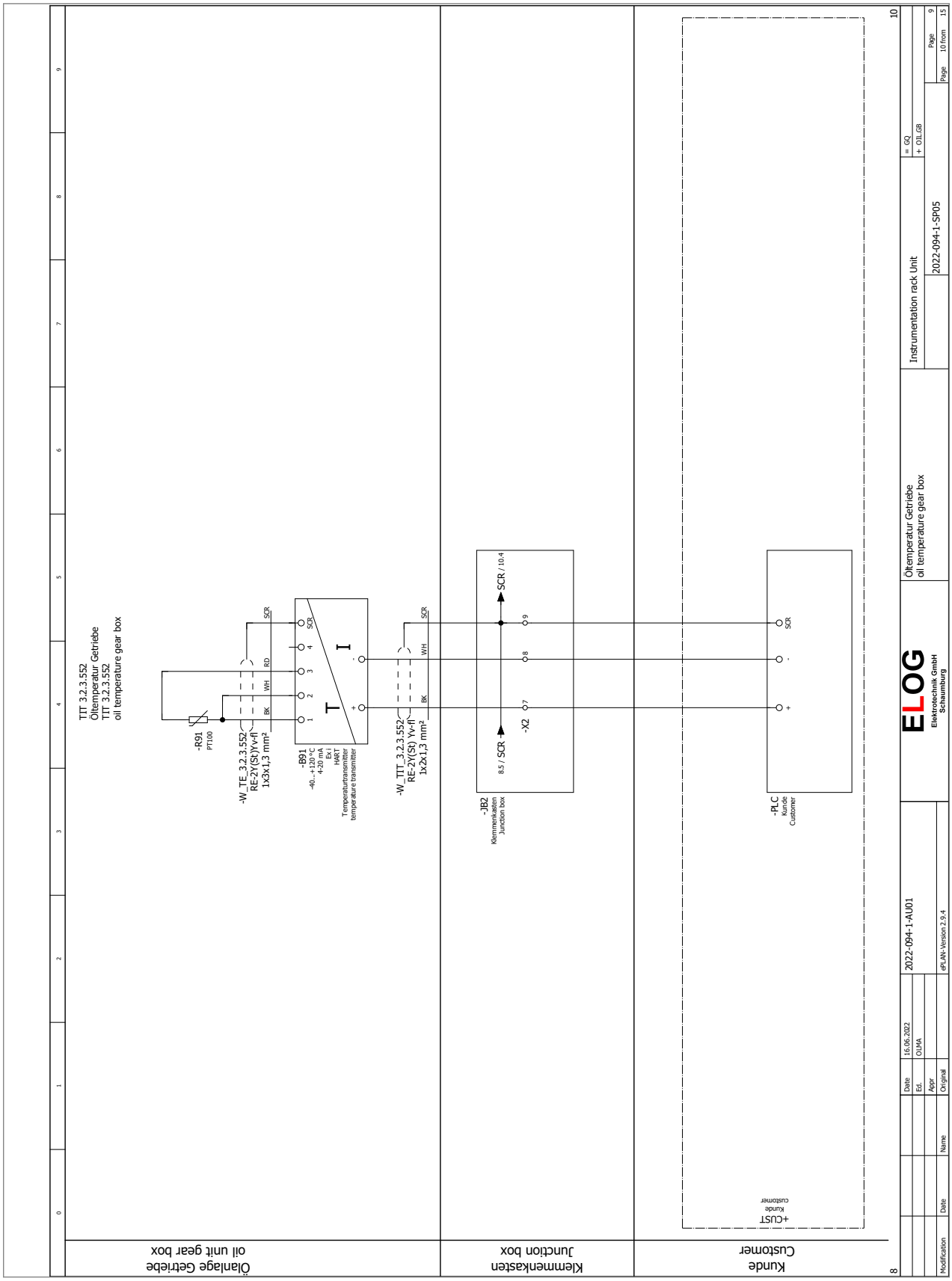
TIT 3.2.3.552
Öltemperatur Getriebe
TIT 3.2.3.552
oil temperature gear box
-R91
PT100
-W_TE_3.2.3.552
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+125°C
4-20 mA
Ex i
HART
Temperaturtransmitter
temperature transmitter
-W_TTT_3.2.3.552
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB2
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X2
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öltemperatur Getriebe
oil temperature gear box
Instrumentation rack Unit
2022-094-1-SP05
= GQ
+ OIL.GB
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OUMA
Date
Ed.
Agpr
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Name
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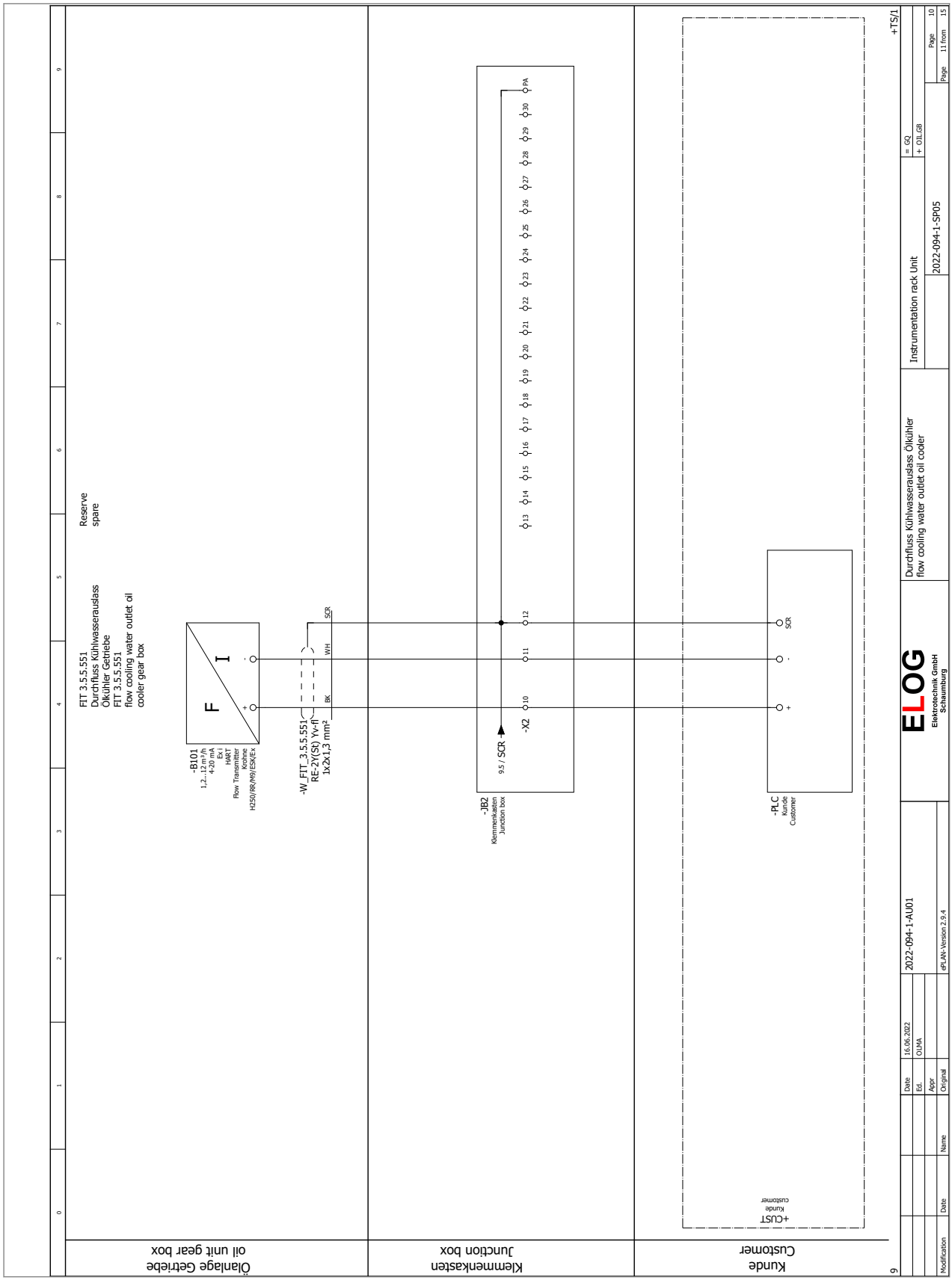
FIT 3.5.5.551
Durchfluss Kühlwasserauslass
Ölkühler Getriebe
FIT 3.5.5.551
flow cooling water outlet oil
cooler gear box
Reserve
spare
-B101
1,2...12 m³/h
4-20 mA
Ex i
HART
Flow Transmitter
Krohne
H250/RR/M9/ESK/Ex
-W_FIT_3.5.5.551
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB2
Klemmenkasten
Junction box
9.5 / SCR
-X2
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler
flow cooling water outlet oil cooler
Instrumentation rack Unit
2022-094-1-SP05
2022-094-1-AU01
+TS/1
Date
16.06.2022
Ed.
OLMA
Appr
Original
Name
Modification
Date
ePLAN-Version 2.9.4

Terminal diagram

F13_JODR2-OLMA

0	1	2				3					4	5			6	7		8				9
function text					-W_FIT_3.5.5.551	-W_TIT_3.2.3.552	-W_PIT_3.2.1.552	-W_PDIT_3.2.1.551	Cable name	Strip =GQ+OIL.GB-JB2-X2						Cable name					Page / column
					RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	cable type					
PDIT 3.2.1.551 Differenzdruck Ölfilter Getriebe PDIT 3.2.1.551 differential pressure oil filter gear box								BK		-B71	+	1		+CUST-PLC	+						/7.4
=								WH		-B71	-	2		+CUST-PLC	-						/7.4
=								SCR				3		+CUST-PLC	SCR						/7.5
PIT 3.2.1.552 Öldruck Getriebe PIT 3.2.1.552 oil-pressure gear box							BK			-B81	+	4		+CUST-PLC	+						/8.4
=							WH			-B81	-	5		+CUST-PLC	-						/8.4
=							SCR					6		+CUST-PLC	SCR						/8.5
TIT 3.2.3.552 Öltemperatur Getriebe TIT 3.2.3.552 oil temperature gear box						BK				-B91	+	7		+CUST-PLC	+						/9.4
=						WH				-B91	-	8		+CUST-PLC	-						/9.4
=						SCR						9		+CUST-PLC	SCR						/9.5
FIT 3.5.5.551 Durchfluss Kühlwasserauslass Ölkühler Getriebe FIT 3.5.5.551 flow cooling water outlet oil cooler gear box					BK					-B101	+	10		+CUST-PLC	+						/10.4
=					WH					-B101	-	11		+CUST-PLC	-						/10.4
=					SCR							12		+CUST-PLC	SCR						/10.5
Reserve spare												13									/10.5
=												14									/10.6
=												15									/10.6
=												16									/10.6
=												17									/10.6
=												18									/10.6
=												19									/10.7
=												20									/10.7
=												21									/10.7
=												22									/10.7
=												23									/10.7
=												24									/10.8
=												25									/10.8

Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.GB-JB2-X2

function text	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
Reserve spare			26				Cable name	cable type	/10.8
=			27						/10.8
=			28						/10.8
=			29						/10.8
=			30						/10.9
=			PA						/10.9

+BOM/1

Klemmenplan =GQ+OIL.GB-JB2-X2
Terminal diagram =GQ+OIL.GB-JB2-X2

Instrumentation rack Unit

2022-094-1-SP05

= GQ
+ TS

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ELOG
Elektrotechnik GmbH
Schaumburg

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	Ed.	OLMA
	Appr	
	Original	

2022-094-1-AU01

ePLAN-Version 2.9.4

Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.GB-JB2	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

+CAB/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71	Instrumentation rack Unit	= GQ
			Ed.	OLMA					+ BOM
			Appr					2022-094-1-SP05	Page 1
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AERZEN

Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.GB-W_FIT_3.5.5.551	+OIL.GB-JB2-X2	+OIL.GB-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.551 flow cooling water outlet oil cooler gear box
+OIL.GB-W_PDIT_3.2.1.551	+OIL.GB-JB2-X2	+OIL.GB-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.551 differential pressure oil filter gear box
+OIL.GB-W_PIT_3.2.1.552	+OIL.GB-JB2-X2	+OIL.GB-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.552 oil-pressure gear box
+OIL.GB-W_TE_3.2.3.552	+OIL.GB-B91	+OIL.GB-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.552 oil temperature gear box
+OIL.GB-W_TIT_3.2.3.552	+OIL.GB-JB2-X2	+OIL.GB-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.551 - =GQ+OIL.GB-W_TIT_3.2.3.552	Instrumentation rack Unit	= GQ
			Ed.	OLMA			Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.551 - =GQ+OIL.GB-W_TIT_3.2.3.552		+ CAB
			Appr					2022-094-1-SP05	Page 1
Modification	Date	Name	Original		ePLAN-Version 2.9.4				Page 15 from 15

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

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Schaumburg

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email info@elog-gmbh.de
Homepage http://www.elog-gmbh.de

Auftraggeber customer

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Fax +49 (0)5154 / 81-9191
email info@aerzen.com
homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP06	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 6 GQ gear box Unit 6

Erstellt am
Created on 16.05.2022

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200015|EAV2101637
H. Stöber

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Anzahl der Seiten
Number of pages 15

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			Ed.	OLMA				=
			Appr					+
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Typenschild
name plate

ELOG
Elektrotechnik GmbH
Schaumburg

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Fax +49 (0) 5723 / 79807-10
E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP06
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

		Date	16.06.2022
		Ed.	OLMA
		Appr	
Modification	Date	Name	Original

2022-094-1-AU01

ELOG
Elektrotechnik GmbH
Schaumburg

Allgemeine Informationen
general information

Instrumentation rack Unit

2022-094-1-SP06

eP-LAN-Version 2.9.4

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F06_ELOG_001_Blatt_x

Page name	Page x of 15	Page description	supplementary page field	Date	Edited by	X
/1	1	Deckblatt Cover sheet		16.06.2022	OlMa	X
/1.1	2	Allgemeine Informationen general information		16.06.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
=GQ+OIL.GB/1	4	Deckblatt Cover sheet		16.06.2022	OlMa	X
=GQ+OIL.GB/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.GB/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.GB/5	7	Ölpumpe / Ölheizung Getriebe oil pump / oil heater gear box		16.06.2022	OlMa	
=GQ+OIL.GB/7	8	Differenzdruck Ölfilter Getriebe differential pressure oil filter gear box		16.06.2022	OlMa	
=GQ+OIL.GB/8	9	Öldruck Getriebe oil-pressure gear box		16.06.2022	OlMa	
=GQ+OIL.GB/9	10	Öltemperatur Getriebe oil temperature gear box		16.06.2022	OlMa	
=GQ+OIL.GB/10	11	Durchfluss Kühlwasserauslass Ölkühler Getriebe flow cooling water outlet oil cooler gear box		16.06.2022	OlMa	
=GQ+TS/1	12	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
=GQ+TS/1.1	13	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2		16.06.2022	OlMa	
=GQ+BOM/1	14	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	15	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.651 - =GQ+OIL.GB-W_TIT_3.2.3.652 Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.651 - =GQ+OIL.GB-W_TIT_3.2.3.652		16.06.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

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AERZEN

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Reherweg 28
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Fax +49 (0)5154 / 81-9191

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP06	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Getriebe Einheit 6

Klemmenkasten Ölanlage 50l Getriebe Einheit 6
Junction box oil unit 50l gear box Unit 6

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP06	= GQ	
			Ed.	OlMa	Instrumentengerüst Einheit Instrumentation rack Unit				+ OIL.GB	
			Appr					GQ gear box Unit 6	Page	1
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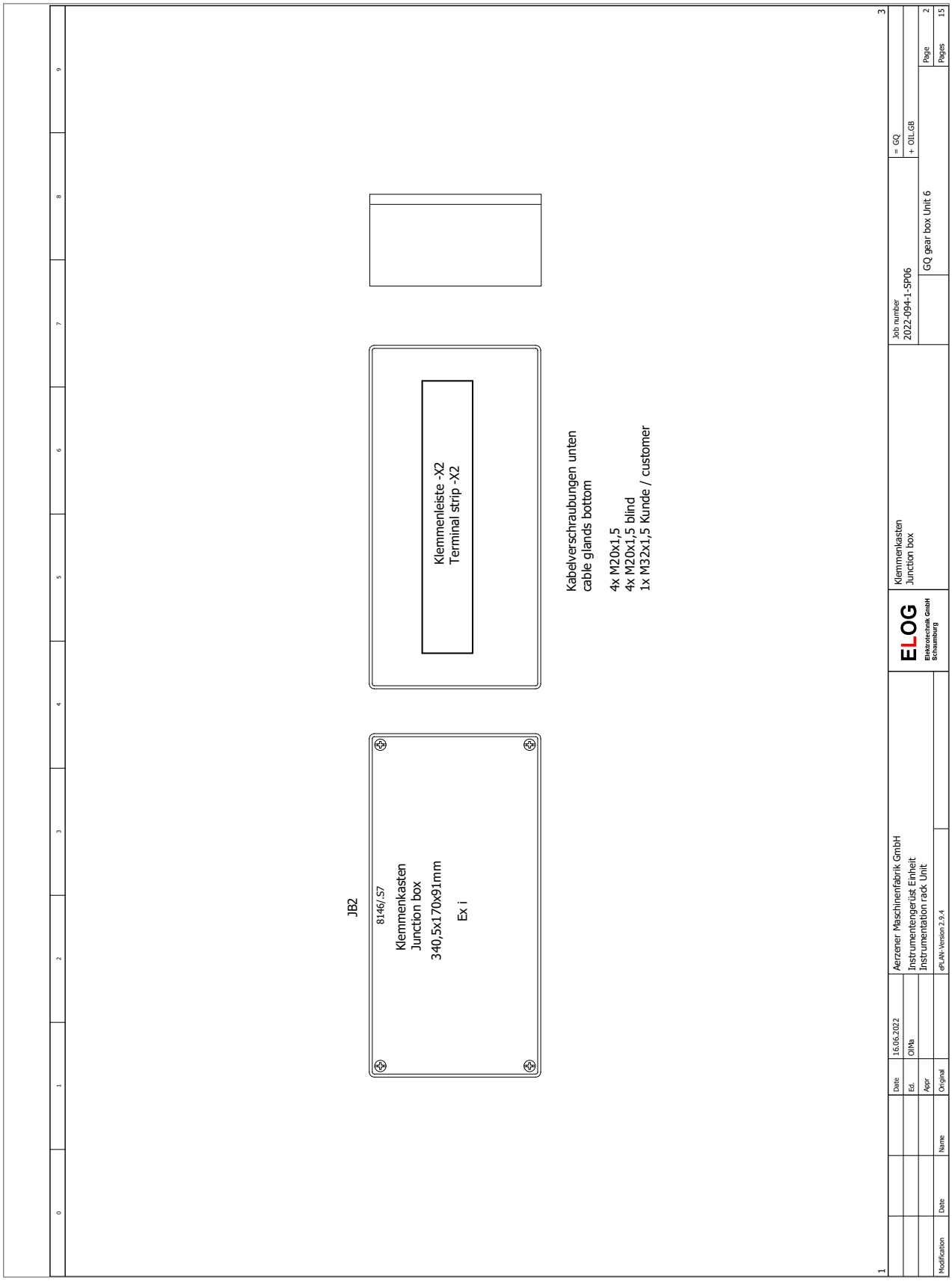
JB2
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X2
Terminal strip -X2
Kabelverschraubungen unten
cable glands bottom
4x M20x1,5
4x M20x1,5 blind
1x M32x1,5 Kunde / customer
Date
16.06.2022
Ed.
OlMa
Appr
Original
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schaumburg
Klemmenkasten
Junction box
Job number
2022-094-1-SP06
= GQ
+ OILGB
GQ gear box Unit 6
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15
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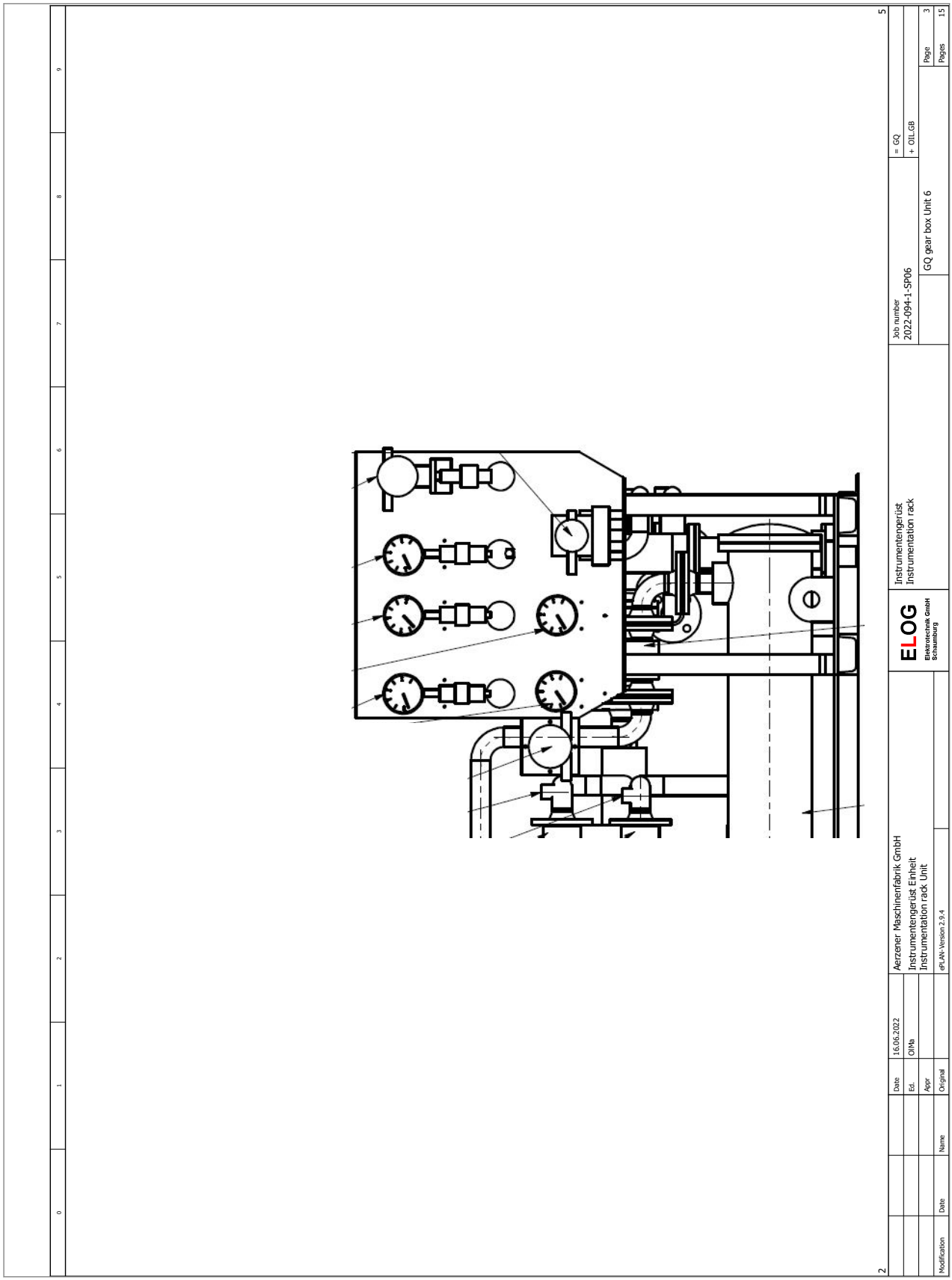
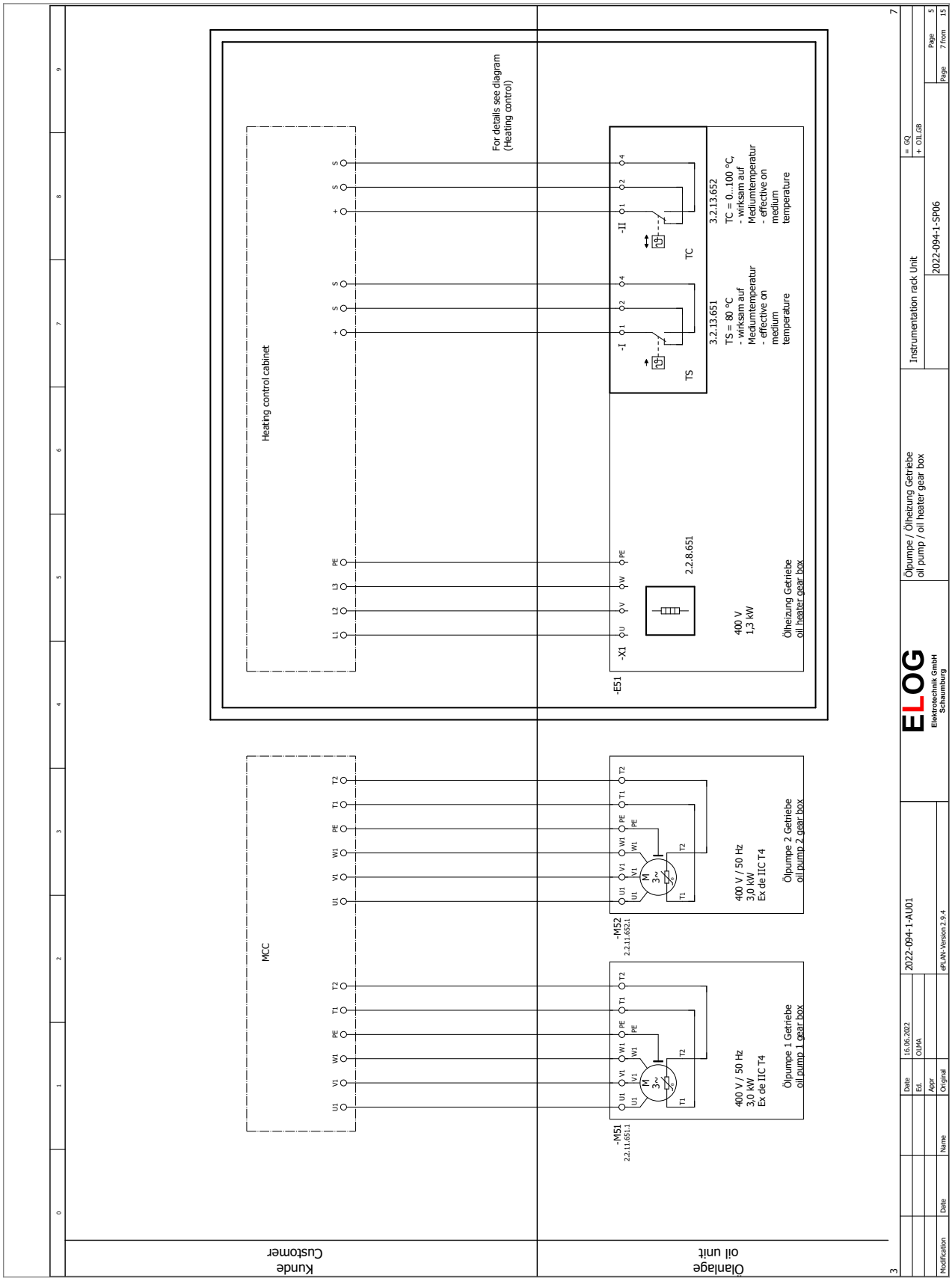
Name


Instrumentengerüst
Instrumentation rack
Job number
2022-094-1-SP06
= GQ
+ OIL.GB
GQ gear box Unit 6
Page 3
Pages 15
ELOG
Elektrotechnik GmbH
Schlaumburg
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
Date 16.06.2022
Ed. OlMa
Appr
Original
Modification
Date
Name


Heating control cabinet
For details see diagram
(Heating control)
-E51
-X1
L1
L2
L3
PE
U
V
W
PE
2.2.8.651
400 V
1,3 kW
Öheizung Getriebe
oil heater gear box
-I
-II
TS
TC
3.2.13.651
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.652
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
MCC
-M51
2.2.11.651.1
-M52
2.2.11.652.1
400 V / 50 Hz
3,0 kW
Ex de IIC T4
Ölpumpe 1 Getriebe
oil pump 1 gear box
Ölpumpe 2 Getriebe
oil pump 2 gear box
Kunde
Customer
Ölanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
2022-094-1-AU01
Ölpumpe / Öleizung Getriebe
oil pump / oil heater gear box
Instrumentation rack Unit
2022-094-1-SP06
= GQ
+ OIL.GB
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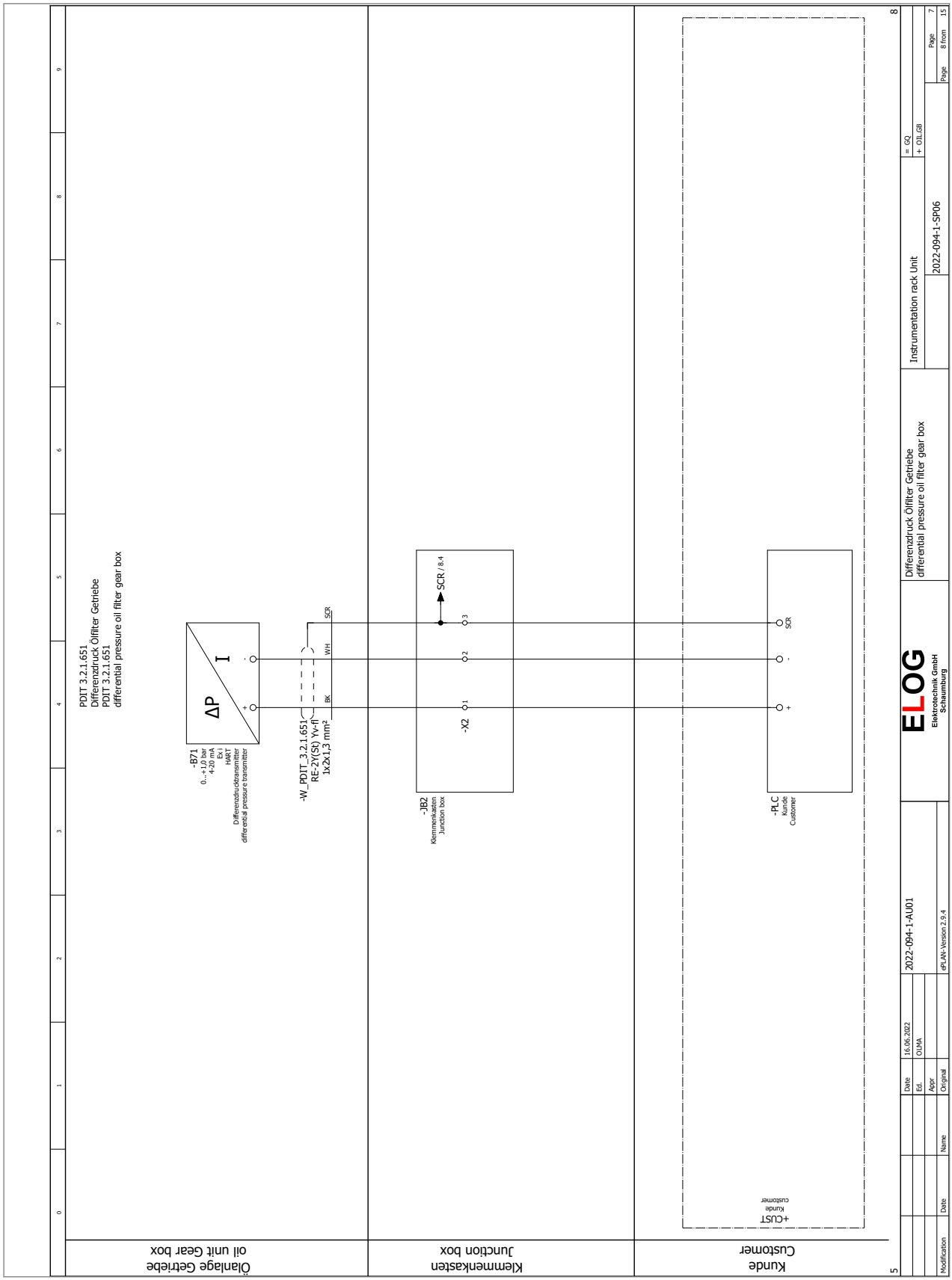
PDIT 3.2.1.651
Differenzdruck Ölfilter Getriebe
PDIT 3.2.1.651
differential pressure oil filter gear box
-B71
0...+1,0 bar
4-20 mA
Ex i
HART
Differenzdrucktransmitter
differential pressure transmitter
ΔP
I
+
-
-W_PDIT_3.2.1.651
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB2
Klemmenkasten
Junction box
-X2
1
2
3
SCR / 8.4
-PLC
Kunde
Customer
SCR
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit Gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Getriebe
differential pressure oil filter gear box
Instrumentation rack Unit
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+ OIL.GB
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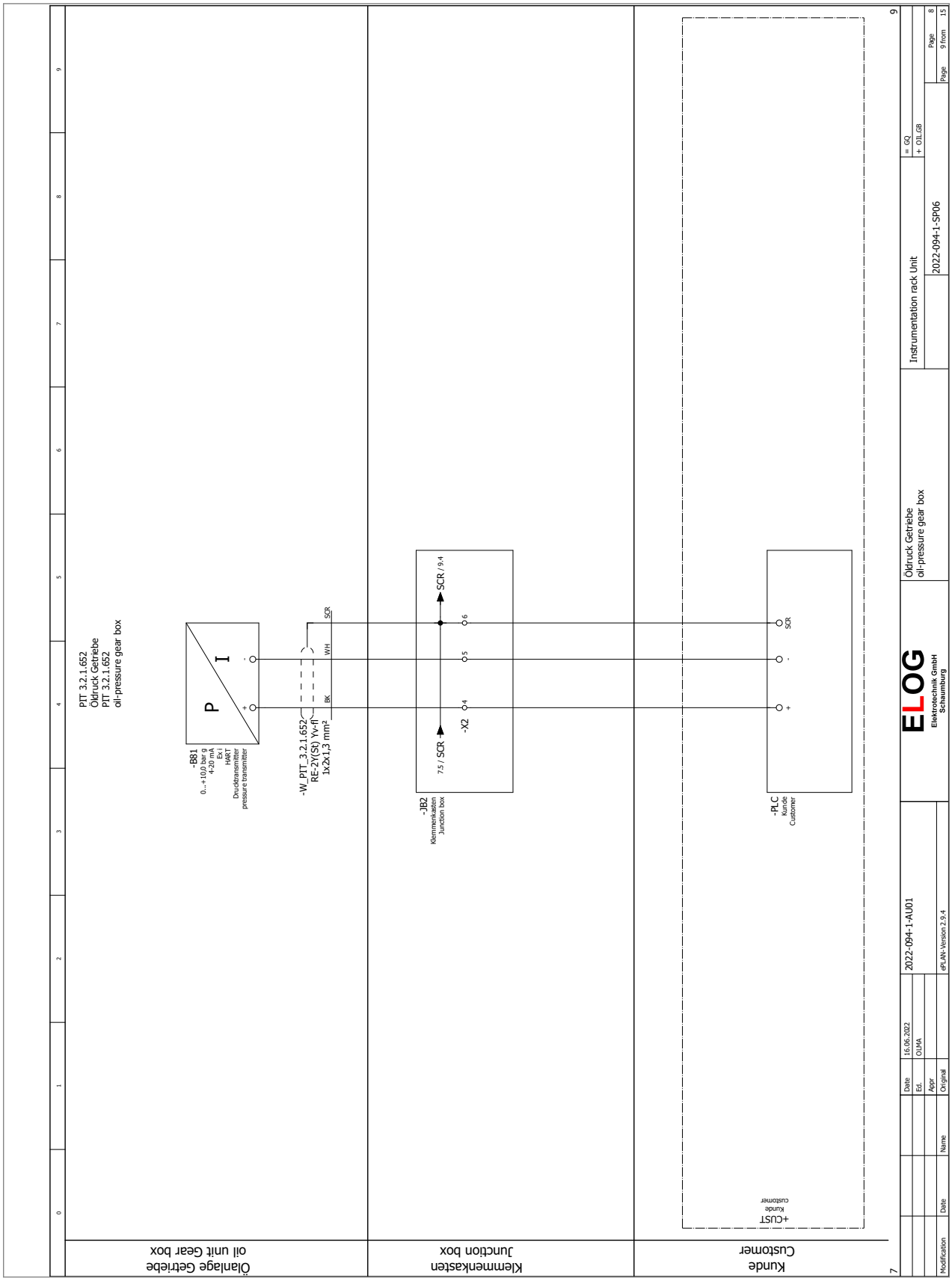
PIT 3.2.1.652
Öldruck Getriebe
PIT 3.2.1.652
oil-pressure gear box
-B81
0...+10,0 bar g
4-20 mA
Ex i
HART
Drucktransmitter
pressure transmitter
P
I
+
-
-W_PIT_3.2.1.652
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
7.5 / SCR
SCR / 9.4
-X2
4
5
6
-PLC
Kunde
Customer
SCR
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit Gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Getriebe
oil-pressure gear box
Instrumentation rack Unit
2022-094-1-SP06
= GQ
+ OIL.GB
Page 8
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Date 16.06.2022
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Date
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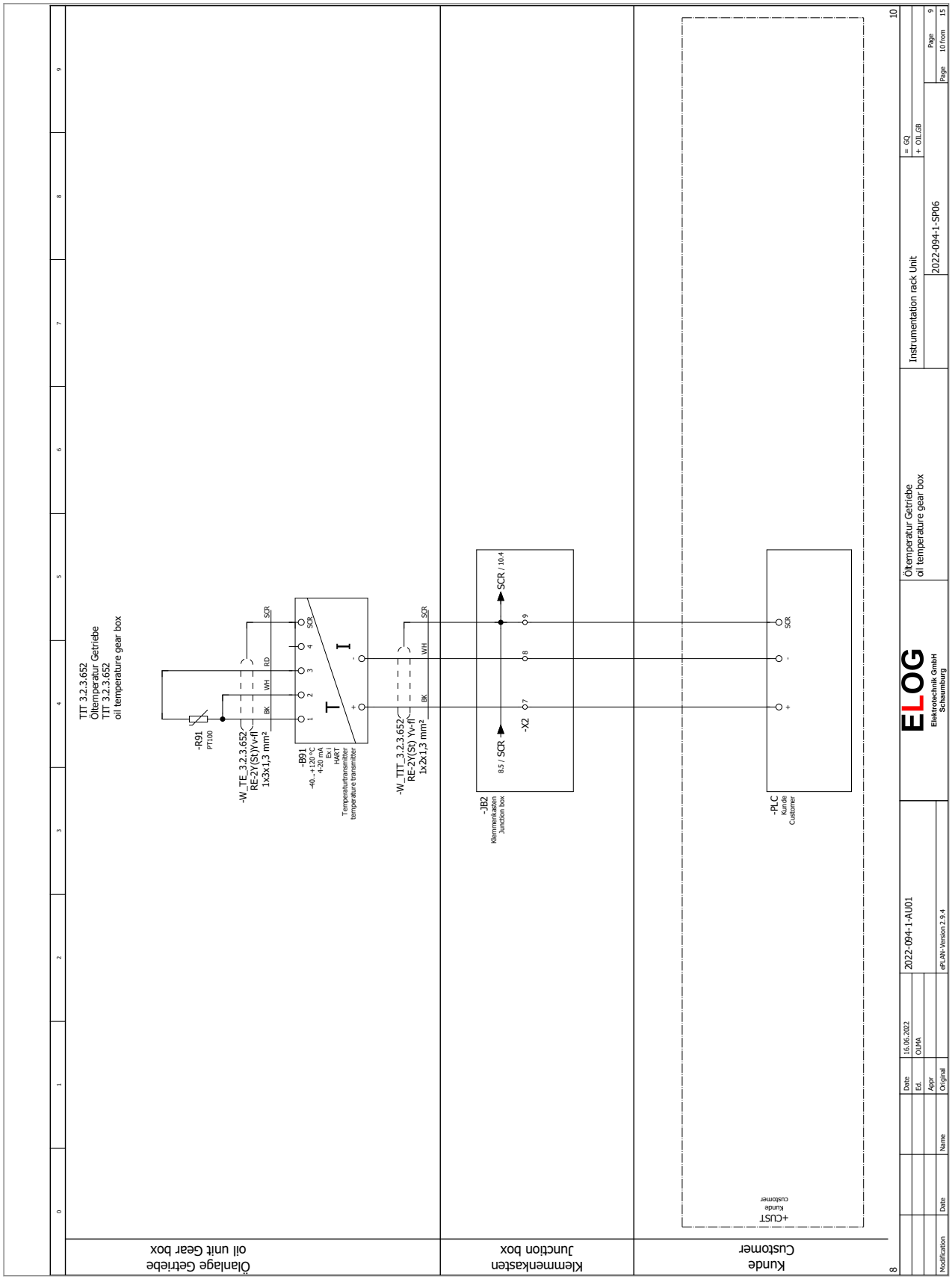
TIT 32.3.652
Ölemperatur Getriebe
TIT 32.3.652
oil temperature gear box
-R91
PT100
-W_TE_32.3.652
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+120 °C
4-20 mA
Ex i
HART
Temperaturtransmitter
temperature transmitter
-W_TIT_3.2.3.652
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB2
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X2
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Getriebe
oil unit Gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Ölemperatur Getriebe
oil temperature gear box
Instrumentation rack Unit
2022-094-1-SP06
= GQ
+ OIL.GB
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OLMA
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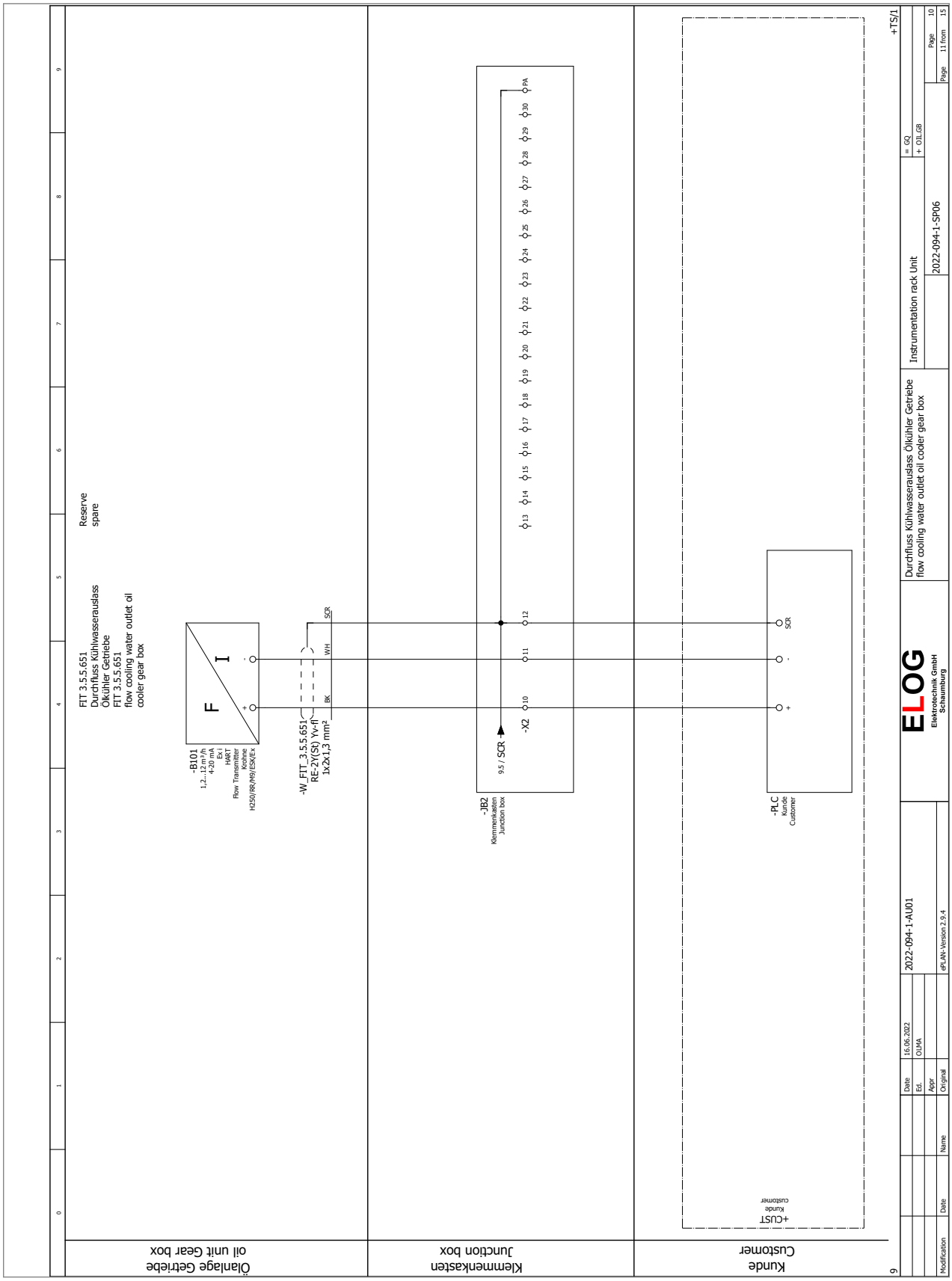
Reserve
spare
FIT 3.5.5.651
Durchfluss Kühlwasserauslass
Ölkühler Getriebe
FIT 3.5.5.651
flow cooling water outlet oil
cooler gear box
-B101
1,2...12 m³/h
4-20 mA
Ex i
HART
Flow Transmitter
Krohne
H250/R0/M9/ESK/Ex
-W_FIT_3.5.5.651
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB2
Klemmenkasten
Junction box
9.5 / SCR
-X2
+CUST
Kunde
customer
-PLC
Kunde
Customer
Ölanlage Getriebe
oil unit Gear box
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler Getriebe
flow cooling water outlet oil cooler gear box
Instrumentation rack Unit
2022-094-1-SP06
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Date
Name
Original
16.06.2022
OUMA
+TS/1

Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.GB-JB2-X2

function text	-W_FIT_3.5.5.651	-W_TIT_3.2.3.652	-W_PIT_3.2.1.652	-W_PDIT_3.2.1.651	Cable name	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	Page / column
	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	RE-2Y(St) Yv-fl	cable type							cable type	
PDIT 3.2.1.651 Differenzdruck Ölfilter Getriebe PDIT 3.2.1.651 differential pressure oil filter gear box				BK		-B71	+	1		+CUST-PLC	+		/7.4
=				WH		-B71	-	2		+CUST-PLC	-		/7.4
=				SCR				3		+CUST-PLC	SCR		/7.5
PIT 3.2.1.652 Öldruck Getriebe PIT 3.2.1.652 oil-pressure gear box			BK			-B81	+	4		+CUST-PLC	+		/8.4
=			WH			-B81	-	5		+CUST-PLC	-		/8.4
=			SCR					6		+CUST-PLC	SCR		/8.5
TIT 3.2.3.652 Öltemperatur Getriebe TIT 3.2.3.652 oil temperature gear box		BK				-B91	+	7		+CUST-PLC	+		/9.4
=		WH				-B91	-	8		+CUST-PLC	-		/9.4
=		SCR						9		+CUST-PLC	SCR		/9.5
FIT 3.5.5.651 Durchfluss Kühlwasserauslass Ölkühler Getriebe FIT 3.5.5.651 flow cooling water outlet oil cooler gear box	BK					-B101	+	10		+CUST-PLC	+		/10.4
=	WH					-B101	-	11		+CUST-PLC	-		/10.4
=	SCR							12		+CUST-PLC	SCR		/10.5
Reserve spare								13					/10.5
=								14					/10.6
=								15					/10.6
=								16					/10.6
=								17					/10.6
=								18					/10.6
=								19					/10.7
=								20					/10.7
=								21					/10.7
=								22					/10.7
=								23					/10.7
=								24					/10.8
=								25					/10.8

+OIL.GB/10 1.1

Modification	Date	Name			
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			Appr		
			Original		ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Klemmenplan =GQ+OIL.GB-JB2-X2
Terminal diagram =GQ+OIL.GB-JB2-X2

Instrumentation rack Unit
2022-094-1-SP06

= GQ
+ TS
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Terminal diagram

F13_JODR2-OLMA

function text	Cable name	cable type	Strip =GQ+OIL.GB-JB2-X2 Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
Reserve spare					26						/10.8
=					27						/10.8
=					28						/10.8
=					29						/10.8
=					30						/10.9
=					PA						/10.9

1

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Klemmenplan =GQ+OIL.GB-JB2-X2 Terminal diagram =GQ+OIL.GB-JB2-X2	Instrumentation rack Unit
			Ed.	OLMA				= GQ + TS
			Appr					2022-094-1-SP06
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Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.GB-JB2	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

	Date	16.06.2022	2022-094-1-AU01
	Ed.	OLMA	
	Appr		
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ELOG
Elektrotechnik GmbH
Schaumburg

Artikelstückliste : STAHL.8146/2S71 - STAHL.814 6/2S71
Parts list : STAHL.8146/2S71 - STAHL.8146/2S71

Instrumentation rack Unit

2022-094-1-SP06

+CAB/1

= GQ
+ BOM

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Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.GB-W_FIT_3.5.5.651	+OIL.GB-JB2-X2	+OIL.GB-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.651 flow cooling water outlet oil cooler gear box
+OIL.GB-W_PDIT_3.2.1.651	+OIL.GB-JB2-X2	+OIL.GB-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.651 differential pressure oil filter gear box
+OIL.GB-W_PIT_3.2.1.652	+OIL.GB-JB2-X2	+OIL.GB-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.652 oil-pressure gear box
+OIL.GB-W_TE_3.2.3.652	+OIL.GB-B91	+OIL.GB-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.652 oil temperature gear box
+OIL.GB-W_TIT_3.2.3.652	+OIL.GB-JB2-X2	+OIL.GB-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Kabelübersicht : =GQ+OIL.GB-W_FIT_3.5.5.651 - =GQ+OIL.GB-W_TIT_3.2.3.652	Instrumentation rack Unit	= GQ
			Ed.	OLMA			Cable overview : =GQ+OIL.GB-W_FIT_3.5.5.651 - =GQ+OIL.GB-W_TIT_3.2.3.652		+ CAB
			Appr					2022-094-1-SP06	Page 1
Modification	Date	Name	Original		ePLAN-Version 2.9.4				Page 15 from 15

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

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homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP07	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 1 GQ blower Unit 1

Erstellt am
Created on 16.05.2022

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200046|EAV2101639
H. Stöber

Anzahl der Seiten
Number of pages 16

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			Ed.	OLMA	
			Appr		
Modification	Date	Name	Original		ePLAN-Version 2.9.4

ELOG Elektrotechnik GmbH Schaumburg

Deckblatt
Cover sheet

Instrumentation rack Unit

2022-094-1-SP07

=
+

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F26_ELOG_Info

Typenschild
name plate

ELOG
Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH

Nordbrucher Straße 6
31559 Hohnhorst / Germany
Phone +49 (0) 5723 / 79807-0
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http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP07
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

1 2

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Allgemeine Informationen general information	Instrumentation rack Unit
			Ed.	OLMA				=
			Appr					+
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Page name	Page x of 16	Page description	supplementary page field	Date	Edited by	X
/1	1	Deckblatt Cover sheet		31.01.2022	OlMa	X
/1.1	2	Allgemeine Informationen general information		31.01.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		04.02.2022	OlMa	
=GQ+OIL.BM/1	4	Deckblatt Cover sheet		03.02.2022	OlMa	X
=GQ+OIL.BM/2	5	Klemmenkasten Junction box		31.01.2022	OlMa	
=GQ+OIL.BM/3	6	Instrumentengerüst Instrumentation rack		03.02.2022	OlMa	
=GQ+OIL.BM/5	7	Ölpumpe / Ölheizung oil pump / oil heater		04.02.2022	OlMa	
=GQ+OIL.BM/6	8	Niveauschalter Öltank Gebläse level switch oil-vessel blower		04.02.2022	OlMa	
=GQ+OIL.BM/7	9	Differenzdruck Ölfilter Gebläse differential pressure oil filter blower		04.02.2022	OlMa	
=GQ+OIL.BM/8	10	Öldruck Gebläse oil-pressure blower		04.02.2022	OlMa	
=GQ+OIL.BM/9	11	Öltemperatur Gebläse oil temperature blower		04.02.2022	OlMa	
=GQ+OIL.BM/10	12	Durchfluss Kühlwasserauslass Ölkühler Gebläse flow cooling water outlet oil cooler blower		04.02.2022	OlMa	
=GQ+TS/1	13	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1		04.02.2022	OlMa	
=GQ+TS/1.1	14	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1		04.02.2022	OlMa	
=GQ+BOM/1	15	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		04.02.2022	OlMa	
=GQ+CAB/1	16	Kabelübersicht : =GQ+OIL.BM-W_FIT_3.5.5.131 - =GQ+OIL.BM-W_TIT_3.2.3.131 Cable overview : =GQ+OIL.BM-W_FIT_3.5.5.131 - =GQ+OIL.BM-W_TIT_3.2.3.131		04.02.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

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Schaumburg

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Fax +49 (0)5154 / 81-9191

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP07	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 1

Klemmenkasten Ölanlage Gebläse Einheit 1
Junction box oil unit blower Unit 1

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH Instrumentengerüst Einheit Instrumentation rack Unit	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP07	= GQ + OIL.BM
			Ed.	OlMa				GQ blower Unit 1	Page 1
			Appr						Pages 16
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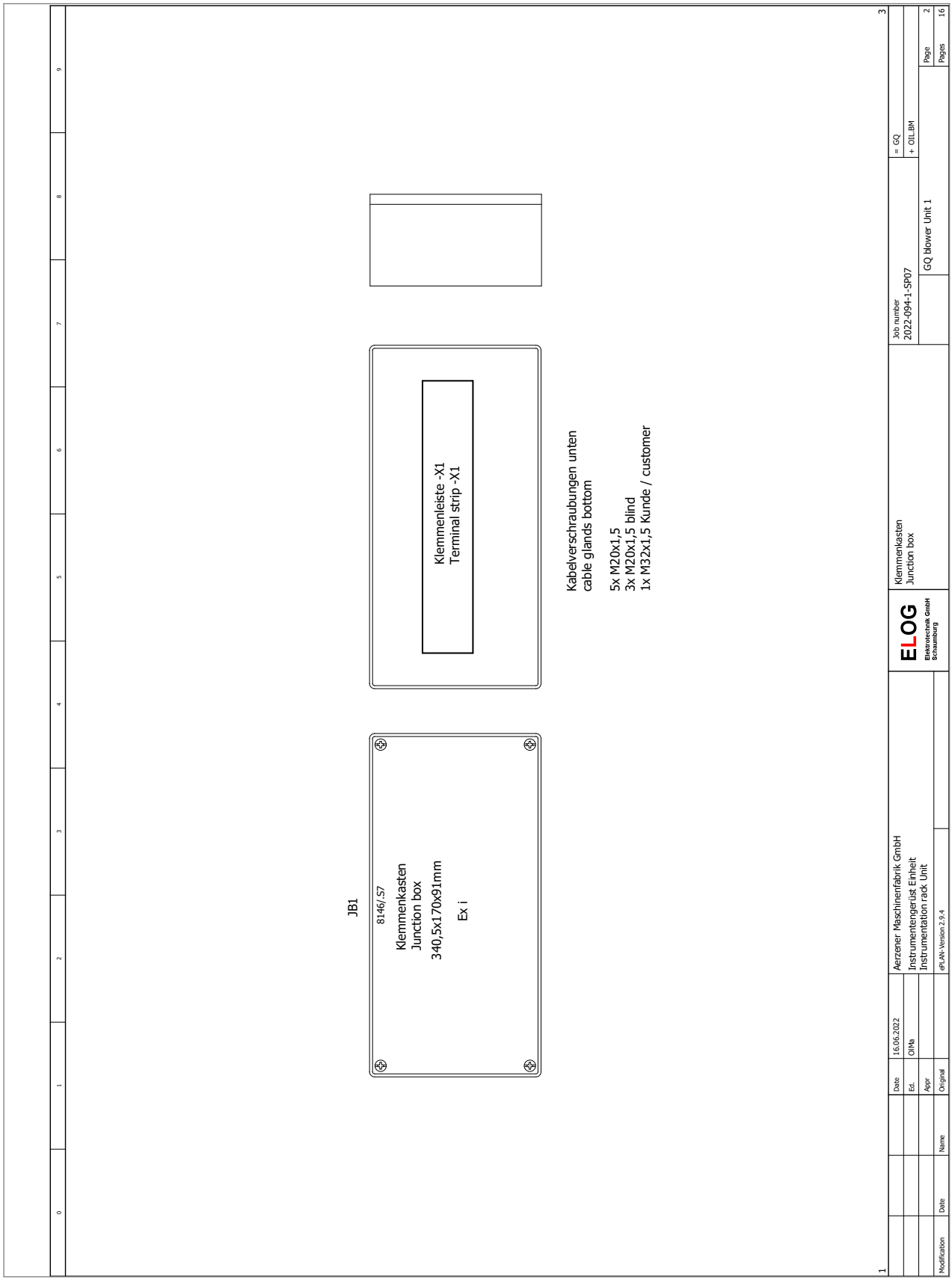
JB1
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X1
Terminal strip -X1
Kabelverschraubungen unten
cable glands bottom
5x M20x1,5
3x M20x1,5 blind
1x M32x1,5 Kunde / customer
Date 16.06.2022
Ed. OlMa
Appr
Original
Name
Date
Modification
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schlaumburg
Klemmenkasten
Junction box
Job number
2022-094-1-SP07
GQ Blower Unit 1
= GQ
+ OIL.BM
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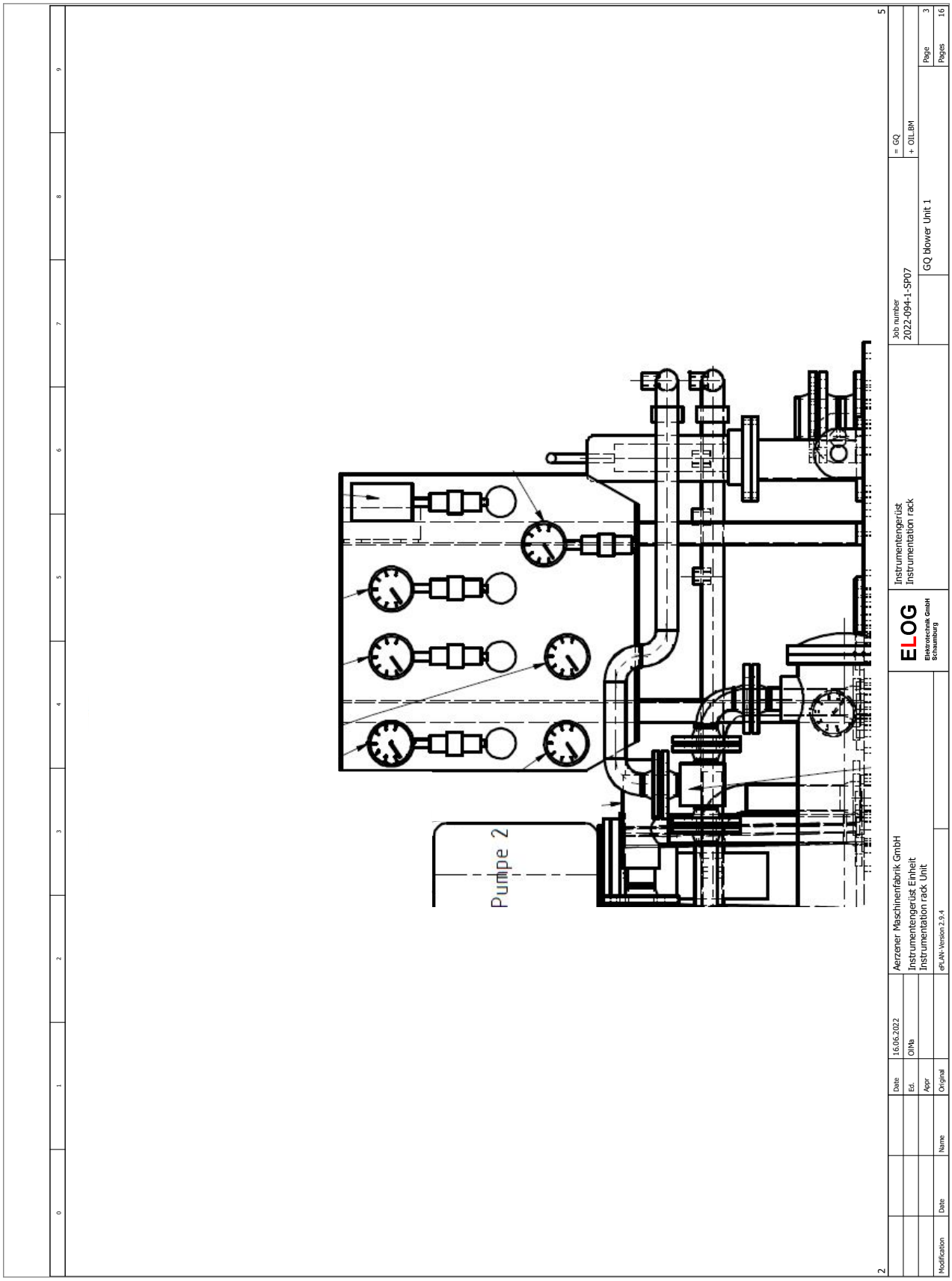
Pumpe 2
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
Date
16.06.2022
Ed.
OlMa
Appr
Original
Name
Date
Modification
ELOG
Elektrotechnik GmbH
Schaumburg
Instrumentengerüst
Instrumentation rack
Job number
2022-094-1-SP07
GQ Blower Unit 1
= GQ
+ OIL.BM
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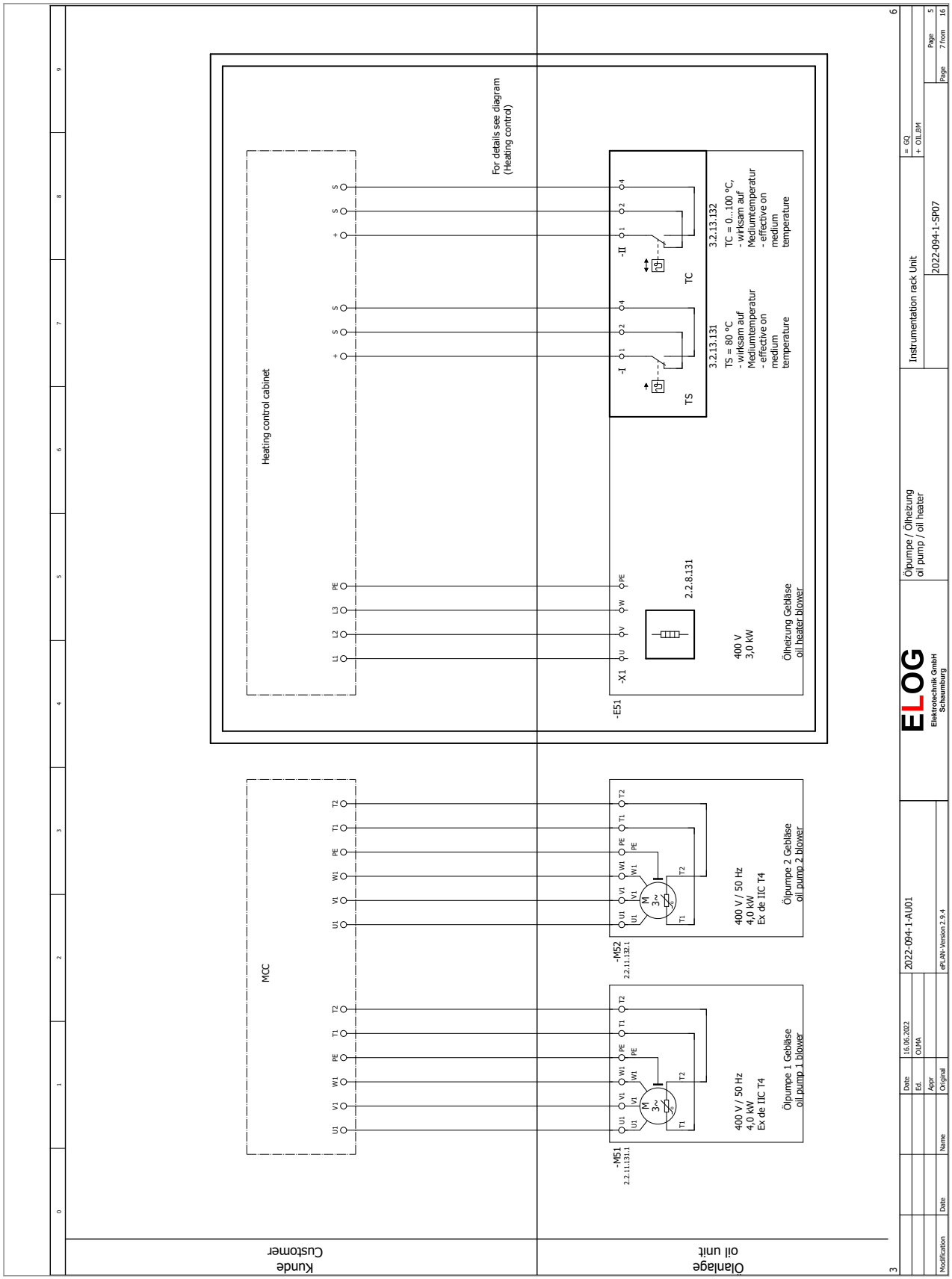
Heating control cabinet
For details see diagram
(Heating control)
-E51
-X1
2.2.8.131
400 V
3,0 kW
Ölheizung Gebläse
oil heater blower
TS
TC
-I
-II
3.2.13.131
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.132
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
MCC
-M51
2.2.11.131.1
-M52
2.2.11.132.1
400 V / 50 Hz
4,0 kW
Ex de IIC T4
Ölpumpe 1 Gebläse
oil pump 1 blower
Ölpumpe 2 Gebläse
oil pump 2 blower
Kunde
Customer
Anlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
Ölpumpe / Ölheizung
oil pump / oil heater
Instrumentation rack Unit
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= GQ
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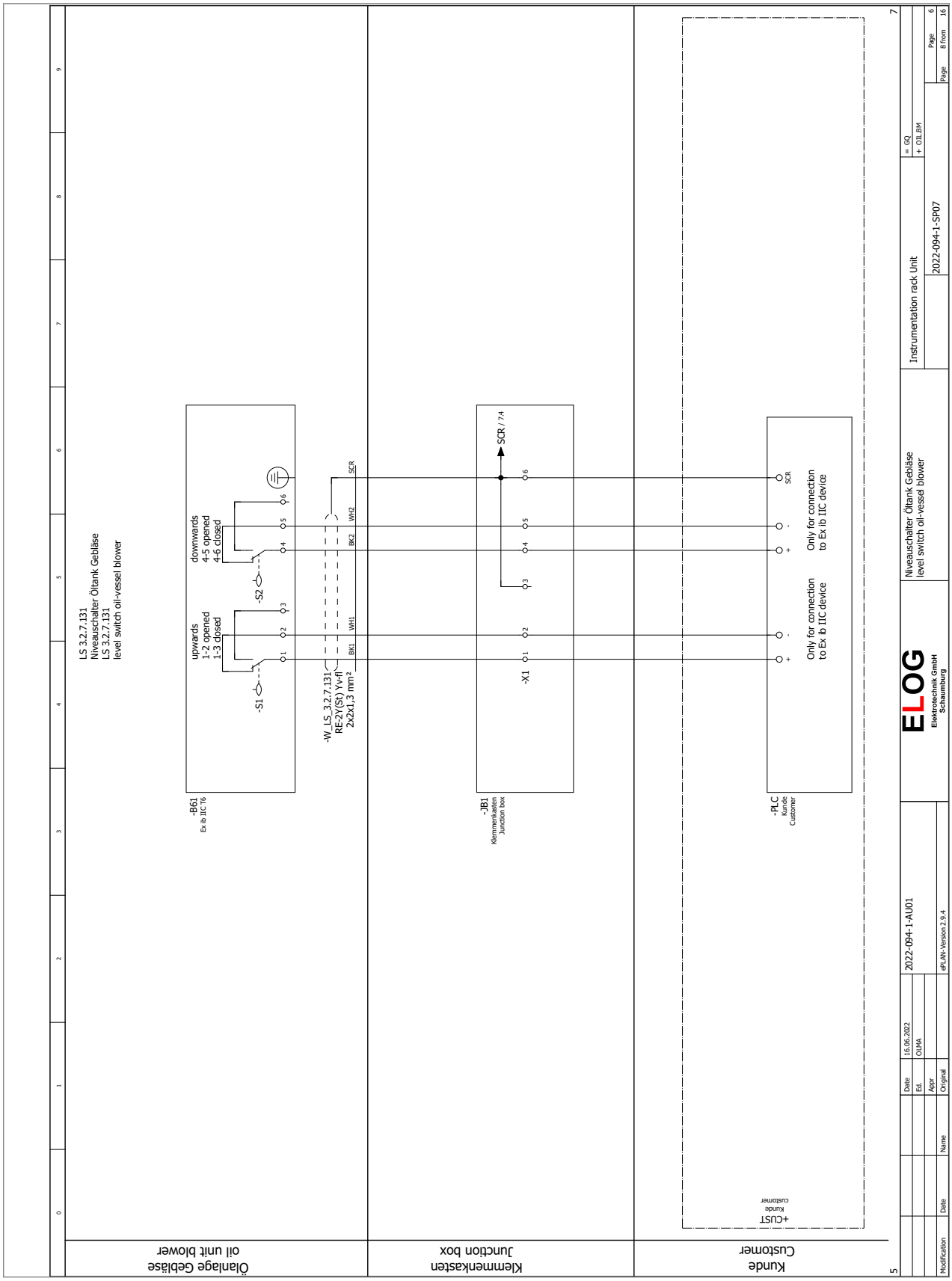
LS 3.2.7.131
Niveauschalter Öltank Gebläse
LS 3.2.7.131
level switch oil-vessel blower
-B61
Ex ib IIC T6
upwards
1-2 opened
1-3 closed
downwards
4-5 opened
4-6 closed
-S1
-S2
-W_LS_3.2.7.131
RE-2Y(St) Yv-fl
2x2x1,3 mm²
BK1
WH1
BK2
WH2
SCR
-JB1
Klemmenkasten
Junction box
-X1
SCR / 7.4
-PLC
Kunde
Customer
Only for connection
to Ex ib IIC device
Only for connection
to Ex ib IIC device
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Niveauschalter Öltank Gebläse
level switch oil-vessel blower
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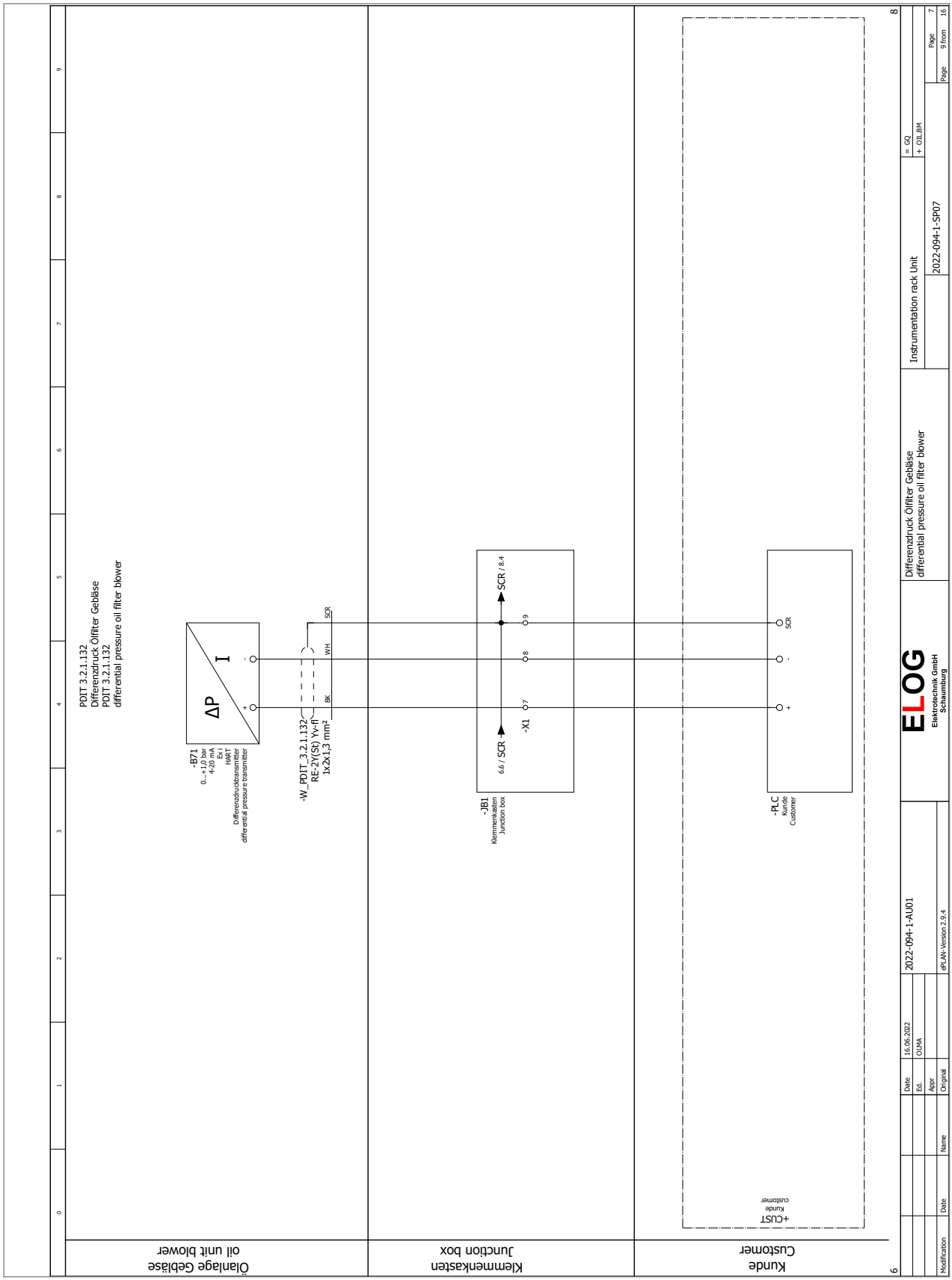
PDIT 3.2.1.132
Differenzdruck Ölfilter Gebläse
PDIT 3.2.1.132
differential pressure oil filter blower
-B71
0...+1,0 bar
4-20 mA
Ex i
HART
Differenzdrucktransmitter
differential pressure e transmitter
ΔP
I
+
-
-W_PDIT_3.2.1.132
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB1
Klemmenkasten
Junction box
6.6 / SCR
SCR / 8.4
-X1
7
8
9
-PLC
Kunde
Customer
SCR
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Gebläse
differential pressure oil filter blower
Instrumentation rack Unit
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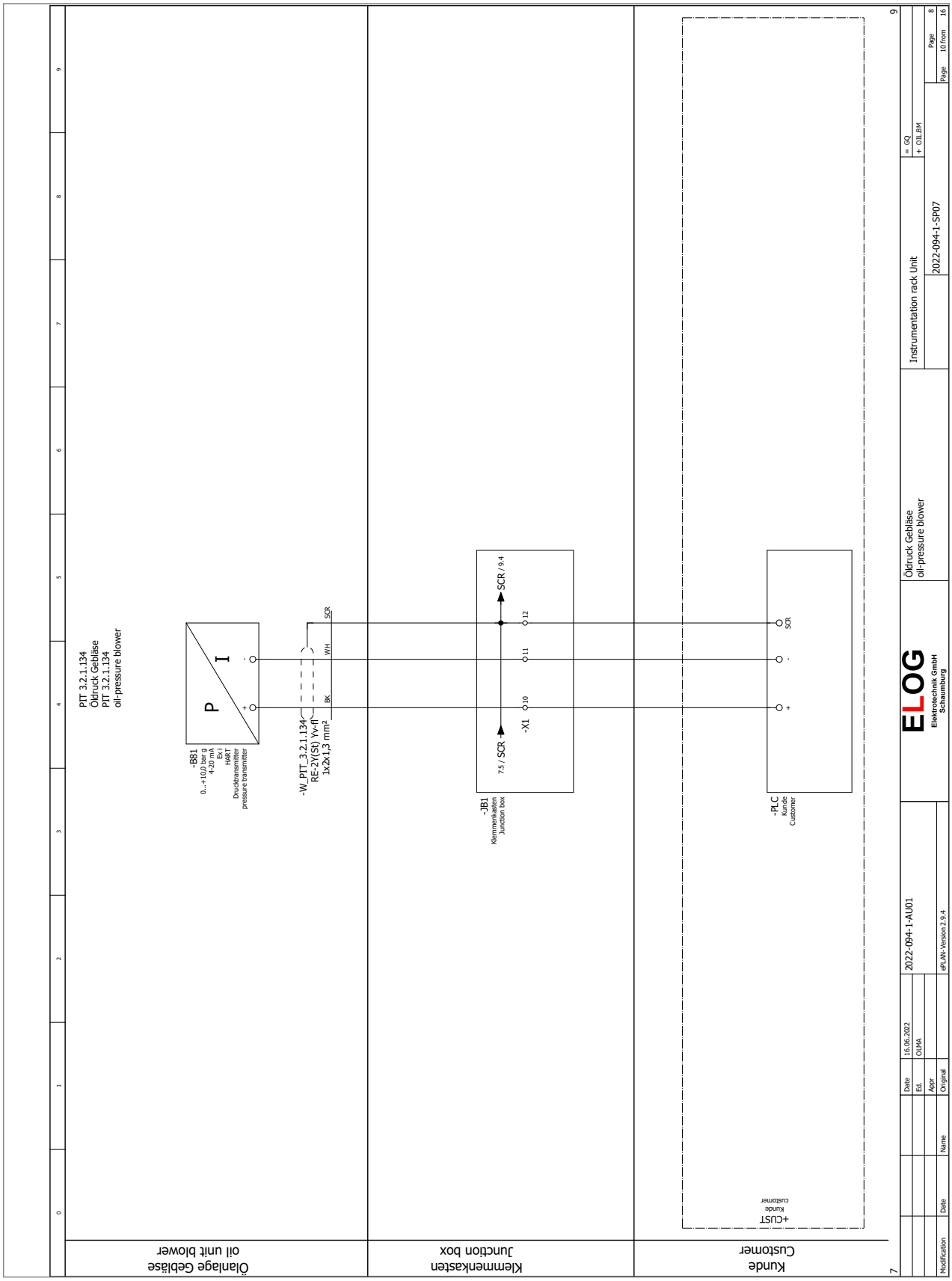
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Öldruck Gebläse
PIT 3.2.1.134
oil-pressure blower
-B81
0...+10,0 bar g
4-20 mA
Ex i
HART
Drucktransmitter
pressure transmitter
P
I
-W_PIT_3.2.1.134
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB1
Klemmenkasten
Junction box
7.5 / SCR
SCR / 9.4
-X1
12
11
10
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Gebläse
oil-pressure blower
Instrumentation rack Unit
2022-094-1-SP07
= GQ
+ OIL.BM
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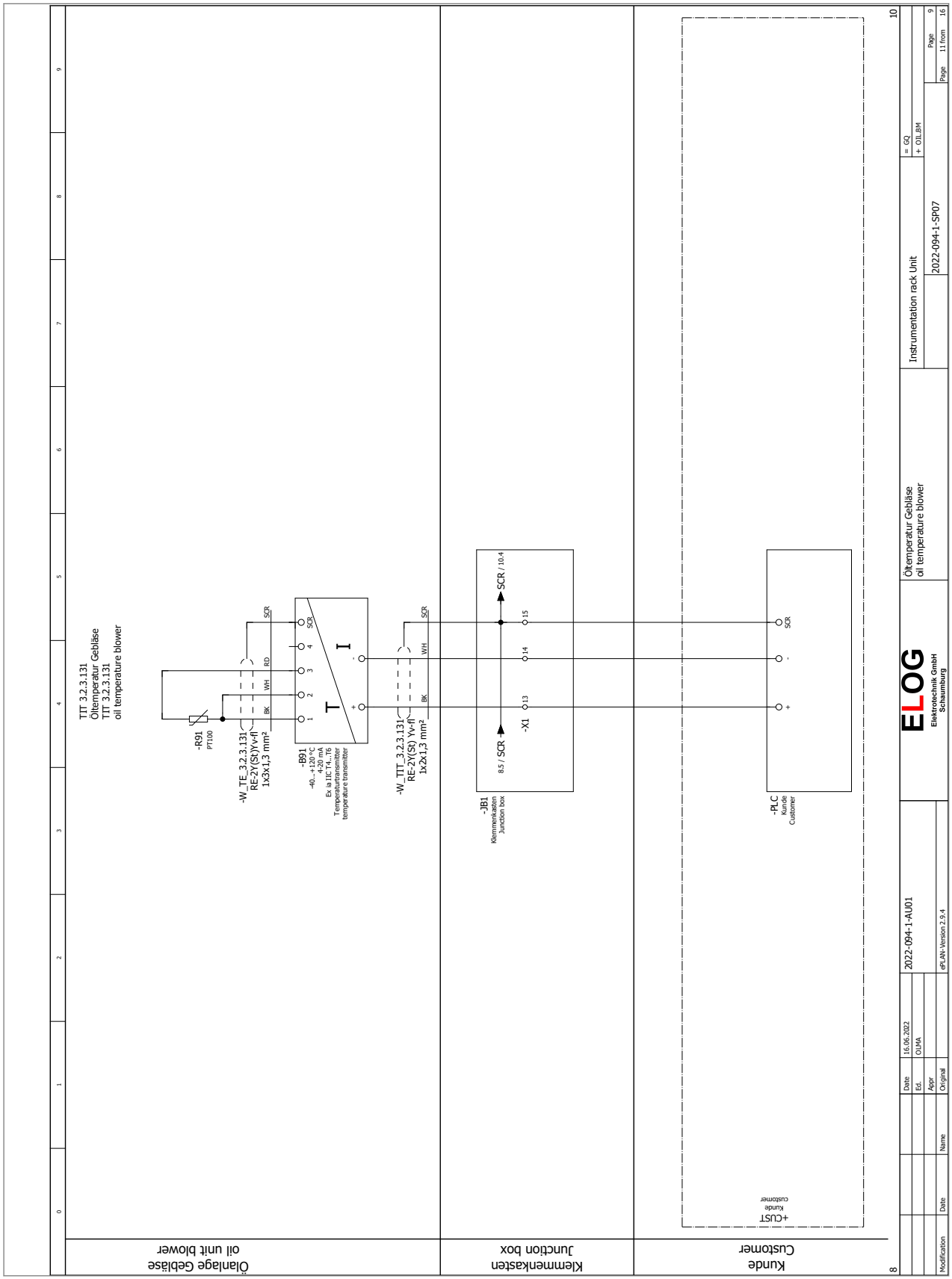
16.06.2022
OUMA
eRLAN-Version 2.9.4
Modification
Date
Name
Date
Ed.
Agpr
Original


TIT 32.3.131
Ölemperatur Gebläse
TIT 32.3.131
oil temperature blower
-R91
PT100
-W_TE_32.3.131
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+120 °C
4-20 mA
Ex ia IIC T4...T6
Temperaturmessumformer
temperature transmitter
-W_TIT_32.3.131
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB1
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X1
13
14
15
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Ölemperatur Gebläse
oil temperature blower
Instrumentation rack Unit
2022-094-1-SP07
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Ed. OLMA
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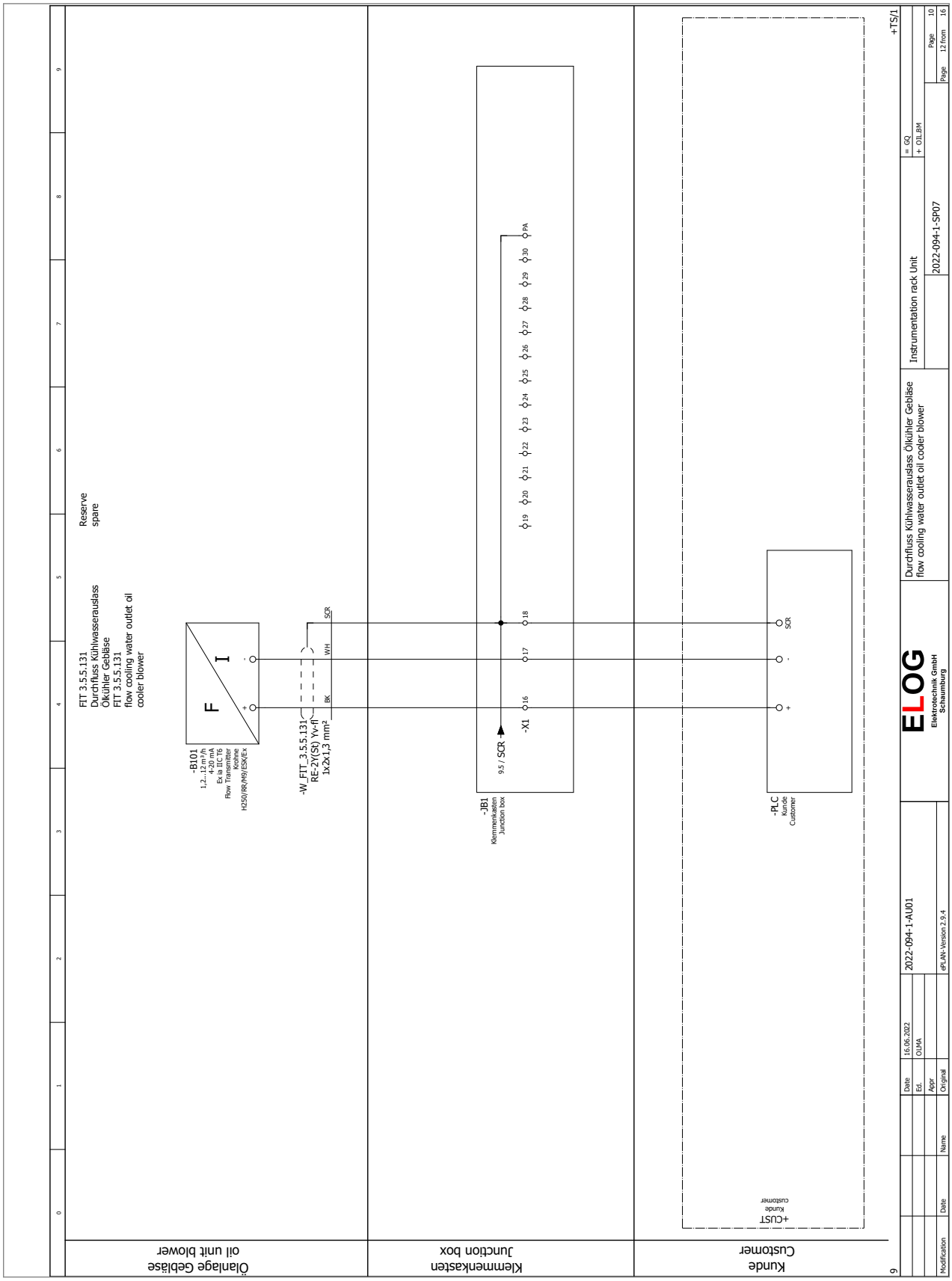
Original
ePLAN-Version 2.9.4
Modification
Date
Name


Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
FIT 3.5.5.131
Durchfluss Kühlwasserauslass
Ölkühler Gebläse
FIT 3.5.5.131
flow cooling water outlet oil
cooler blower
Reserve
spare
-B101
1,2...12 m³/h
4-20 mA
Ex ia IIC T6
Flow Transmitter
Krohne
H250/R6/M9/ESK/Ex
-W_FIT_3.5.5.131
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB1
Klemmenkasten
Junction box
9.5 / SCR
-X1
-PLC
Kunde
Customer
+CUST
Kunde
customer
+TS/1
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler Gebläse
flow cooling water outlet oil cooler blower
Instrumentation rack Unit
2022-094-1-SP07
= GQ
+ OILBM
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ePLAN-Version 2.9.4
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Date
Name
Date
Ed.
Appr
Original

Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	-W_FIT_3.5.5.131	-W_TIT_3.2.3.131	-W_PIT_3.2.1.134	-W_PDIT_3.2.1.132	-W_LS_3.2.7.131	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl											
LS 3.2.7.131 Niveauschalter Öltank Gebläse LS 3.2.7.131 level switch oil-vessel blower					BK1		-B61	1	1		+CUST-PLC	+				/6.4
=					WH1		-B61	2	2		+CUST-PLC	-				/6.5
=									3							/6.5
=					BK2		-B61	4	4		+CUST-PLC	+				/6.5
=					WH2		-B61	5	5		+CUST-PLC	-				/6.5
=					SCR				6		+CUST-PLC	SCR				/6.6
PDIT 3.2.1.132 Differenzdruck Ölfilter Gebläse PDIT 3.2.1.132 differential pressure oil filter blower				BK			-B71	+	7		+CUST-PLC	+				/7.4
=				WH			-B71	-	8		+CUST-PLC	-				/7.4
=				SCR					9		+CUST-PLC	SCR				/7.5
PIT 3.2.1.134 Öldruck Gebläse PIT 3.2.1.134 oil-pressure blower			BK				-B81	+	10		+CUST-PLC	+				/8.4
=			WH				-B81	-	11		+CUST-PLC	-				/8.4
=			SCR						12		+CUST-PLC	SCR				/8.5
TIT 3.2.3.131 Öltemperatur Gebläse TIT 3.2.3.131 oil temperature blower		BK					-B91	+	13		+CUST-PLC	+				/9.4
=		WH					-B91	-	14		+CUST-PLC	-				/9.4
=		SCR							15		+CUST-PLC	SCR				/9.5
FIT 3.5.5.131 Durchfluss Kühlwasserauslass Ölkühler Gebläse FIT 3.5.5.131 flow cooling water outlet oil cooler blower	BK						-B101	+	16		+CUST-PLC	+				/10.4
=	WH						-B101	-	17		+CUST-PLC	-				/10.4
=	SCR								18		+CUST-PLC	SCR				/10.5
Reserve spare									19							/10.5
=									20							/10.6
=									21							/10.6
=									22							/10.6
=									23							/10.6
=									24							/10.6
=									25							/10.7

+OIL.BM/10 1.1

Modification	Date	Name			
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			Ed.	OLMA	
			Appr		
			Original		ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Klemmenplan =GQ+OIL.BM-JB1-X1
Terminal diagram =GQ+OIL.BM-JB1-X1

Instrumentation rack Unit
2022-094-1-SP07

= GQ
+ TS

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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	Cable name / cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name / cable type	Page / column
Reserve spare				26					/10.7
=				27					/10.7
=				28					/10.7
=				29					/10.7
=				30					/10.8
=				PA					/10.8

1

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1
			Ed.	OLMA			
			Appr				
Modification	Date	Name	Original		ePLAN-Version 2.9.4		

Instrumentation rack Unit
= GQ
+ TS
2022-094-1-SP07
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Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.BM-JB1	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

		Date	16.06.2022
		Ed.	OLMA
		Appr	
Modification	Date	Name	Original

2022-094-1-AU01

ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Artikelstückliste : STAHL.8146/2S71 - STAHL.814 6/2S71
Parts list : STAHL.8146/2S71 - STAHL.8146/2S71

Instrumentation rack Unit

2022-094-1-SP07

+CAB/1

= GQ
+ BOM

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Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.BM-W_FIT_3.5.5.131	+OIL.BM-JB1-X1	+OIL.BM-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.131 flow cooling water outlet oil cooler blower
+OIL.BM-W_LS_3.2.7.131	+OIL.BM-B61	+OIL.BM-JB1-X1	RE-2Y(St) Yv-fl	2x2	4	1,3 mm²	LS 3.2.7.131 level switch oil-vessel blower
+OIL.BM-W_PDIT_3.2.1.132	+OIL.BM-JB1-X1	+OIL.BM-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.132 differential pressure oil filter blower
+OIL.BM-W_PIT_3.2.1.134	+OIL.BM-JB1-X1	+OIL.BM-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.134 oil-pressure blower
+OIL.BM-W_TE_3.2.3.131	+OIL.BM-B91	+OIL.BM-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.131 oil temperature blower
+OIL.BM-W_TIT_3.2.3.131	+OIL.BM-JB1-X1	+OIL.BM-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

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ELOG Elektrotechnik GmbH
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homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP08	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 2 GQ blower Unit 2

Erstellt am
Created on 16.06.2022

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200047|EAV2101639
H. Stöber

Anzahl der Seiten
Number of pages 16

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			Ed.	OLMA	
			Appr		
Modification	Date	Name	Original		ePLAN-Version 2.9.4

ELOG Elektrotechnik GmbH Schaumburg

Deckblatt
Cover sheet

Instrumentation rack Unit

2022-094-1-SP08

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F26_ELOG_Info

Typenschild
name plate

ELOG
Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH

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Fax +49 (0) 5723 / 79807-10
E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP08
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

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/1.1	2	Allgemeine Informationen general information		16.06.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
=GQ+OIL.BM/1	4	Deckblatt Cover sheet		16.06.2022	OlMa	X
=GQ+OIL.BM/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.BM/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.BM/5	7	Ölpumpe / Ölheizung Gebläse oil pump / oil heater blower		16.06.2022	OlMa	
=GQ+OIL.BM/6	8	Niveauschalter Öltank Gebläse level switch oil-vessel blower		16.06.2022	OlMa	
=GQ+OIL.BM/7	9	Differenzdruck Ölfilter Gebläse differential pressure oil filter blower		16.06.2022	OlMa	
=GQ+OIL.BM/8	10	Öldruck Gebläse oil-pressure blower		16.06.2022	OlMa	
=GQ+OIL.BM/9	11	Öltemperatur Gebläse oil temperature blower		16.06.2022	OlMa	
=GQ+OIL.BM/10	12	Durchfluss Kühlwasserauslass Ölkühler Gebläse flow cooling water outlet oil cooler blower		16.06.2022	OlMa	
=GQ+TS/1	13	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1		16.06.2022	OlMa	
=GQ+TS/1.1	14	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1		16.06.2022	OlMa	
=GQ+BOM/1	15	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	16	Kabelübersicht : =GQ+OIL.BM-W_FIT_3.5.5.231 - =GQ+OIL.BM-W_TIT_3.2.3.231 Cable overview : =GQ+OIL.BM-W_FIT_3.5.5.231 - =GQ+OIL.BM-W_TIT_3.2.3.231		16.06.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

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Schaumburg

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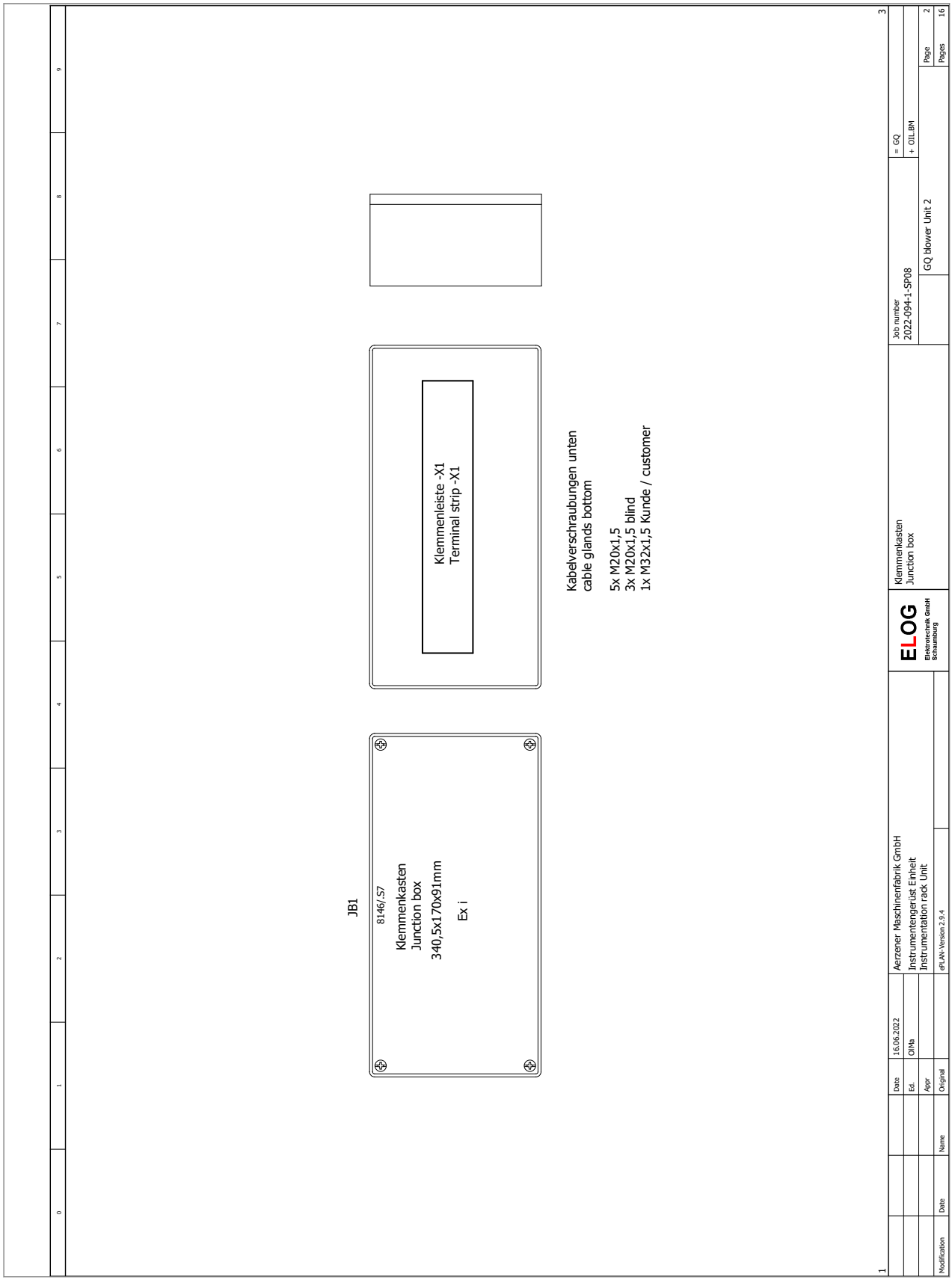
Fax +49 (0)5154 / 81-9191

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP08	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 2

Klemmenkasten Ölanlage Gebläse Einheit 2
Junction box oil unit blower Unit 2

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH Instrumentengerüst Einheit Instrumentation rack Unit	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP08	= GQ + OIL.BM
			Ed.	OlMa				GQ blower Unit 2	Page 1
			Appr						Pages 16
Modification	Date	Name	Original		ePLAN-Version 2.9.4				


JB1
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X1
Terminal strip -X1
Kabelverschraubungen unten
cable glands bottom
5x M20x1,5
3x M20x1,5 blind
1x M32x1,5 Kunde / customer
Date 16.06.2022
Ed. OlMa
Appr
Original
Name
Date
Modification
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schlaumburg
Klemmenkasten
Junction box
Job number
2022-094-1-SP08
GQ Blower Unit 2
= GQ
+ OIL.BM
Page 2
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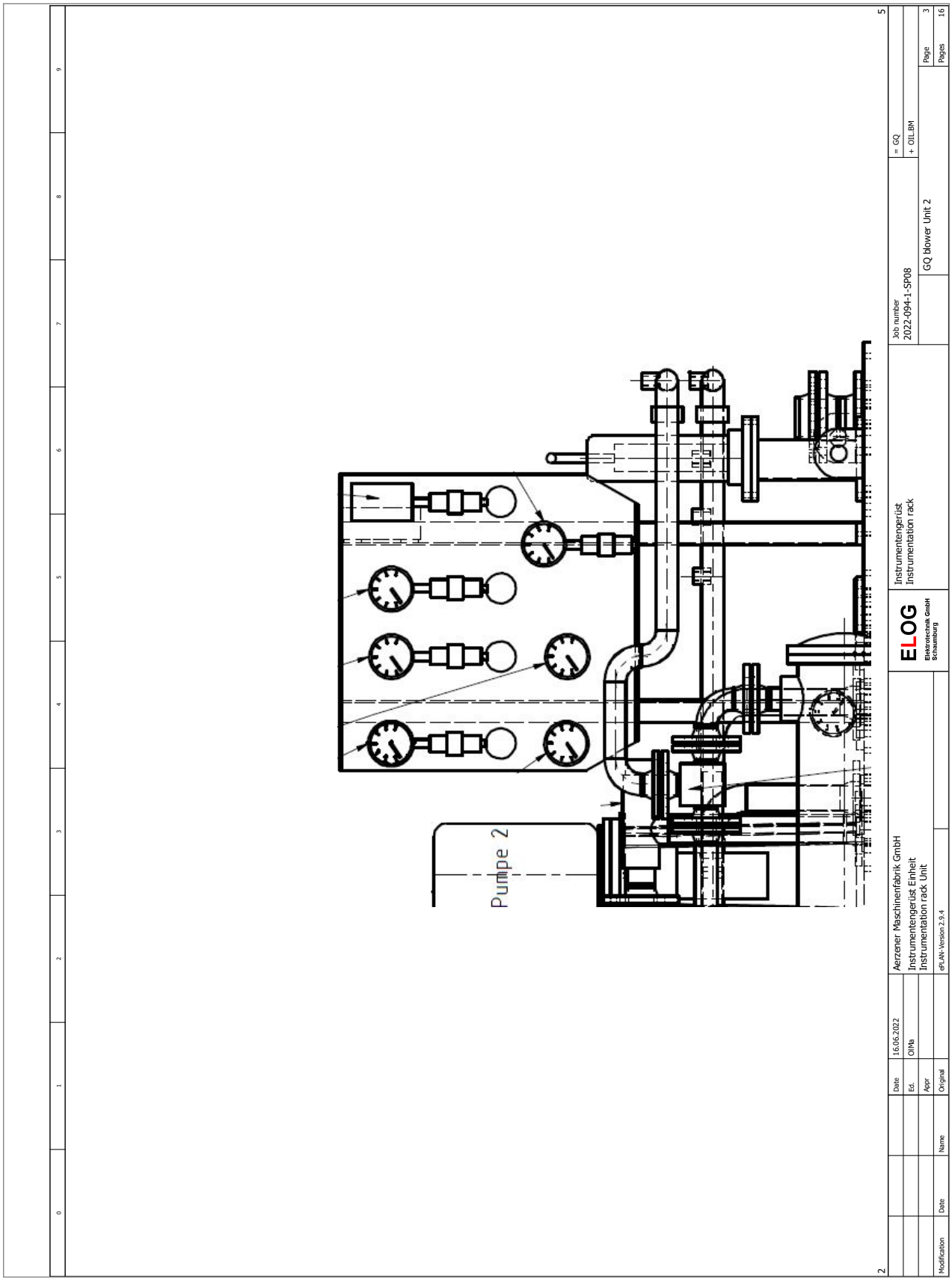
Pumpe 2
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
Date
16.06.2022
Ed.
OlMa
Appr
Original
Name
Date
Modification
ELOG
Elektrotechnik GmbH
Schaumburg
Instrumentengerüst
Instrumentation rack
Job number
2022-094-1-SP08
GQ Blower Unit 2
= GQ
+ OIL.BM
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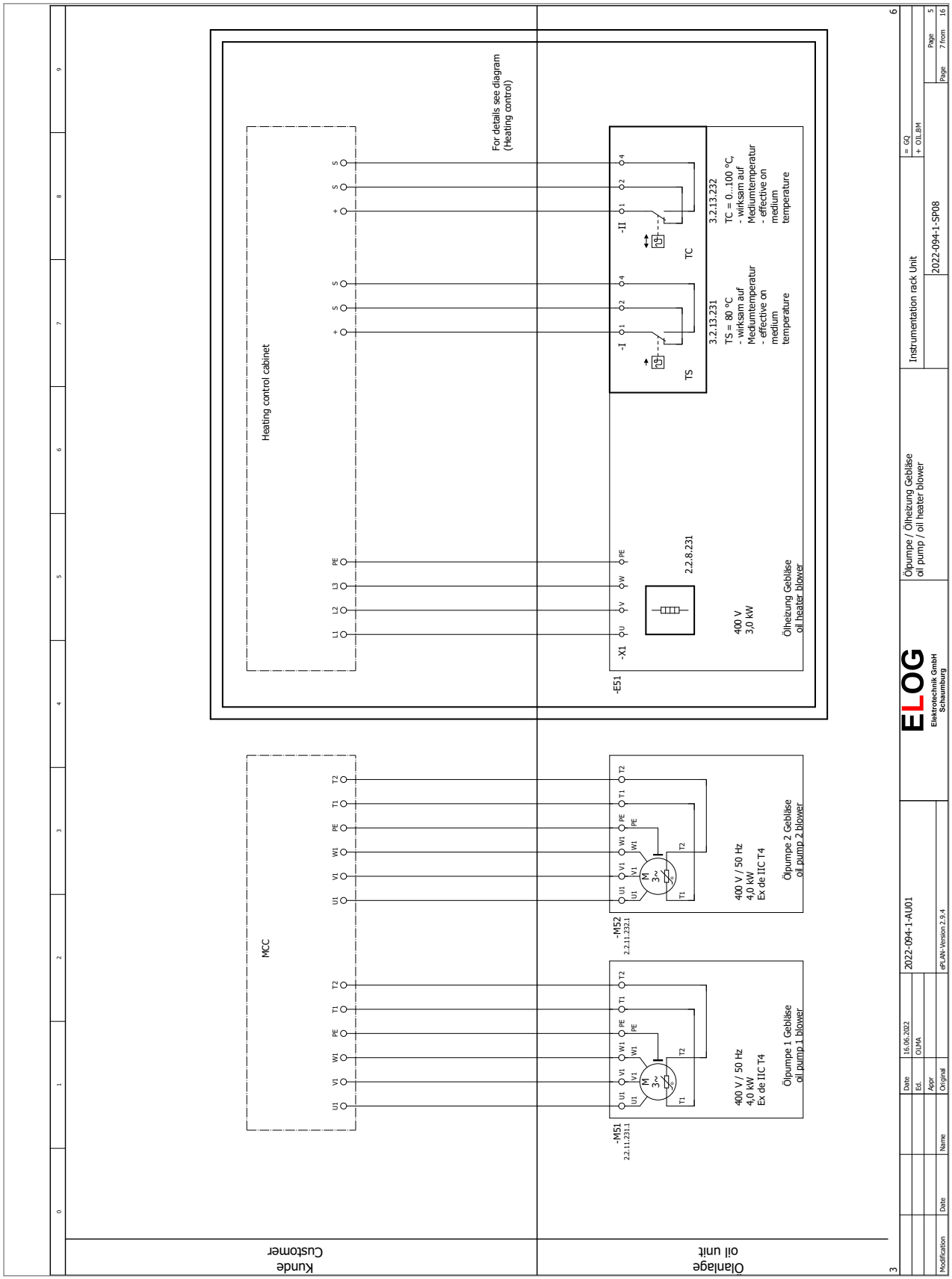
Heating control cabinet
For details see diagram
(Heating control)
L1
L2
L3
PE
S
S
+
-E51
-X1
U
V
W
PE
2.2.8.231
400 V
3,0 kW
Ölheizung Gebläse
oil heater blower
-I
-II
TS
TC
3.2.13.231
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.232
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
MCC
U1
V1
W1
PE
T1
T2
-M51
2.2.11.231.1
-M52
2.2.11.232.1
400 V / 50 Hz
4,0 kW
Ex de IIC T4
Ölpumpe 1 Gebläse
oil pump 1 blower
Ölpumpe 2 Gebläse
oil pump 2 blower
Kunde
Customer
Olanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
Ölpumpe / Ölheizung Gebläse
oil pump / oil heater blower
Instrumentation rack Unit
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+ OIL.BM
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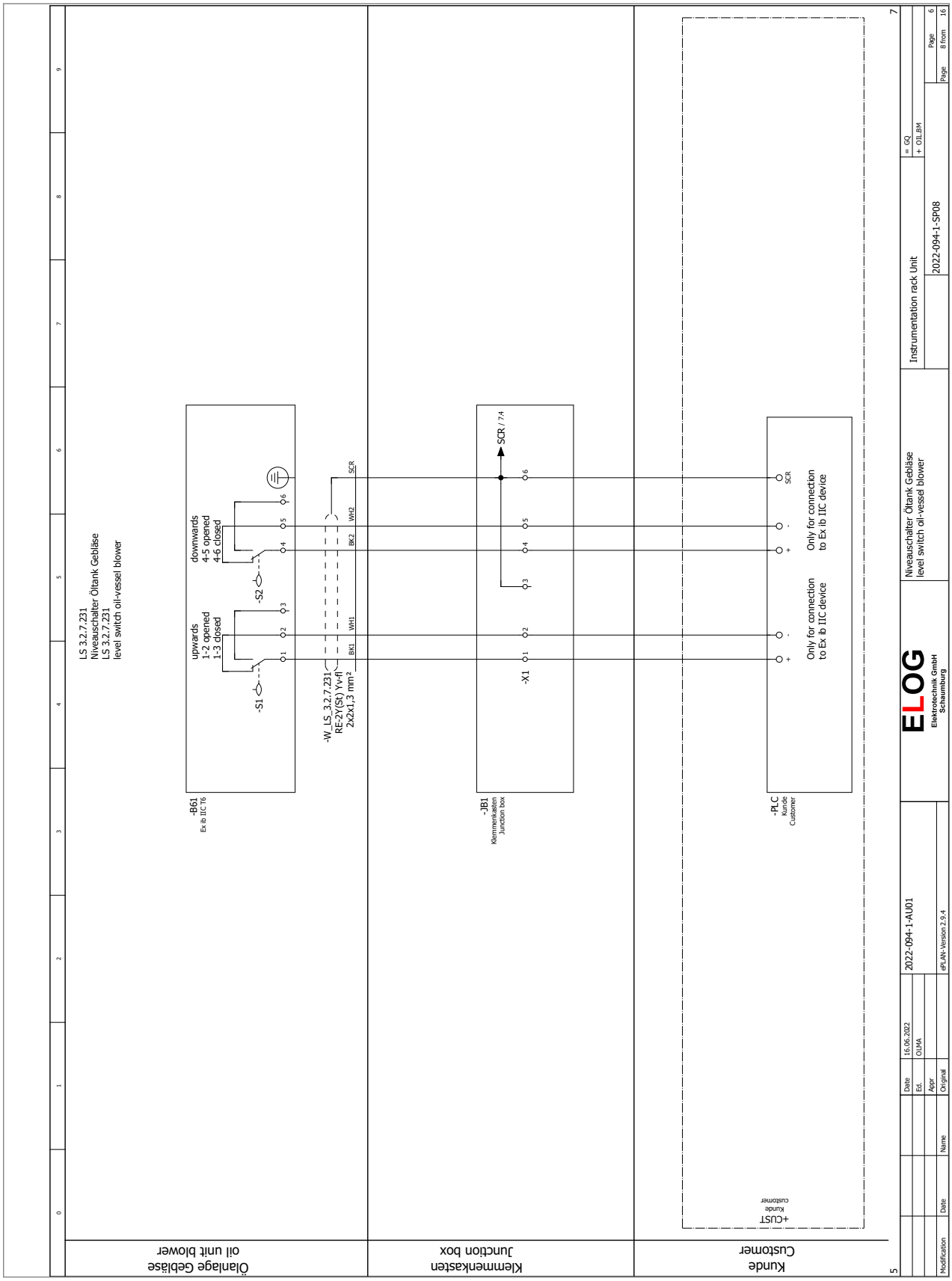
Date
Name


LS 3.2.7.231
Niveauschalter Öltank Gebläse
LS 3.2.7.231
level switch oil-vessel blower
-B61
Ex ib IIC T6
upwards
1-2 opened
1-3 closed
downwards
4-5 opened
4-6 closed
-S1
-S2
-W_LS_3.2.7.231
RE-2Y(St) Yv-fl
2x2x1,3 mm²
BK1
WH1
BK2
WH2
SCR
-JB1
Klemmenkasten
Junction box
-X1
SCR / 7.4
-PLC
Kunde
Customer
Only for connection
to Ex ib IIC device
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Niveauschalter Öltank Gebläse
level switch oil-vessel blower
Instrumentation rack Unit
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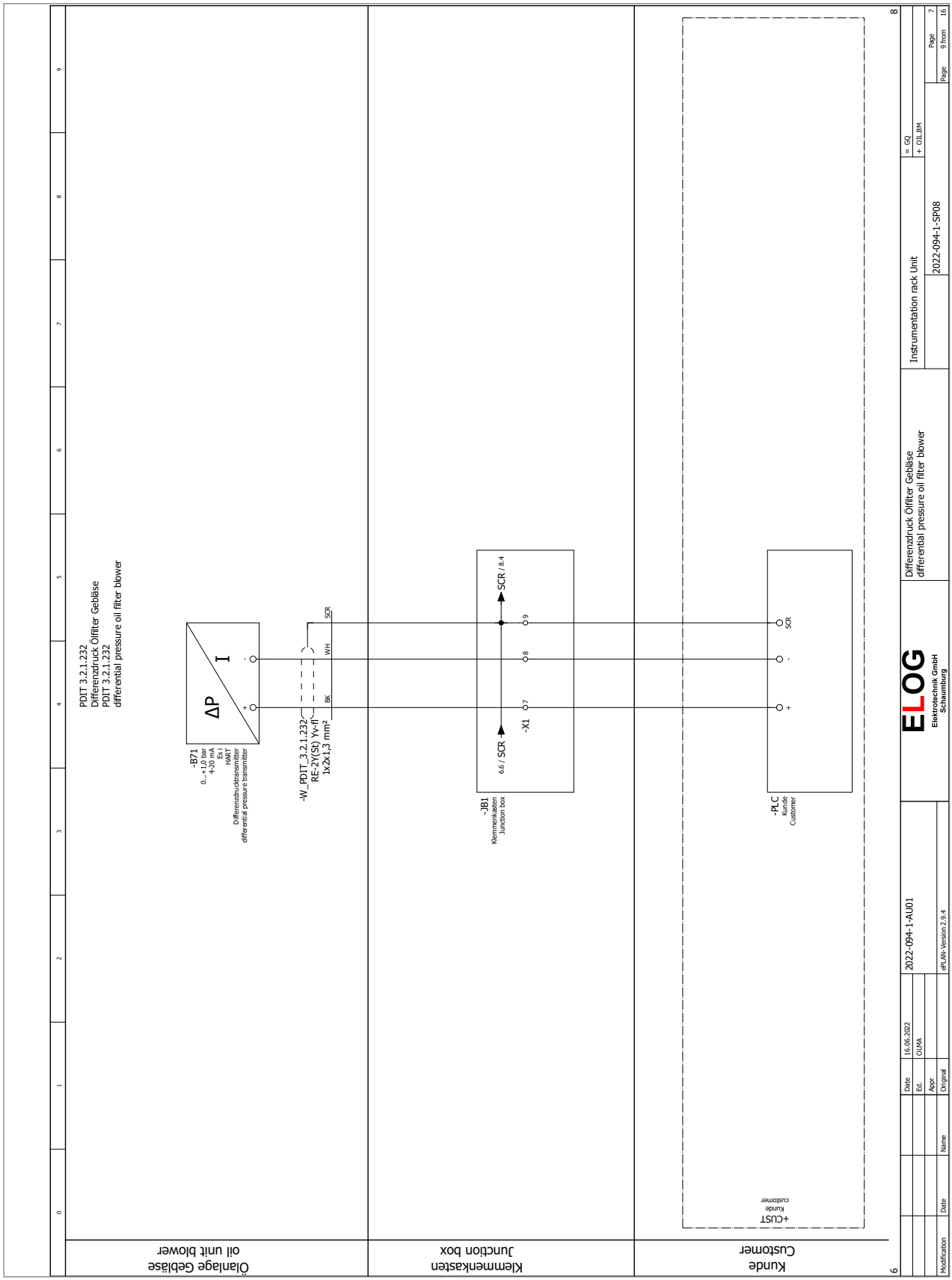
PDIT 3.2.1.232
Differenzdruck Ölfilter Gebläse
PDIT 3.2.1.232
differential pressure oil filter blower
-B71
0...+1,0 bar
4-20 mA
Ex
HART
Differenzdrucktransmitter
differential pressure transmitter
ΔP
I
+
-
-W_PDIT_3.2.1.232
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB1
Klemmenkasten
Junction box
6.6 / SCR
SCR / 8.4
-X1
7
8
9
-PLC
Kunde
Customer
SCR
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Gebläse
differential pressure oil filter blower
Instrumentation rack Unit
2022-094-1-SP08
= GQ
+ OIL.BM
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2022-094-1-AU01
Date 16.06.2022
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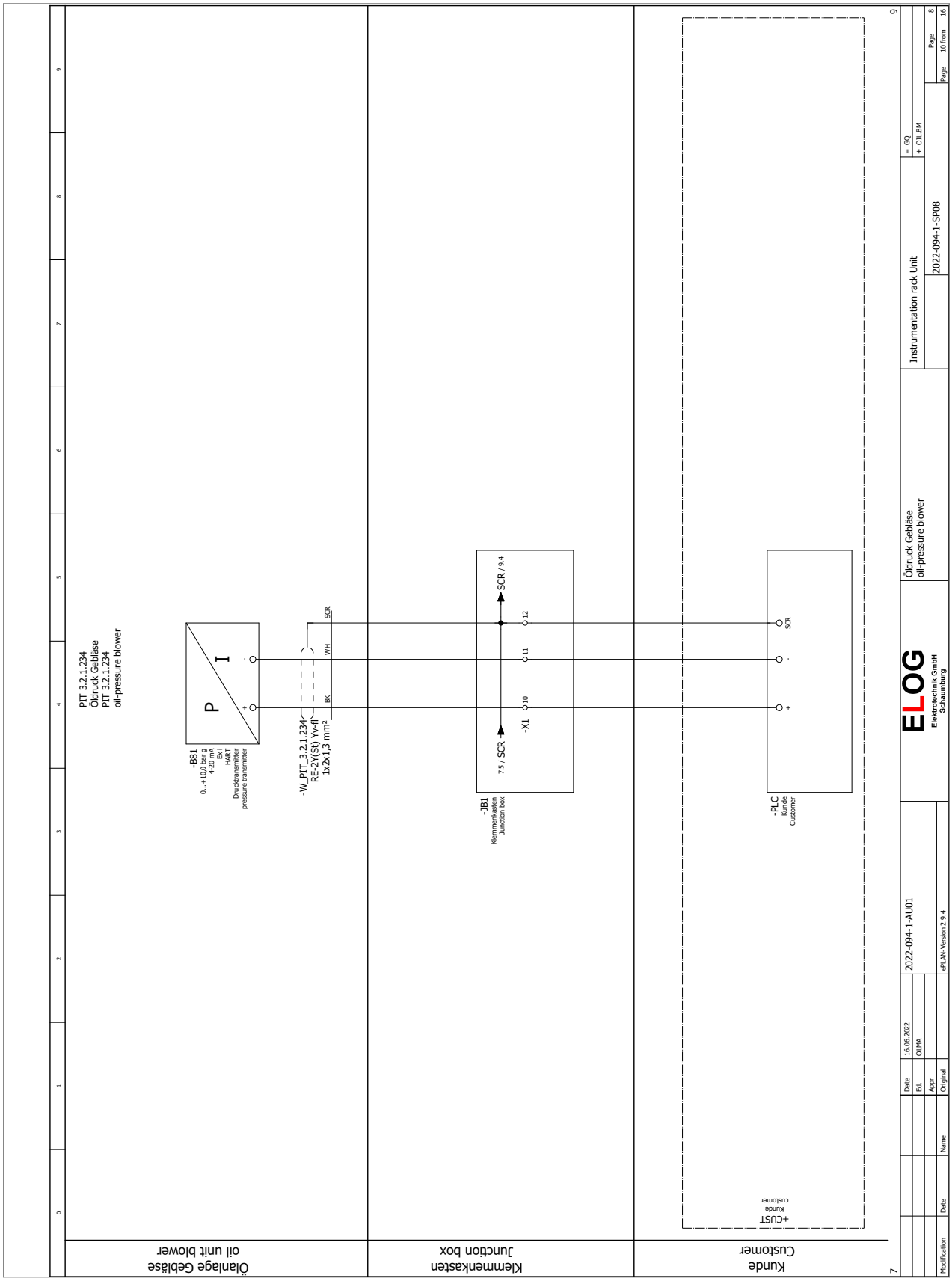
Original
ePLAN-Version 2.9.4
Modification
Date
Name


PIT 3.2.1.234
Öldruck Gebläse
PIT 3.2.1.234
oil-pressure blower
-B81
0...+10,0 bar g
4-20 mA
Ex i
HART
Drucktransmitter
pressure transmitter
P
I
-W_PIT_3.2.1.234
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB1
Klemmenkasten
Junction box
7.5 / SCR
SCR / 9.4
-X1
10
11
12
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Gebläse
oil-pressure blower
Instrumentation rack Unit
2022-094-1-SP08
= GQ
+ OIL.BM
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OUMA
Date
Ed.
Agpr
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Name
Date
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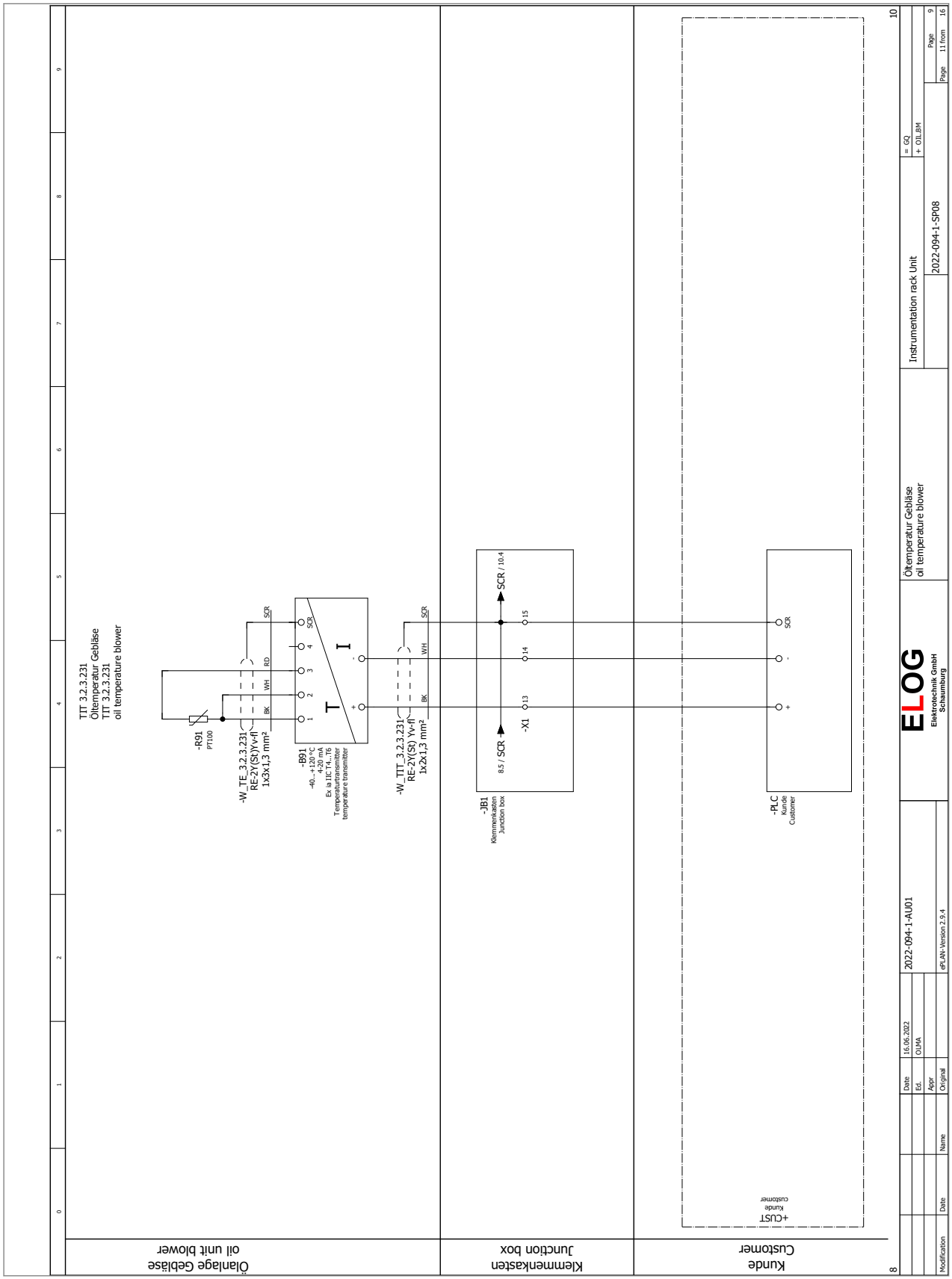
TIT 32.3.231
Öltemperatur Gebläse
TIT 32.3.231
oil temperature blower
-R91
PT100
-W_TE_32.3.231
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+120 °C
4-20 mA
Ex ia IIC T4...T6
Temperaturmessumformer
temperature transmitter
-W_TIT_3.2.3.231
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB1
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X1
13
14
15
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öltemperatur Gebläse
oil temperature blower
Instrumentation rack Unit
2022-094-1-SP08
= GQ
+ OIL.BM
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Original
Name
Date
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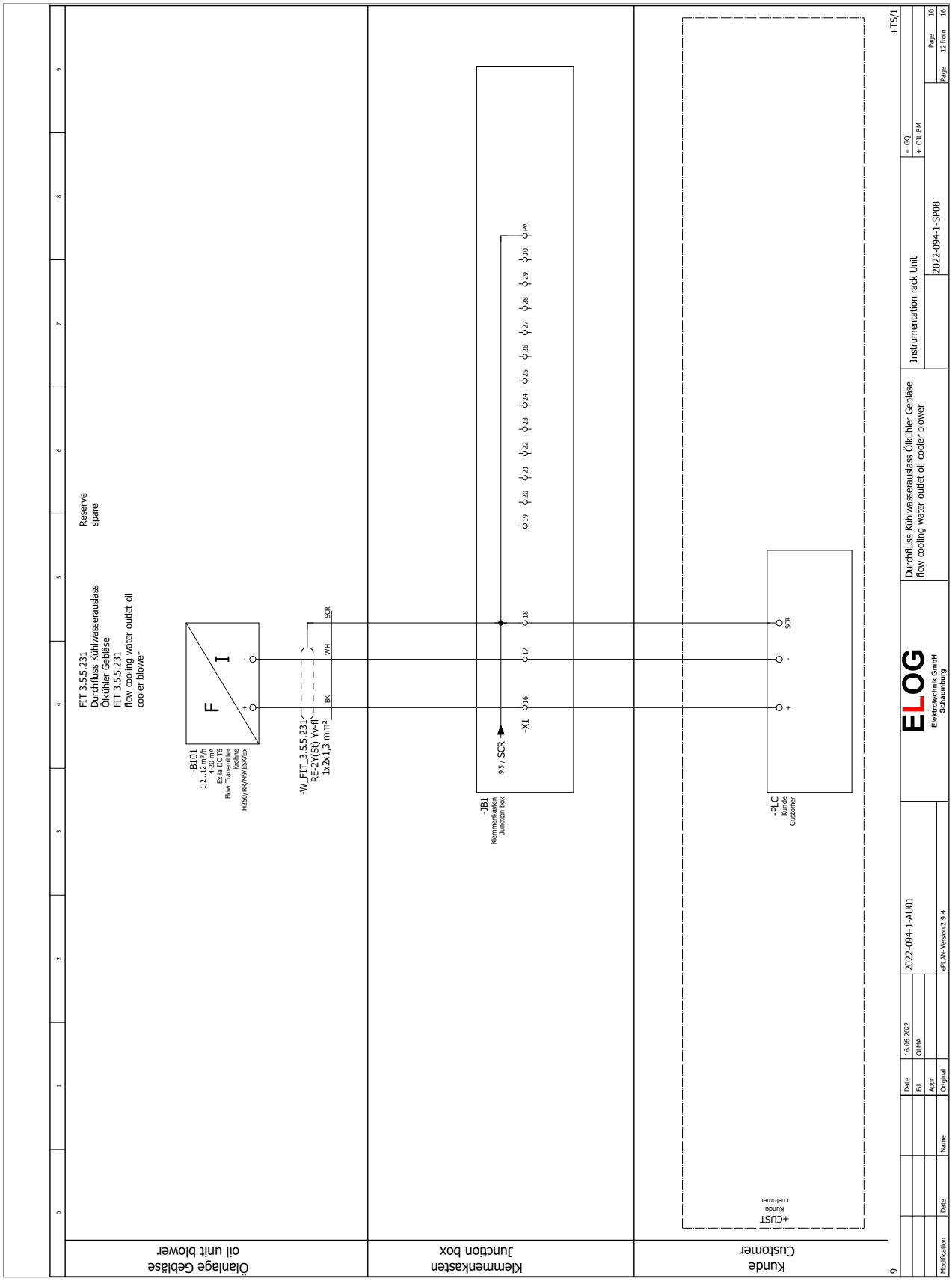
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
FIT 3.5.5.231
Durchfluss Kühlwasserauslass
Ölkühler Gebläse
FIT 3.5.5.231
flow cooling water outlet oil
cooler blower
Reserve
spare
-B101
1,2...12 m³/h
4-20 mA
Ex ia IIC T6
Flow Transmitter
Krohne
H250/R6/M9/ESK/Ex
F
I
-W_FIT_3.5.5.231
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB1
Klemmenkasten
Junction box
9.5 / SCR
-X1
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
PA
+CUST
Kunde
customer
-PLC
Kunde
Customer
SCR
+TS/1
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler Gebläse
flow cooling water outlet oil cooler blower
Instrumentation rack Unit
2022-094-1-SP08
= GQ
+ OILBM
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OUMA
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Date
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Ed.
Appr

Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	-W_FIT_3.5.5.231	-W_TIT_3.2.3.231	-W_PIT_3.2.1.234	-W_PDIT_3.2.1.232	-W_LS_3.2.7.231	Cable name	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	Page / column
	RE-ZY(SI) Yv-fl	RE-ZY(SI) Yv-fl	RE-ZY(SI) Yv-fl	RE-ZY(SI) Yv-fl	RE-ZY(SI) Yv-fl	cable type							cable type	
LS 3.2.7.231 Niveauschalter Öltank Gebläse LS 3.2.7.231 level switch oil-vessel blower					BK1		-B61	1	1		+CUST-PLC	+		/6.4
=					WH1		-B61	2	2		+CUST-PLC	-		/6.5
=									3					/6.5
=					BK2		-B61	4	4		+CUST-PLC	+		/6.5
=					WH2		-B61	5	5		+CUST-PLC	-		/6.5
=					SCR				6		+CUST-PLC	SCR		/6.6
PDIT 3.2.1.232 Differenzdruck Ölfilter Gebläse PDIT 3.2.1.232 differential pressure oil filter blower				BK			-B71	+	7		+CUST-PLC	+		/7.4
=				WH			-B71	-	8		+CUST-PLC	-		/7.4
=				SCR					9		+CUST-PLC	SCR		/7.5
PIT 3.2.1.234 Öldruck Gebläse PIT 3.2.1.234 oil-pressure blower			BK				-B81	+	10		+CUST-PLC	+		/8.4
=			WH				-B81	-	11		+CUST-PLC	-		/8.4
=			SCR						12		+CUST-PLC	SCR		/8.5
TIT 3.2.3.231 Öltemperatur Gebläse TIT 3.2.3.231 oil temperature blower		BK					-B91	+	13		+CUST-PLC	+		/9.4
=		WH					-B91	-	14		+CUST-PLC	-		/9.4
=		SCR							15		+CUST-PLC	SCR		/9.5
FIT 3.5.5.231 Durchfluss Kühlwasserauslass Ölkühler Gebläse FIT 3.5.5.231 flow cooling water outlet oil cooler blower	BK						-B101	+	16		+CUST-PLC	+		/10.4
=	WH						-B101	-	17		+CUST-PLC	-		/10.4
=	SCR								18		+CUST-PLC	SCR		/10.5
Reserve spare									19					/10.5
=									20					/10.6
=									21					/10.6
=									22					/10.6
=									23					/10.6
=									24					/10.6
=									25					/10.7

+OIL.BM/10 1.1

Modification	Date	Name			
			Date	16.06.2022	2022-094-1-AU01
			Ed.	OLMA	
			Appr		
			Original		ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Klemmenplan =GQ+OIL.BM-JB1-X1
Terminal diagram =GQ+OIL.BM-JB1-X1

Instrumentation rack Unit

2022-094-1-SP08

= GQ
+ TS

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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	Cable name / cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name / cable type	Page / column
Reserve spare				26					/10.7
=				27					/10.7
=				28					/10.7
=				29					/10.7
=				30					/10.8
=				PA					/10.8

1

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1	Instrumentation rack Unit
			Ed.	OLMA				= GQ + TS
			Appr					2022-094-1-SP08
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Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.BM-JB1	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

		Date	16.06.2022
		Ed.	OLMA
		Appr	
Modification	Date	Name	Original

2022-094-1-AU01

ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Artikelstückliste : STAHL.8146/2S71 - STAHL.814
6/2S71
Parts list : STAHL.8146/2S71 - STAHL.8146/2S71

Instrumentation rack Unit

2022-094-1-SP08

+CAB/1

= GQ
+ BOM

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Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.BM-W_FIT_3.5.5.231	+OIL.BM-JB1-X1	+OIL.BM-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.231 flow cooling water outlet oil cooler blower
+OIL.BM-W_LS_3.2.7.231	+OIL.BM-B61	+OIL.BM-JB1-X1	RE-2Y(St) Yv-fl	2x2	4	1,3 mm²	LS 3.2.7.231 level switch oil-vessel blower
+OIL.BM-W_PDIT_3.2.1.232	+OIL.BM-JB1-X1	+OIL.BM-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.232 differential pressure oil filter blower
+OIL.BM-W_PIT_3.2.1.234	+OIL.BM-JB1-X1	+OIL.BM-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.234 oil-pressure blower
+OIL.BM-W_TE_3.2.3.231	+OIL.BM-B91	+OIL.BM-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.231 oil temperature blower
+OIL.BM-W_TIT_3.2.3.231	+OIL.BM-JB1-X1	+OIL.BM-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Kabelübersicht : =GQ+OIL.BM-W_FIT_3.5.5.231 - =GQ+OIL.BM-W_TIT_3.2.3.231	Instrumentation rack Unit	= GQ
			Ed.	OLMA			Cable overview : =GQ+OIL.BM-W_FIT_3.5.5.231 - =GQ+OIL.BM-W_TIT_3.2.3.231		+ CAB
			Appr					2022-094-1-SP08	Page 1
Modification	Date	Name	Original		ePLAN-Version 2.9.4				Page 16 from 16

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

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ELOG Elektrotechnik GmbH
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email info@elog-gmbh.de
Homepage http://www.elog-gmbh.de

Auftraggeber customer

AERZEN

Aerzener Maschinenfabrik GmbH
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email info@aerzen.com
homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP09	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 3 GQ blower Unit 3

Erstellt am
Created on 16.06.2022

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200048|EAV2101639
H. Stöber

Anzahl der Seiten
Number of pages 16

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			Appr		
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ELOG Elektrotechnik GmbH Schaumburg

Deckblatt
Cover sheet

Instrumentation rack Unit

=
+

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F26_ELOG_Info

Typenschild
name plate

ELOG
Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH

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31559 Hohnhorst / Germany
Phone +49 (0) 5723 / 79807-0
Fax +49 (0) 5723 / 79807-10
E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP09
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

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Column X: An automatically generated page was edited

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Page name	Page x of 16	Page description	supplementary page field	Date	Edited by	X
/1	1	Deckblatt Cover sheet		16.06.2022	OlMa	X
/1.1	2	Allgemeine Informationen general information		16.06.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
=GQ+OIL.BM/1	4	Deckblatt Cover sheet		16.06.2022	OlMa	X
=GQ+OIL.BM/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.BM/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.BM/5	7	Ölpumpe / Ölheizung Gebläse oil pump / oil heater blower		16.06.2022	OlMa	
=GQ+OIL.BM/6	8	Niveauschalter Öltank Gebläse level switch oil-vessel blower		16.06.2022	OlMa	
=GQ+OIL.BM/7	9	Differenzdruck Ölfilter Gebläse differential pressure oil filter blower		16.06.2022	OlMa	
=GQ+OIL.BM/8	10	Öldruck Gebläse oil-pressure blower		16.06.2022	OlMa	
=GQ+OIL.BM/9	11	Öltemperatur Gebläse oil temperature blower		16.06.2022	OlMa	
=GQ+OIL.BM/10	12	Durchfluss Kühlwasserauslass Ölkühler Gebläse flow cooling water outlet oil cooler blower		16.06.2022	OlMa	
=GQ+TS/1	13	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1		16.06.2022	OlMa	
=GQ+TS/1.1	14	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1		16.06.2022	OlMa	
=GQ+BOM/1	15	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	16	Kabelübersicht : =GQ+OIL.BM-W_FIT_3.5.5.331 - =GQ+OIL.BM-W_TIT_3.2.3.331 Cable overview : =GQ+OIL.BM-W_FIT_3.5.5.331 - =GQ+OIL.BM-W_TIT_3.2.3.331		16.06.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

Hersteller Manufacturer

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Elektrotechnik GmbH
Schaumburg

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Auftraggeber customer

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Fax +49 (0)5154 / 81-9191

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP09	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 3

Klemmenkasten Ölanlage Gebläse Einheit 3
Junction box oil unit blower Unit 3

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH Instrumentengerüst Einheit Instrumentation rack Unit	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP09	= GQ + OIL.BM
			Ed.	OlMa				GQ blower Unit 3	Page 1
			Appr						Pages 16
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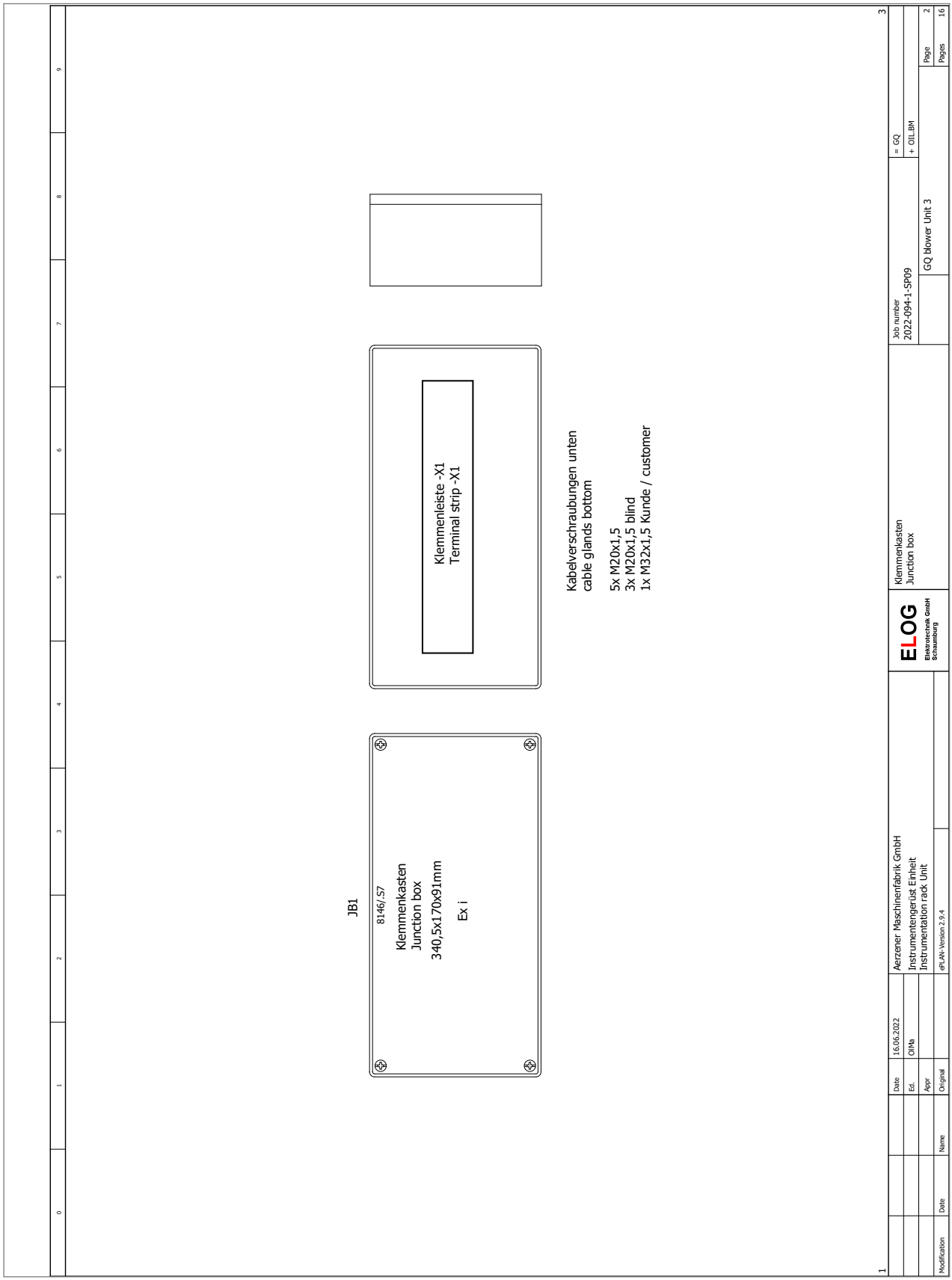
JB1
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X1
Terminal strip -X1
Kabelverschraubungen unten
cable glands bottom
5x M20x1,5
3x M20x1,5 blind
1x M32x1,5 Kunde / customer
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ELOG
Elektrotechnik GmbH
Schlaumburg
Klemmenkasten
Junction box
Job number
2022-094-1-SP09
GQ Blower Unit 3
= GQ
+ OIL.BM
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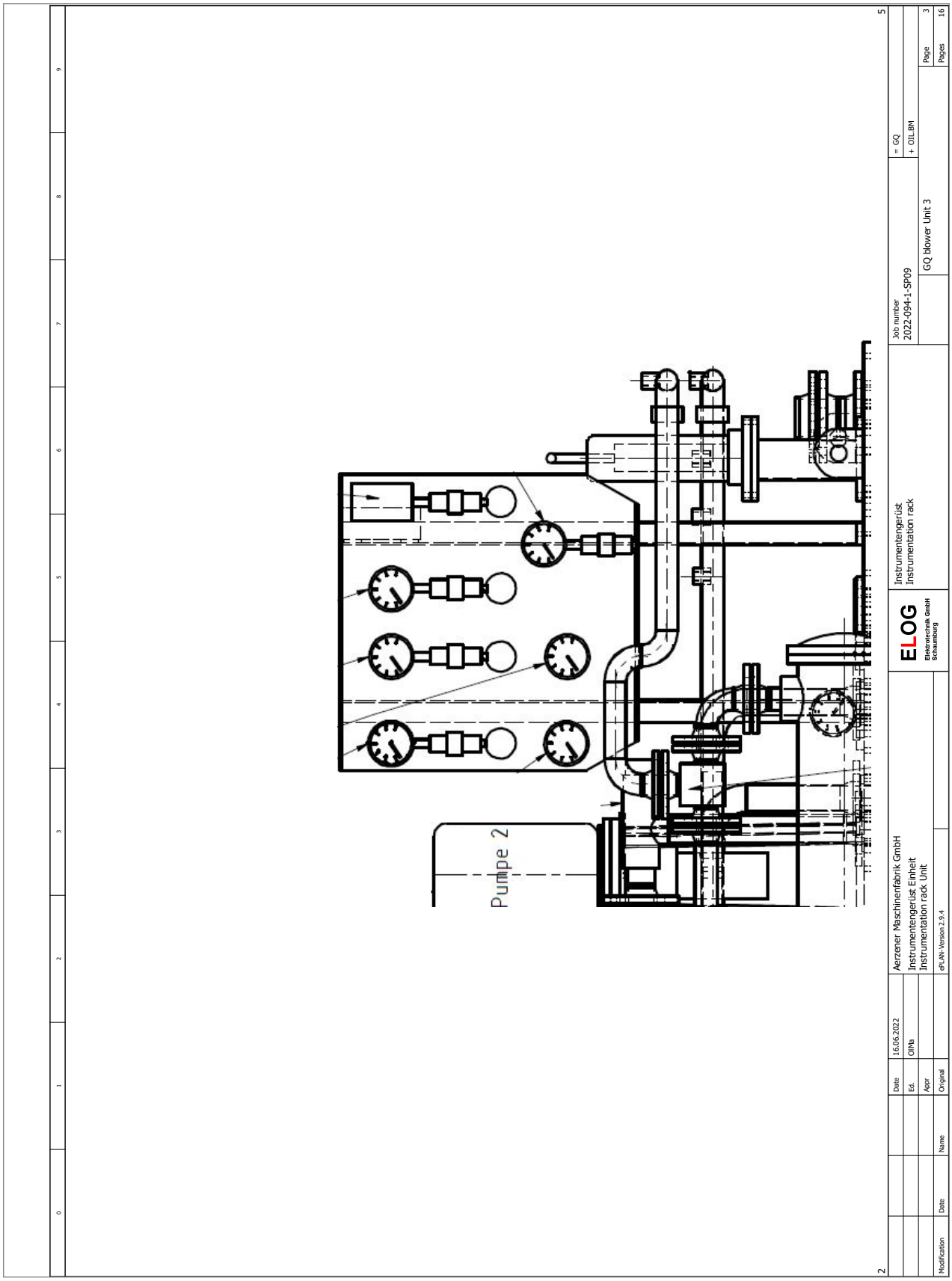
Pumpe 2
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
Date
16.06.2022
Ed.
OlMa
Appr
Original
Name
Date
Modification
ELOG
Elektrotechnik GmbH
Schaumburg
Instrumentengerüst
Instrumentation rack
Job number
2022-094-1-SP09
GQ Blower Unit 3
= GQ
+ OIL.BM
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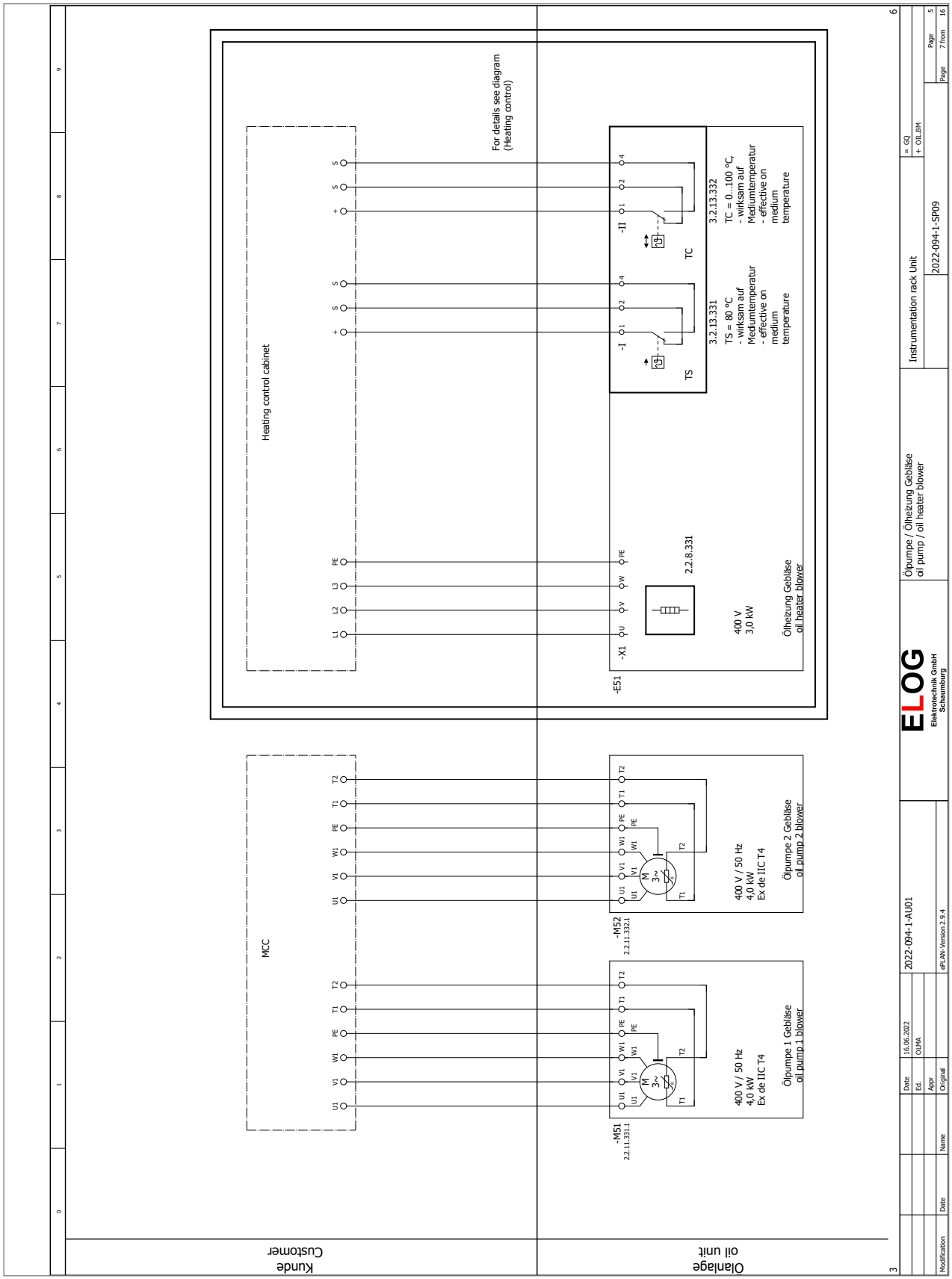
Heating control cabinet
For details see diagram
(Heating control)
L1
L2
L3
PE
S
S
+
-E51
-X1
U
V
W
PE
2.2.8.331
400 V
3,0 kW
Ölheizung Gebläse
oil heater blower
-I
-II
TS
TC
3.2.13.331
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.332
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
MCC
U1
V1
W1
PE
T1
T2
-M51
2.2.11.331.1
-M52
2.2.11.332.1
400 V / 50 Hz
4,0 kW
Ex de IIC T4
Ölpumpe 1 Gebläse
oil pump 1 blower
Ölpumpe 2 Gebläse
oil pump 2 blower
Kunde
Customer
Olanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
Ölpumpe / Ölheizung Gebläse
oil pump / oil heater blower
Instrumentation rack Unit
= GQ
+ OIL.BM
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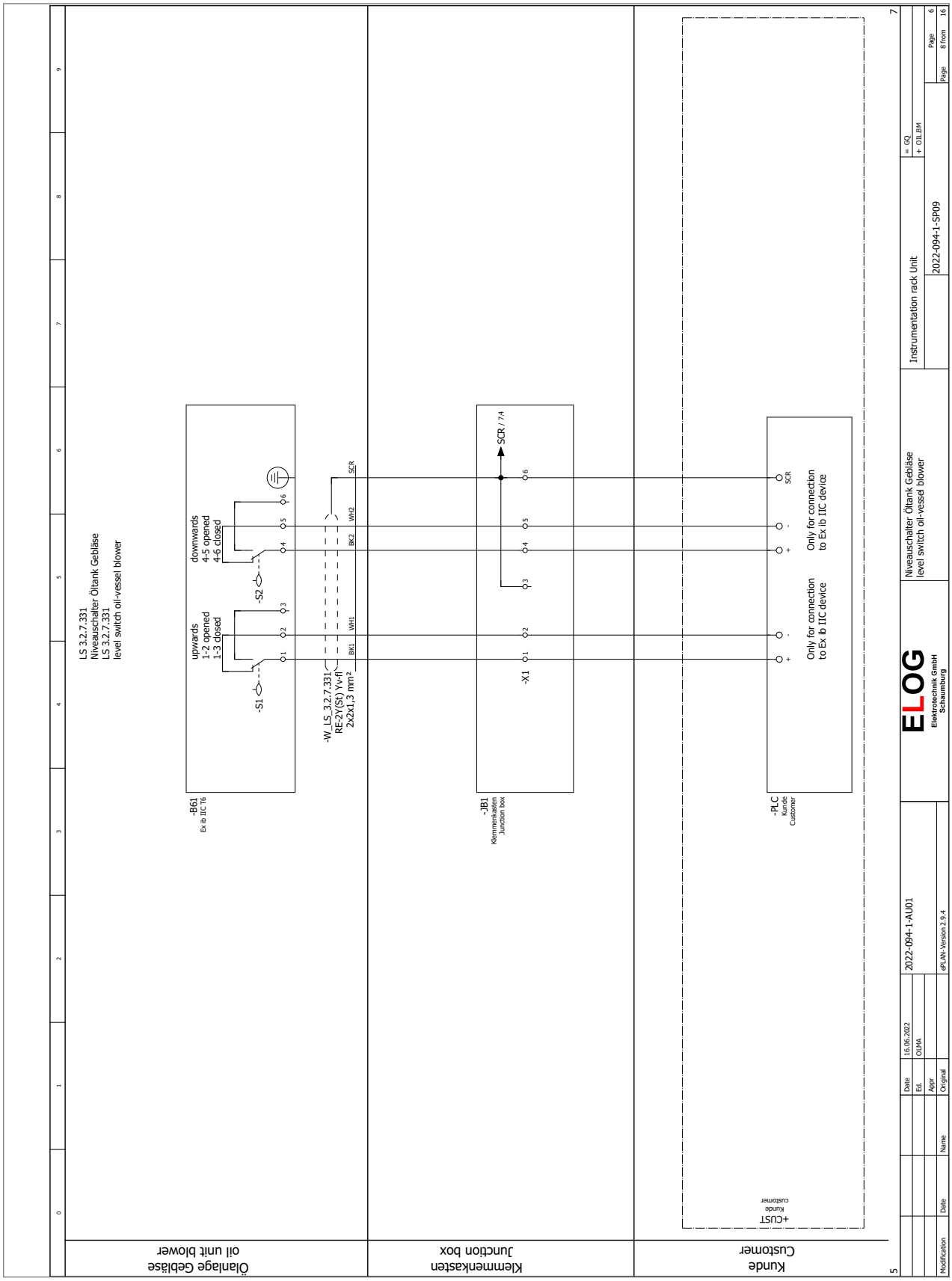
LS 3.2.7.331
Niveauschalter Öltank Gebläse
LS 3.2.7.331
level switch oil-vessel blower
-B61
Ex ib IIC T6
upwards
1-2 opened
1-3 closed
downwards
4-5 opened
4-6 closed
-S1
-S2
-W_LS_3.2.7.331
RE-2Y(St) Yv-fl
2x2x1,3 mm²
BK1
WH1
BK2
WH2
SCR
-JB1
Klemmenkasten
Junction box
-X1
SCR / 7.4
-PLC
Kunde
Customer
Only for connection
to Ex ib IIC device
Only for connection
to Ex ib IIC device
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Niveauschalter Öltank Gebläse
level switch oil-vessel blower
Instrumentation rack Unit
2022-094-1-SP09
= GQ
+ OILBM
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Date
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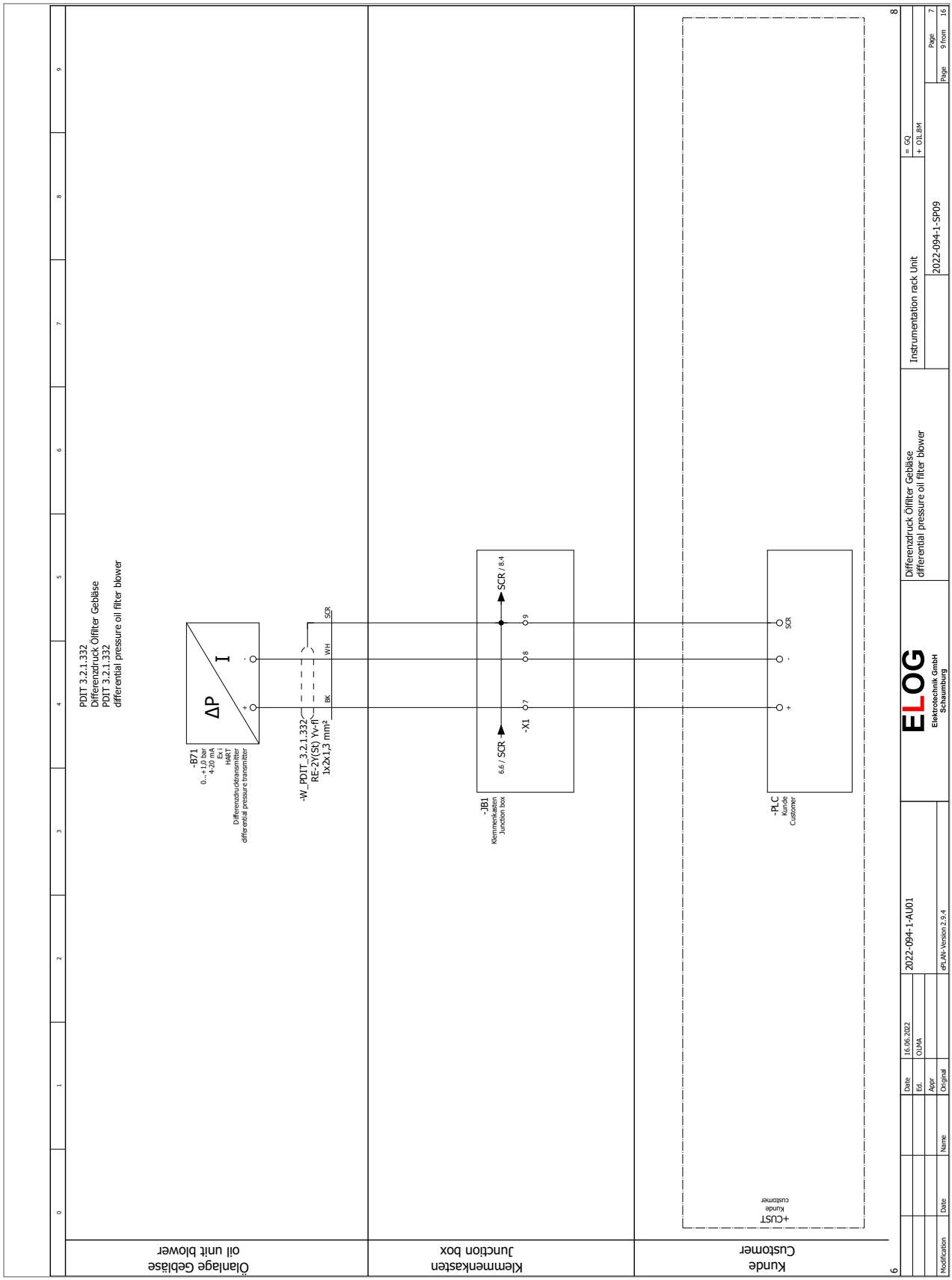
Date
Ed.
Appr
Original


PDIT 3.2.1.332
Differenzdruck Ölfilter Gebläse
PDIT 3.2.1.332
differential pressure oil filter blower
-B71
0...+1,0 bar
4-20 mA
Ex i
HART
Differenzdrucktransmitter
differential pressure transmitter
ΔP
I
+
-
-W_PDIT_3.2.1.332
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB1
Klemmenkasten
Junction box
6.6 / SCR
SCR / 8.4
-X1
7
8
9
-PLC
Kunde
Customer
SCR
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Gebläse
differential pressure oil filter blower
Instrumentation rack Unit
2022-094-1-SP09
= GQ
+ OIL.BM
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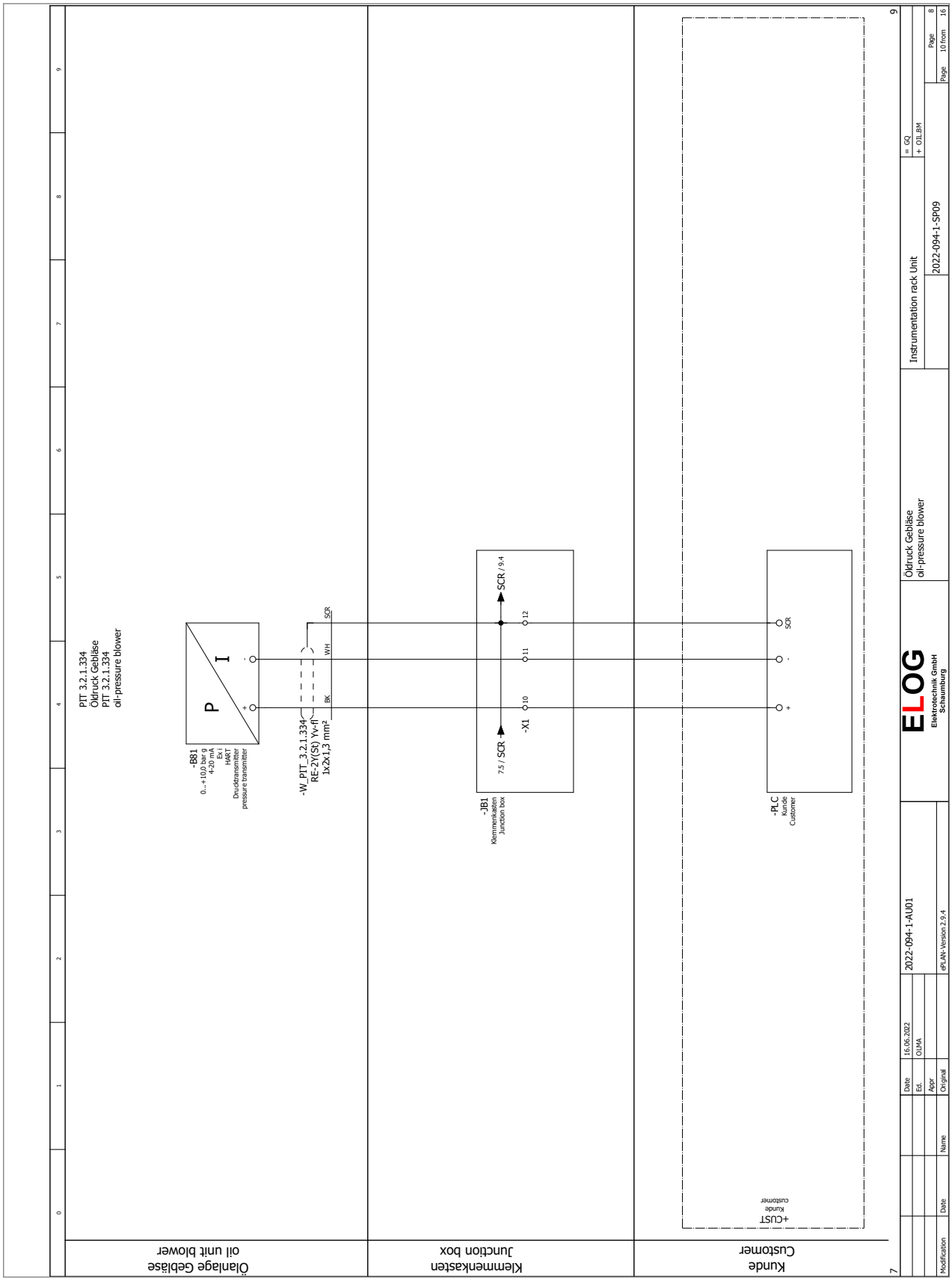
Original
Name
Date
Modification
ePLAN-Version 2.9.4


PIT 3.2.1.334
Öldruck Gebläse
PIT 3.2.1.334
oil-pressure blower
-B81
0...+10,0 bar g
4-20 mA
Ex i
HART
Drucktransmitter
pressure transmitter
-W_PIT_3.2.1.334
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB1
Klemmenkasten
Junction box
7.5 / SCR
SCR / 9.4
-X1
12
11
10
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Gebläse
oil-pressure blower
Instrumentation rack Unit
2022-094-1-SP09
= GQ
+ OIL.BM
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Date
Modification
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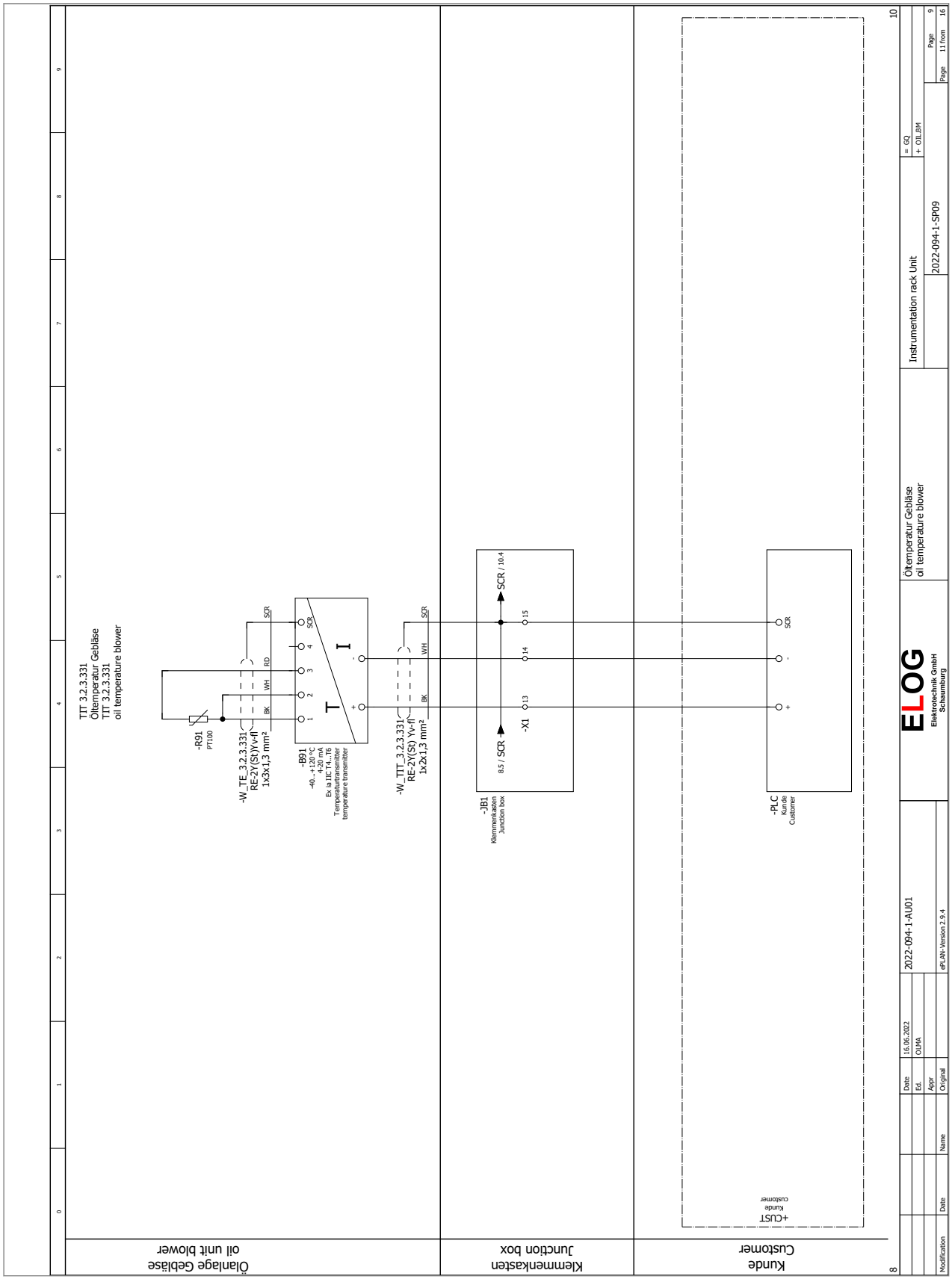
TIT 32.3.331
Öltemperatur Gebläse
TIT 32.3.331
oil temperature blower
-R91
PT100
-W_TE_32.3.331
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+120 °C
4-20 mA
Ex ia IIC T4...T6
Temperaturtransmitter
temperature transmitter
-W_TIT_3.2.3.331
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR / 10.4
8.5 / SCR
-X1
-JB1
Klemmenkasten
Junction box
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öltemperatur Gebläse
oil temperature blower
Instrumentation rack Unit
2022-094-1-SP09
= GQ
+ OIL.BM
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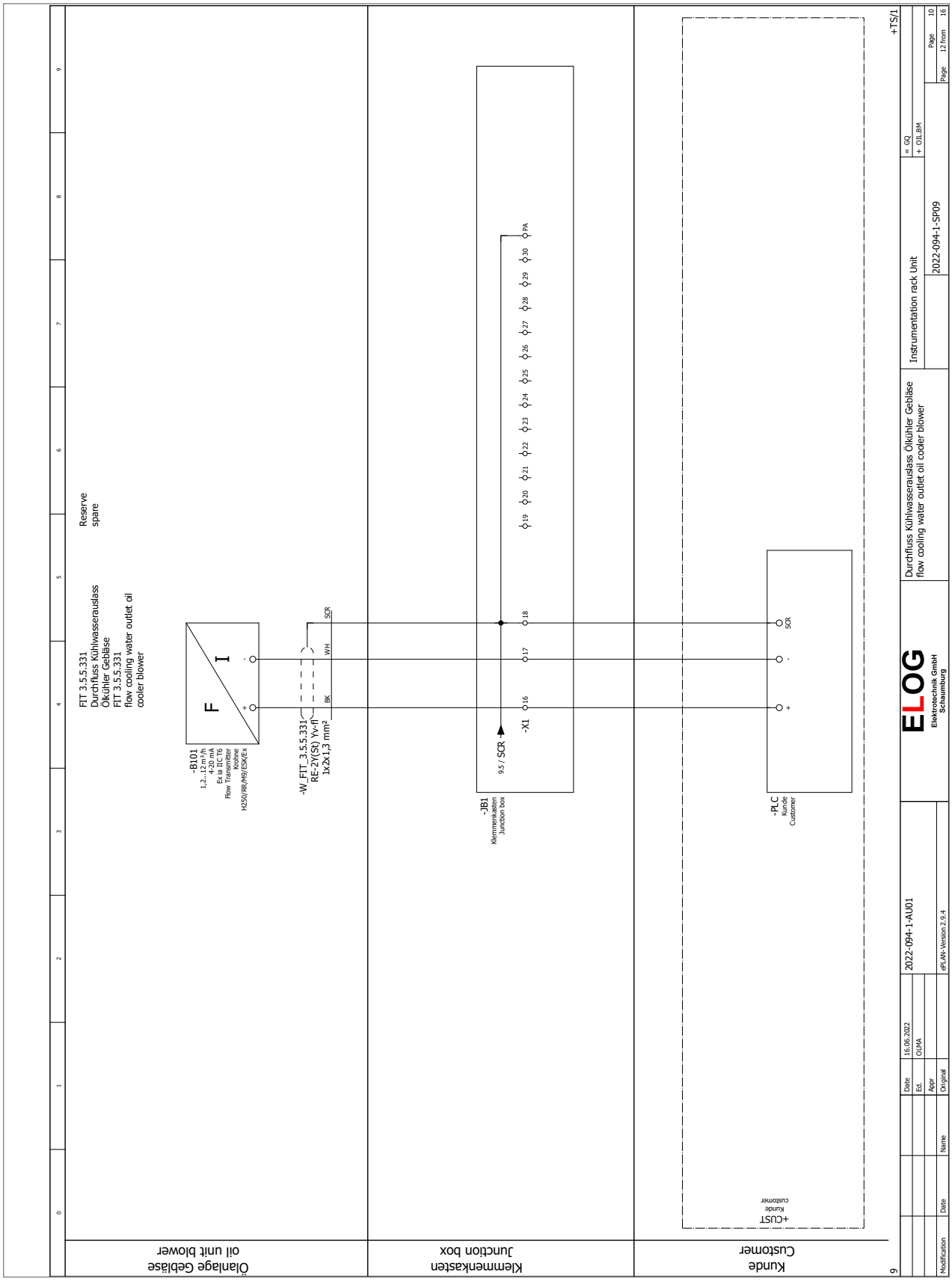
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
FIT 3.5.5.331
Durchfluss Kühlwasserauslass
Ölkühler Gebläse
FIT 3.5.5.331
flow cooling water outlet oil
cooler blower
Reserve
spare
-B101
1,2...12 m³/h
4-20 mA
Ex ia IIC T6
Flow Transmitter
Krohne
H250/R6/M9/ESX/Ex
-W_FIT_3.5.5.331
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB1
Klemmenkasten
Junction box
9.5 / SCR
-X1
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
PA
+CUST
Kunde
customer
-PLC
Kunde
Customer
SCR
+TS/1
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler Gebläse
flow cooling water outlet oil cooler blower
Instrumentation rack Unit
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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	-W_FIT_3.5.5.331 RE-ZY(SS) Yv-fl	-W_TIT_3.2.3.331 RE-ZY(SS) Yv-fl	-W_PIT_3.2.1.334 RE-ZY(SS) Yv-fl	-W_PDIT_3.2.1.332 RE-ZY(SS) Yv-fl	-W_LS_3.2.7.331 RE-ZY(SS) Yv-fl	Cable name / cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name / cable type	Page / column
LS 3.2.7.331 Niveauschalter Öltank Gebläse LS 3.2.7.331 level switch oil-vessel blower					BK1		-B61	1	1		+CUST-PLC	+		/6.4
=					WH1		-B61	2	2		+CUST-PLC	-		/6.5
=									3					/6.5
=					BK2		-B61	4	4		+CUST-PLC	+		/6.5
=					WH2		-B61	5	5		+CUST-PLC	-		/6.5
=					SCR				6		+CUST-PLC	SCR		/6.6
PDIT 3.2.1.332 Differenzdruck Ölfilter Gebläse PDIT 3.2.1.332 differential pressure oil filter blower				BK			-B71	+	7		+CUST-PLC	+		/7.4
=				WH			-B71	-	8		+CUST-PLC	-		/7.4
=				SCR					9		+CUST-PLC	SCR		/7.5
PIT 3.2.1.334 Öldruck Gebläse PIT 3.2.1.334 oil-pressure blower			BK				-B81	+	10		+CUST-PLC	+		/8.4
=			WH				-B81	-	11		+CUST-PLC	-		/8.4
=			SCR						12		+CUST-PLC	SCR		/8.5
TIT 3.2.3.331 Öltemperatur Gebläse TIT 3.2.3.331 oil temperature blower		BK					-B91	+	13		+CUST-PLC	+		/9.4
=		WH					-B91	-	14		+CUST-PLC	-		/9.4
=		SCR							15		+CUST-PLC	SCR		/9.5
FIT 3.5.5.331 Durchfluss Kühlwasserauslass Ölkühler Gebläse FIT 3.5.5.331 flow cooling water outlet oil cooler blower	BK						-B101	+	16		+CUST-PLC	+		/10.4
=	WH						-B101	-	17		+CUST-PLC	-		/10.4
=	SCR								18		+CUST-PLC	SCR		/10.5
Reserve spare									19					/10.5
=									20					/10.6
=									21					/10.6
=									22					/10.6
=									23					/10.6
=									24					/10.6
=									25					/10.7

+OIL.BM/10 1.1

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			Appr		
			Original		ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Klemmenplan =GQ+OIL.BM-JB1-X1
Terminal diagram =GQ+OIL.BM-JB1-X1

Instrumentation rack Unit
2022-094-1-SP09

= GQ
+ TS
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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	Cable name / cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name / cable type	Page / column
Reserve spare				26					/10.7
=				27					/10.7
=				28					/10.7
=				29					/10.7
=				30					/10.8
=				PA					/10.8

1

+BOM/1

			Date	16.06.2022	2022-094-1-AU01
			Ed.	OLMA	
			Appr		
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ELOG
Elektrotechnik GmbH
Schaumburg

Klemmenplan =GQ+OIL.BM-JB1-X1
Terminal diagram =GQ+OIL.BM-JB1-X1

Instrumentation rack Unit

= GQ
+ TS

2022-094-1-SP09

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Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.BM-JB1	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

		Date	16.06.2022
		Ed.	OLMA
		Appr	
Modification	Date	Name	Original

2022-094-1-AU01

ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Artikelstückliste : STAHL.8146/2S71 - STAHL.814
6/2S71
Parts list : STAHL.8146/2S71 - STAHL.8146/2S71

Instrumentation rack Unit

2022-094-1-SP09

+CAB/1

= GQ
+ BOM

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Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.BM-W_FIT_3.5.5.331	+OIL.BM-JB1-X1	+OIL.BM-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.331 flow cooling water outlet oil cooler blower
+OIL.BM-W_LS_3.2.7.331	+OIL.BM-B61	+OIL.BM-JB1-X1	RE-2Y(St) Yv-fl	2x2	4	1,3 mm²	LS 3.2.7.331 level switch oil-vessel blower
+OIL.BM-W_PDIT_3.2.1.332	+OIL.BM-JB1-X1	+OIL.BM-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.332 differential pressure oil filter blower
+OIL.BM-W_PIT_3.2.1.334	+OIL.BM-JB1-X1	+OIL.BM-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.334 oil-pressure blower
+OIL.BM-W_TE_3.2.3.331	+OIL.BM-B91	+OIL.BM-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.331 oil temperature blower
+OIL.BM-W_TIT_3.2.3.331	+OIL.BM-JB1-X1	+OIL.BM-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

ELOG Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH
Nordbrucher Straße 6
31559 Hohnhorst / Germany
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email info@elog-gmbh.de
Homepage http://www.elog-gmbh.de

Auftraggeber customer

AERZEN

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31855 Aerzen / Germany
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Fax +49 (0)5154 / 81-9191
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homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP10	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 4 GQ blower Unit 4

Erstellt am
Created on 16.06.2022

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200049|EAV2101639
H. Stöber

Anzahl der Seiten
Number of pages 16

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			Appr		
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ELOG Elektrotechnik GmbH Schaumburg

Deckblatt
Cover sheet

Instrumentation rack Unit
=
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F26_ELOG_Info

Typenschild
name plate

ELOG
Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH

Nordbrucher Straße 6
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Fax +49 (0) 5723 / 79807-10
E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP10
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

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Page name	Page x of 16	Page description	supplementary page field	Date	Edited by	X
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/1.1	2	Allgemeine Informationen general information		16.06.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
=GQ+OIL.BM/1	4	Deckblatt Cover sheet		16.06.2022	OlMa	X
=GQ+OIL.BM/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.BM/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.BM/5	7	Ölpumpe / Ölheizung Gebläse oil pump / oil heater blower		16.06.2022	OlMa	
=GQ+OIL.BM/6	8	Niveauschalter Öltank Gebläse level switch oil-vessel blower		16.06.2022	OlMa	
=GQ+OIL.BM/7	9	Differenzdruck Ölfilter Gebläse differential pressure oil filter blower		16.06.2022	OlMa	
=GQ+OIL.BM/8	10	Öldruck Gebläse oil-pressure blower		16.06.2022	OlMa	
=GQ+OIL.BM/9	11	Öltemperatur Gebläse oil temperature blower		16.06.2022	OlMa	
=GQ+OIL.BM/10	12	Durchfluss Kühlwasserauslass Ölkühler Gebläse flow cooling water outlet oil cooler blower		16.06.2022	OlMa	
=GQ+TS/1	13	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1		16.06.2022	OlMa	
=GQ+TS/1.1	14	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1		16.06.2022	OlMa	
=GQ+BOM/1	15	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	16	Kabelübersicht : =GQ+OIL.BM-W_FIT_3.5.5.431 - =GQ+OIL.BM-W_TIT_3.2.3.431 Cable overview : =GQ+OIL.BM-W_FIT_3.5.5.431 - =GQ+OIL.BM-W_TIT_3.2.3.431		16.06.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

Hersteller Manufacturer

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Elektrotechnik GmbH
Schaumburg

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Auftraggeber customer

AERZEN

Aerzener Maschinenfabrik GmbH
Reherweg 28
31855 Aerzen / Germany
Phone +49 (0)5154 / 81-0
Fax +49 (0)5154 / 81-9191

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP10	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 4

Klemmenkasten Ölanlage Gebläse Einheit 4
Junction box oil unit blower Unit 4

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH Instrumentengerüst Einheit Instrumentation rack Unit	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP10	= GQ + OIL.BM
			Ed.	OlMa				GQ blower Unit 4	Page 1
			Appr						Pages 16
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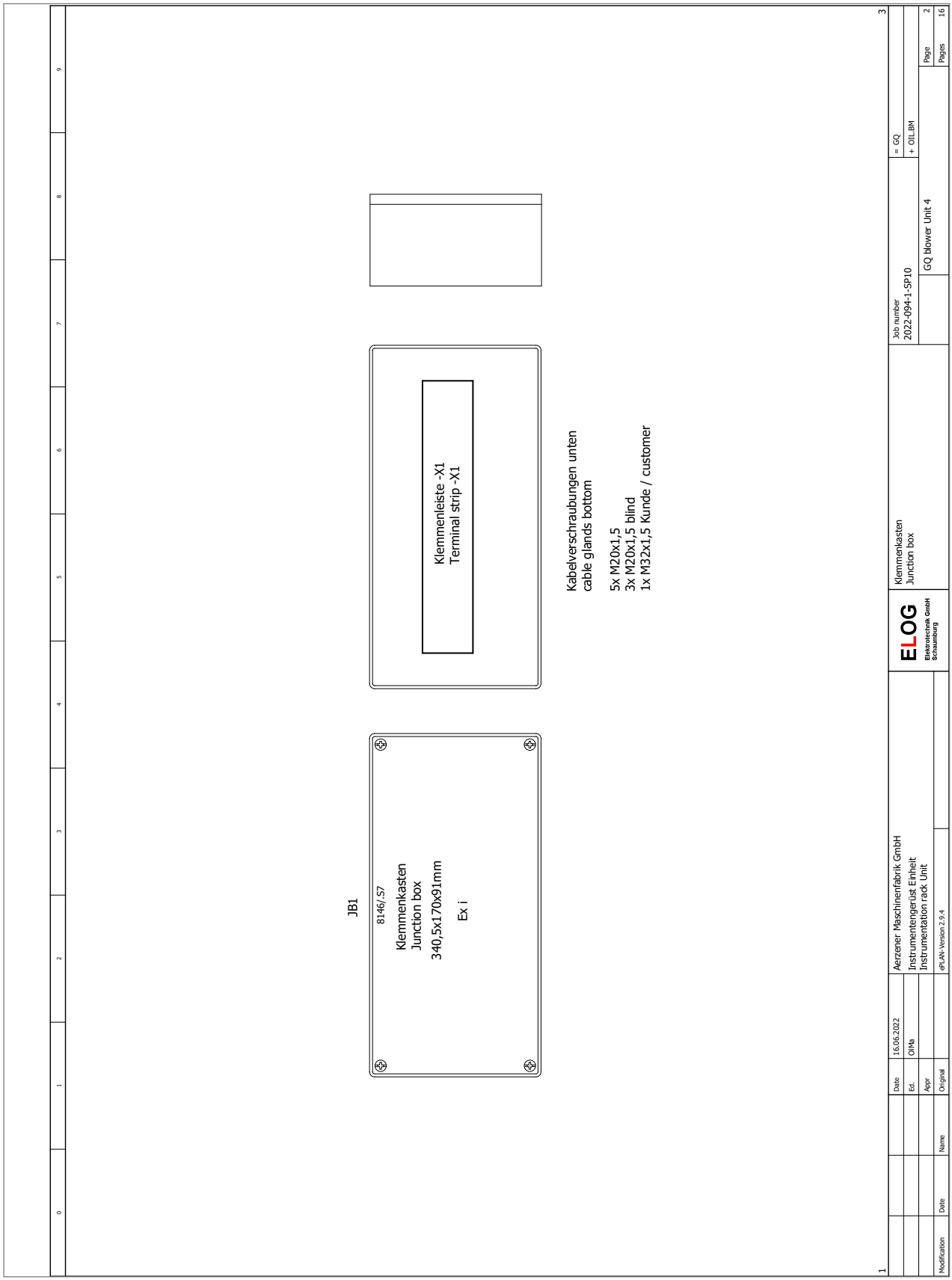
JB1
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X1
Terminal strip -X1
Kabelverschraubungen unten
cable glands bottom
5x M20x1,5
3x M20x1,5 blind
1x M32x1,5 Kunde / customer
Date 16.06.2022
Ed. OlMa
Appr
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Date
Modification
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schlaumburg
Klemmenkasten
Junction box
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GQ Blower Unit 4
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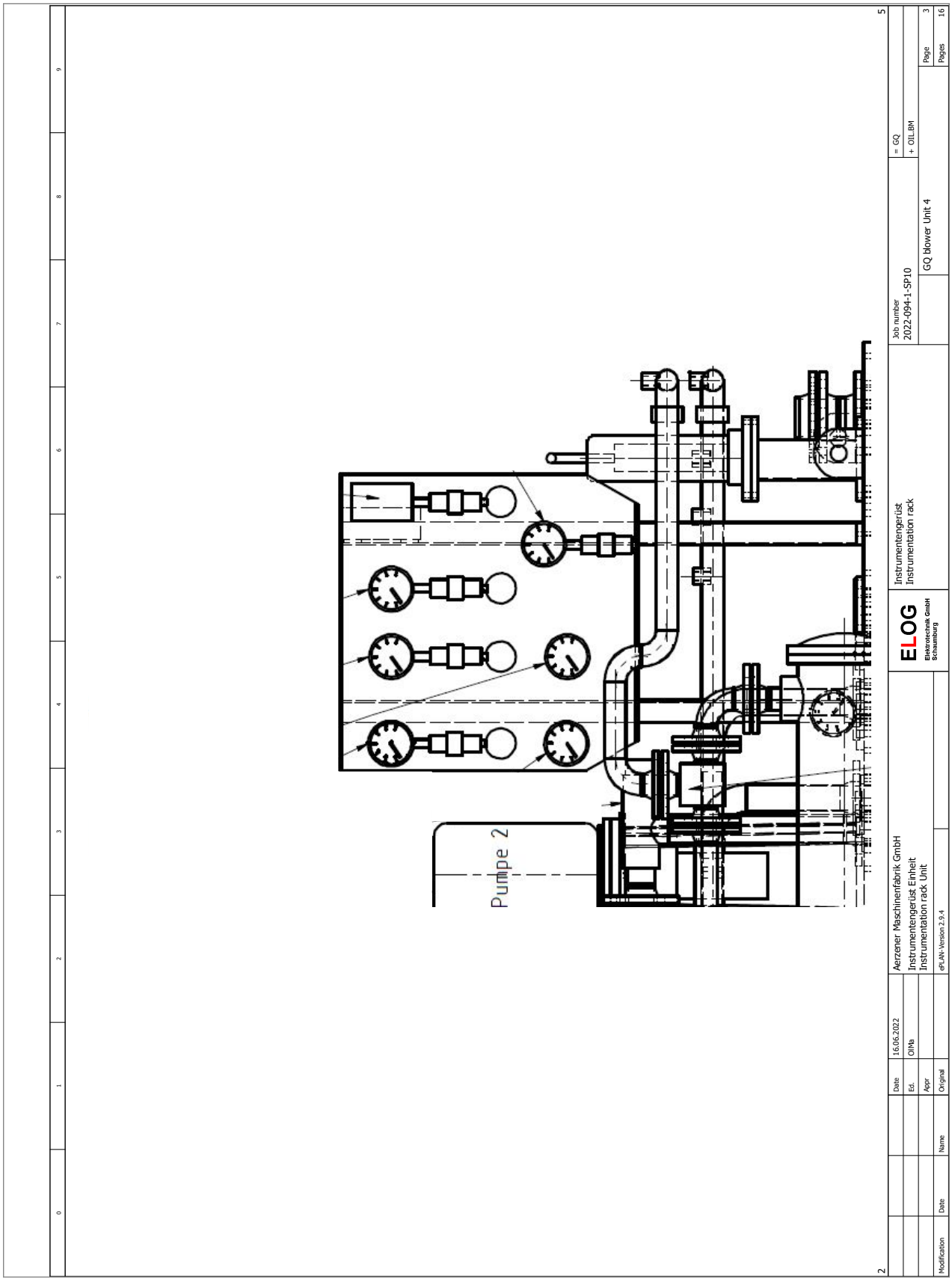
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Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
eFLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schaumburg
Instrumentengerüst
Instrumentation rack
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GQ Blower Unit 4
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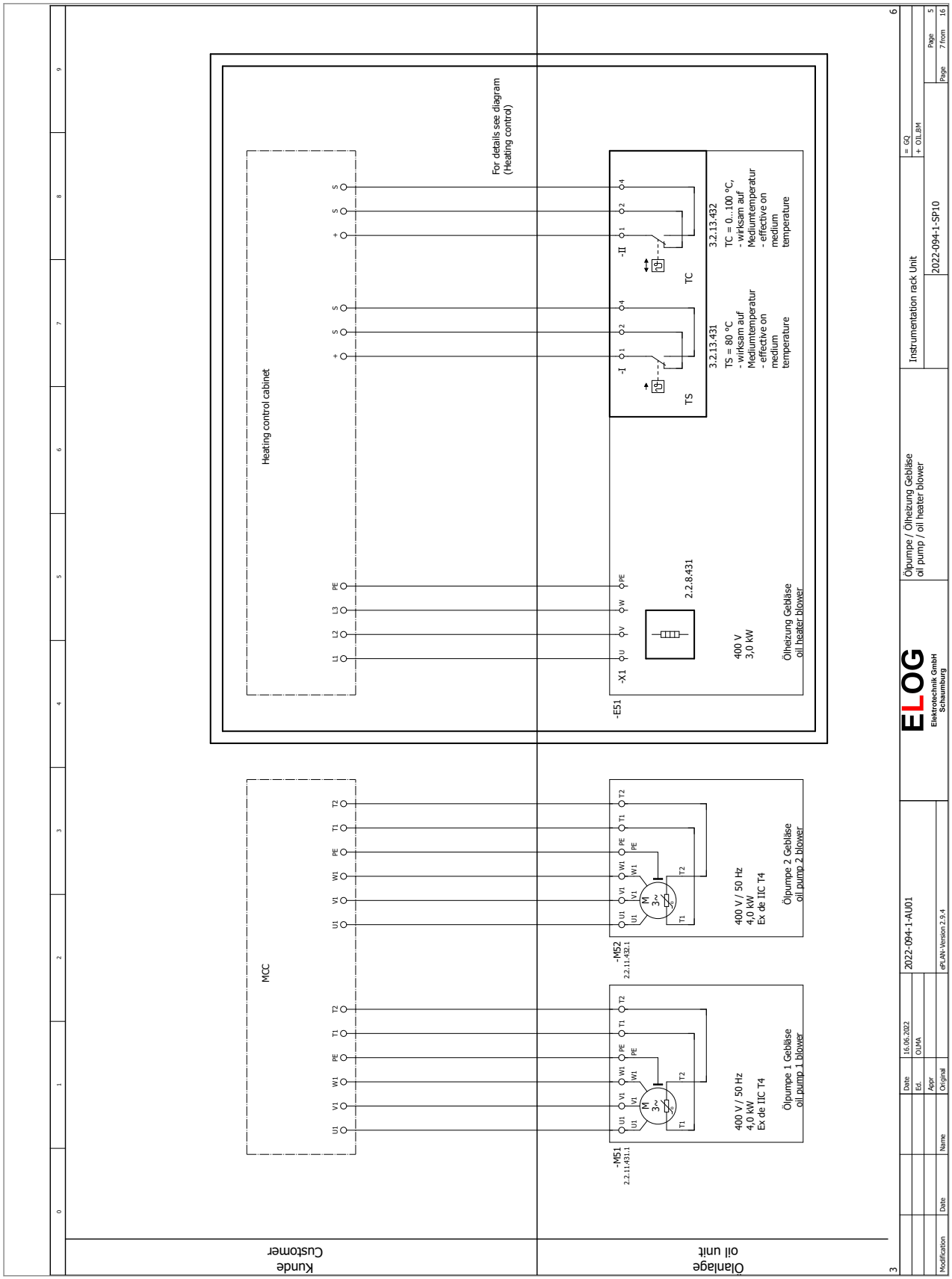
Heating control cabinet
For details see diagram
(Heating control)
-E51
-X1
TS
TC
-I
-II
3.2.13.431
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.432
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
2.2.8.431
400 V
3,0 kW
Ölheizung Gebläse
oil heater blower
MCC
-M52
2.2.11.432.1
400 V / 50 Hz
4,0 kW
Ex de IIC T4
Ölpumpe 2 Gebläse
oil pump 2 blower
-M51
2.2.11.431.1
Ölpumpe 1 Gebläse
oil pump 1 blower
Kunde
Customer
Olanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
Ölpumpe / Ölheizung Gebläse
oil pump / oil heater blower
Instrumentation rack Unit
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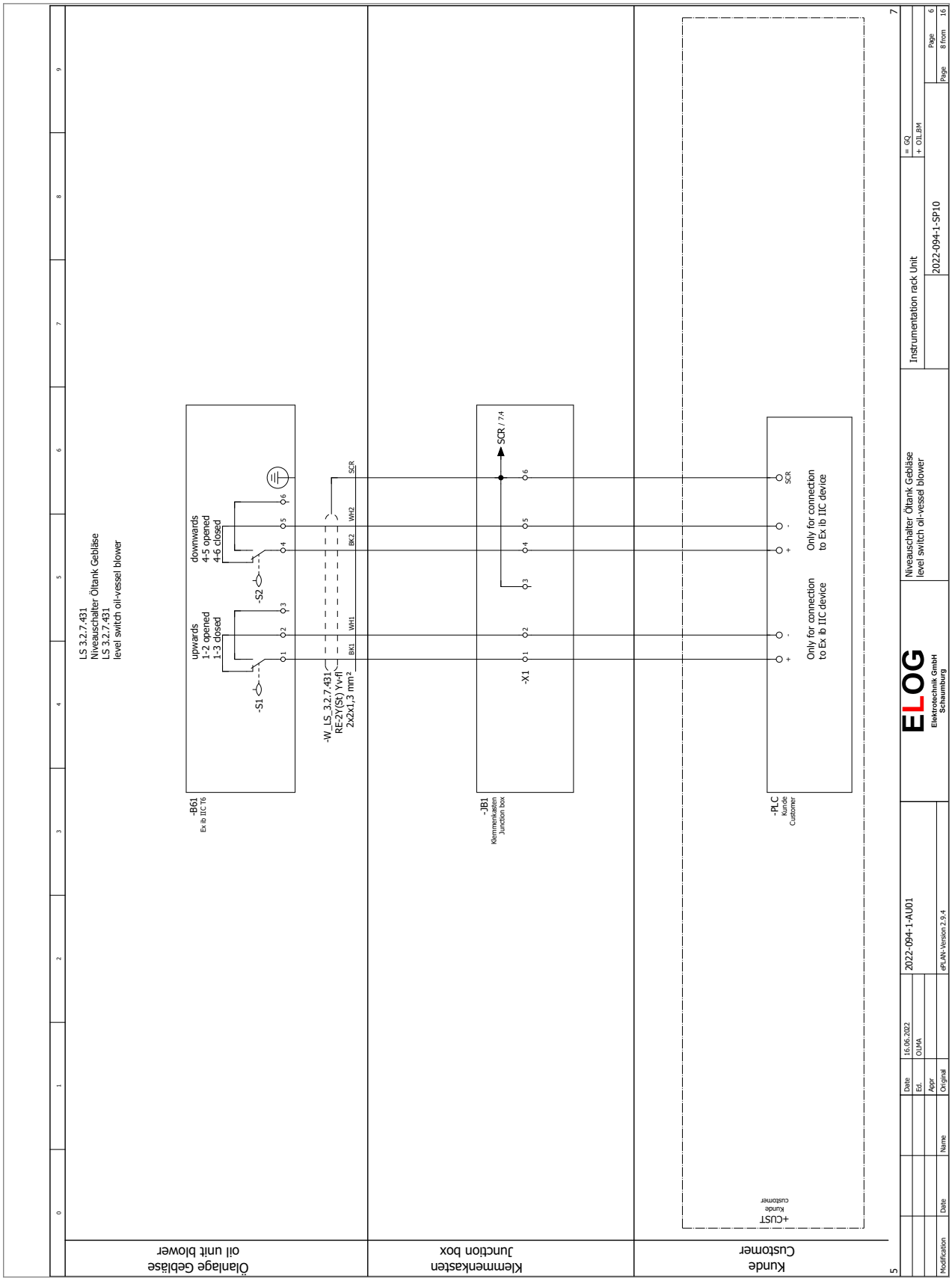
LS 3.2.7.431
Niveauschalter Öltank Gebläse
LS 3.2.7.431
level switch oil-vessel blower
-B61
Ex ib IIC T6
upwards
1-2 opened
1-3 closed
downwards
4-5 opened
4-6 closed
-S1
-S2
-W_LS_3.2.7.431
RE-2Y(St) Yv-fl
2x2x1,3 mm²
BK1
WH1
BK2
WH2
SCR
-JB1
Klemmenkasten
Junction box
-X1
SCR / 7.4
-PLC
Kunde
Customer
Only for connection
to Ex ib IIC device
Only for connection
to Ex ib IIC device
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Niveauschalter Öltank Gebläse
level switch oil-vessel blower
Instrumentation rack Unit
2022-094-1-SP10
= GQ
+ OILBM
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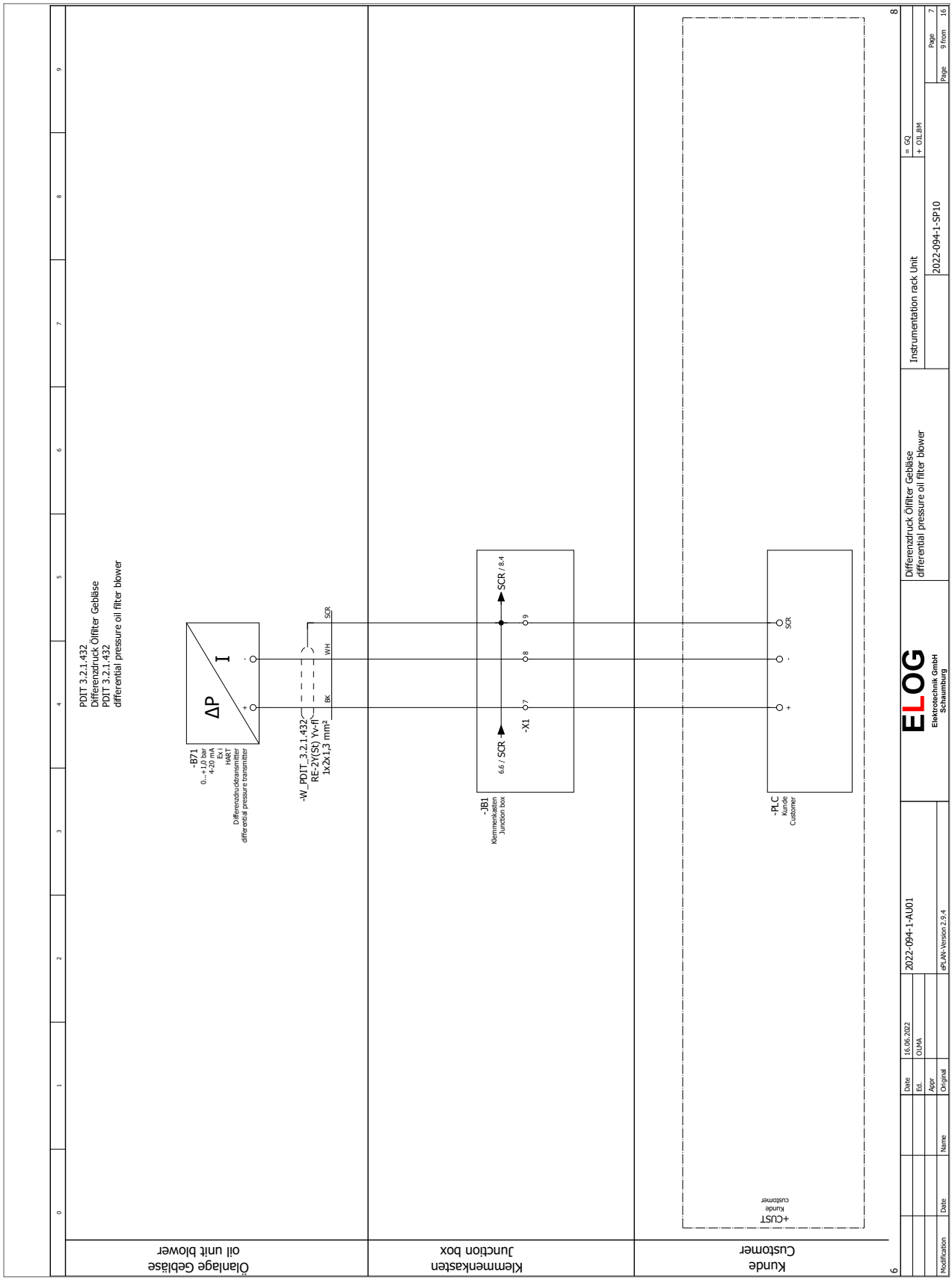
16.06.2022
OUMA
eRLAN-Version 2.9.4
Modification
Date
Name
Date
Ed.
Appr
Original


PDIT 3.2.1.432
Differenzdruck Ölfilter Gebläse
PDIT 3.2.1.432
differential pressure oil filter blower
-B71
0...+1,0 bar
4-20 mA
Ex
HART
Differenzdrucktransmitter
differential pressure transmitter
ΔP
I
+
-
-W_PDIT_3.2.1.432
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB1
Klemmenkasten
Junction box
6.6 / SCR
SCR / 8.4
-X1
7
8
9
-PLC
Kunde
Customer
SCR
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Gebläse
differential pressure oil filter blower
Instrumentation rack Unit
2022-094-1-SP10
= GQ
+ OIL.BM
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Date 16.06.2022
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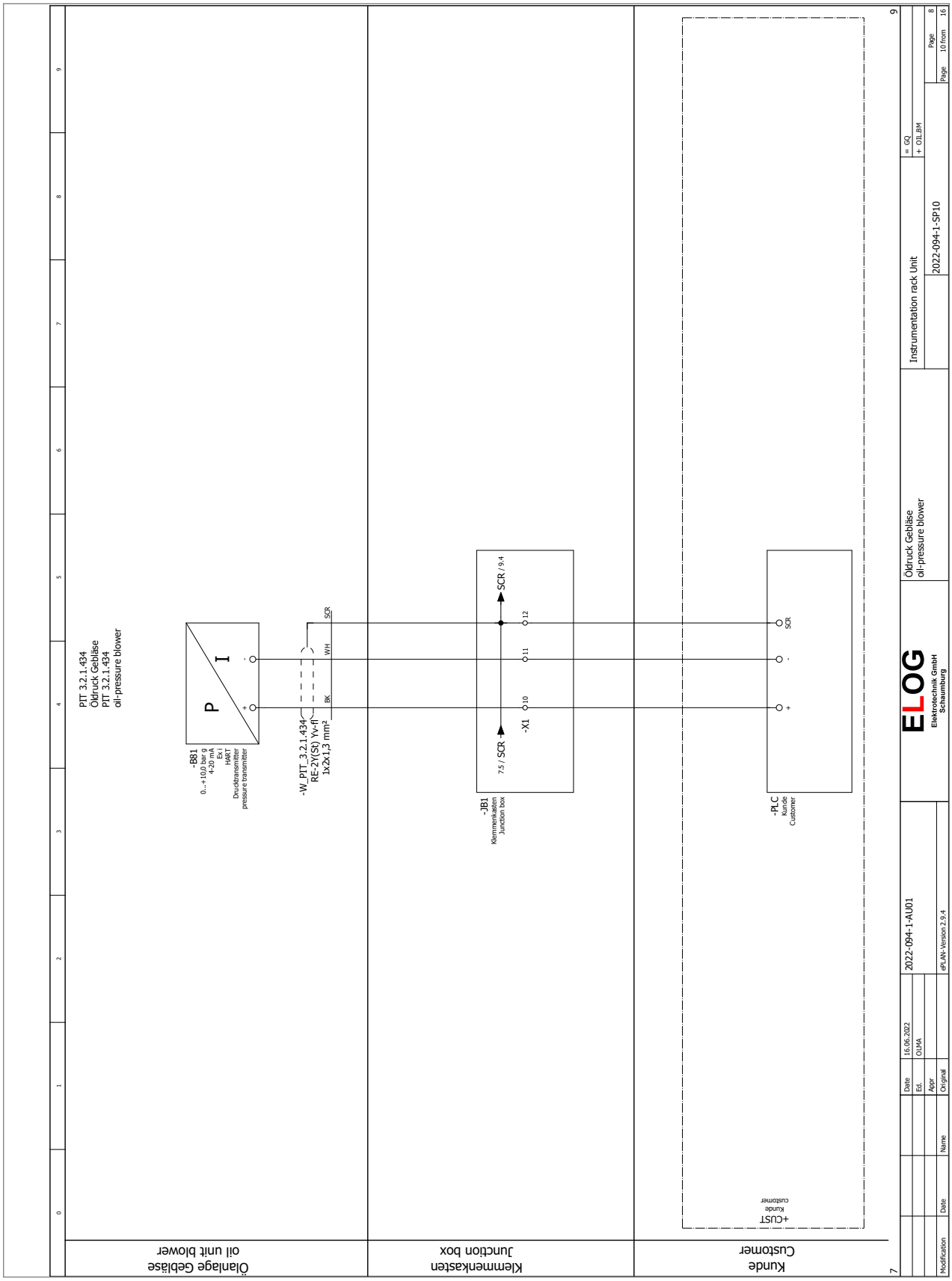
Original
ePLAN-Version 2.9.4
Modification
Date
Name


PIT 3.2.1.434
Öldruck Gebläse
PIT 3.2.1.434
oil-pressure blower
-B81
0...+10,0 bar g
4-20 mA
Ex i
HART
Drucktransmitter
pressure transmitter
-W_PIT_3.2.1.434
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB1
Klemmenkasten
Junction box
7.5 / SCR
SCR / 9.4
-X1
12
11
10
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
Modification
Date
Name
Date
16.06.2022
Ed.
OUMA
Appr
Original
2022-094-1-AU01
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Gebläse
oil-pressure blower
Instrumentation rack Unit
2022-094-1-SP10
= GQ
+ OIL.BM
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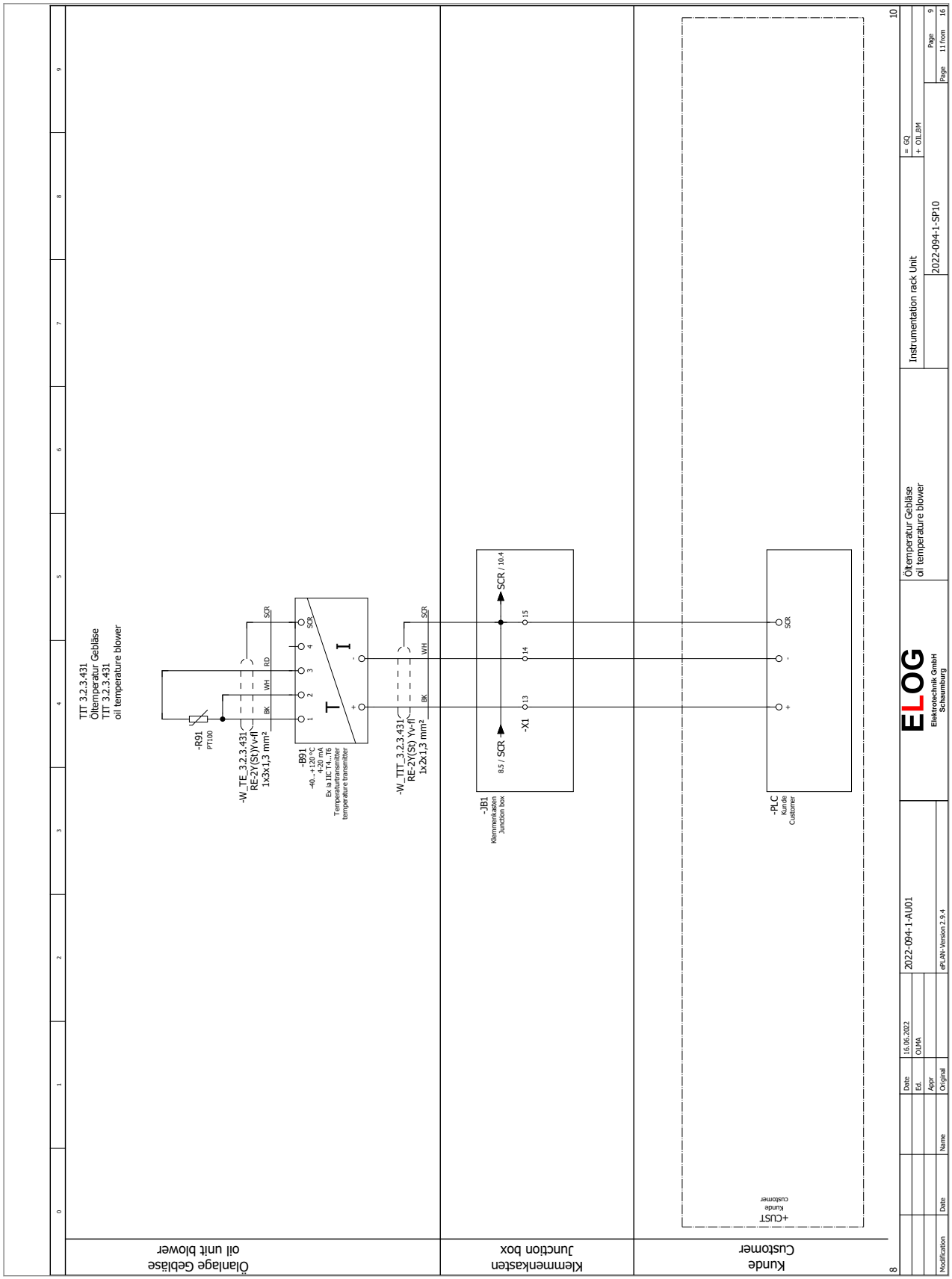
TIT 32.3.431
Ölemperatur Gebläse
TIT 32.3.431
oil temperature blower
-R91
PT100
-W_TE_32.3.431
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+120 °C
4-20 mA
Ex ia IIC T4...T6
Temperaturmessumformer
temperature transmitter
-W_TIT_3.2.3.431
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB1
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X1
13
14
15
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Ölemperatur Gebläse
oil temperature blower
Instrumentation rack Unit
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= GQ
+ OIL.BM
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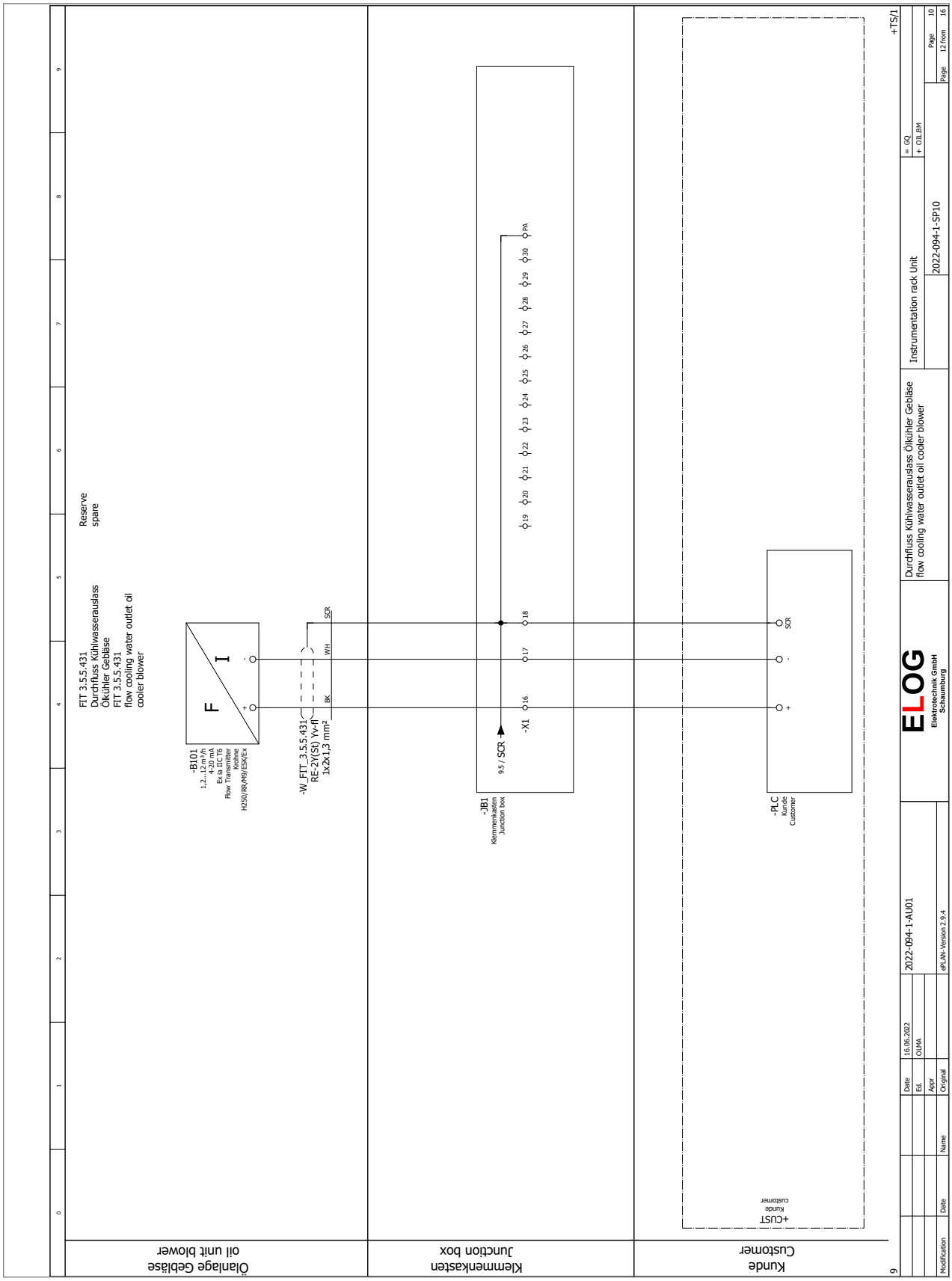
Date
Name


Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
FIT 3.5.5.431
Durchfluss Kühlwasserauslass
Ölkühler Gebläse
FIT 3.5.5.431
flow cooling water outlet oil
cooler blower
Reserve
spare
-B101
1,2...12 m³/h
4-20 mA
Ex ia IIC T6
Flow Transmitter
Krohne
H250/R6/M9/ESK/Ex
F
I
-W_FIT_3.5.5.431
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB1
Klemmenkasten
Junction box
9.5 / SCR
-X1
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
PA
+CUST
Kunde
customer
-PLC
Kunde
Customer
SCR
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler Gebläse
flow cooling water outlet oil cooler blower
Instrumentation rack Unit
2022-094-1-SP10
= GQ
+ OILBM
Page 10
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+TS/1
2022-094-1-AU01
16.06.2022
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ePLAN-Version 2.9.4
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Date
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Original
Agpr
Ed.
Date

Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	-W_FIT_3.5.5.431	-W_TIT_3.2.3.431	-W_PIT_3.2.1.434	-W_PDIT_3.2.1.432	-W_LS_3.2.7.431	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl											
LS 3.2.7.431 Niveauschalter Öltank Gebläse LS 3.2.7.431 level switch oil-vessel blower					BK1		-B61	1	1		+CUST-PLC	+			/6.4
=					WH1		-B61	2	2		+CUST-PLC	-			/6.5
=									3						/6.5
=					BK2		-B61	4	4		+CUST-PLC	+			/6.5
=					WH2		-B61	5	5		+CUST-PLC	-			/6.5
=					SCR				6		+CUST-PLC	SCR			/6.6
PDIT 3.2.1.432 Differenzdruck Ölfilter Gebläse PDIT 3.2.1.432 differential pressure oil filter blower				BK			-B71	+	7		+CUST-PLC	+			/7.4
=				WH			-B71	-	8		+CUST-PLC	-			/7.4
=				SCR					9		+CUST-PLC	SCR			/7.5
PIT 3.2.1.434 Öldruck Gebläse PIT 3.2.1.434 oil-pressure blower			BK				-B81	+	10		+CUST-PLC	+			/8.4
=			WH				-B81	-	11		+CUST-PLC	-			/8.4
=			SCR						12		+CUST-PLC	SCR			/8.5
TIT 3.2.3.431 Öltemperatur Gebläse TIT 3.2.3.431 oil temperature blower		BK					-B91	+	13		+CUST-PLC	+			/9.4
=		WH					-B91	-	14		+CUST-PLC	-			/9.4
=		SCR							15		+CUST-PLC	SCR			/9.5
FIT 3.5.5.431 Durchfluss Kühlwasserauslass Ölkühler Gebläse FIT 3.5.5.431 flow cooling water outlet oil cooler blower	BK						-B101	+	16		+CUST-PLC	+			/10.4
=	WH						-B101	-	17		+CUST-PLC	-			/10.4
=	SCR								18		+CUST-PLC	SCR			/10.5
Reserve spare									19						/10.5
=									20						/10.6
=									21						/10.6
=									22						/10.6
=									23						/10.6
=									24						/10.6
=									25						/10.7

Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	Cable name / cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name / cable type	Page / column
Reserve spare				26					/10.7
=				27					/10.7
=				28					/10.7
=				29					/10.7
=				30					/10.8
=				PA					/10.8

1

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1
			Ed.	OLMA			
			Appr				
Modification	Date	Name	Original		ePLAN-Version 2.9.4		

Instrumentation rack Unit
= GQ
+ TS
2022-094-1-SP10
Page 1.1
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Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.BM-JB1	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

		Date	16.06.2022
		Ed.	OLMA
		Appr	
Modification	Date	Name	Original

2022-094-1-AU01

ELOG
Elektrotechnik GmbH
Schaumburg

Artikelstückliste : STAHL.8146/2S71 - STAHL.814
6/2S71
Parts list : STAHL.8146/2S71 - STAHL.8146/2S71

Instrumentation rack Unit

2022-094-1-SP10

+CAB/1

= GQ
+ BOM

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Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.BM-W_FIT_3.5.5.431	+OIL.BM-JB1-X1	+OIL.BM-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.431 flow cooling water outlet oil cooler blower
+OIL.BM-W_LS_3.2.7.431	+OIL.BM-B61	+OIL.BM-JB1-X1	RE-2Y(St) Yv-fl	2x2	4	1,3 mm²	LS 3.2.7.431 level switch oil-vessel blower
+OIL.BM-W_PDIT_3.2.1.432	+OIL.BM-JB1-X1	+OIL.BM-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.432 differential pressure oil filter blower
+OIL.BM-W_PIT_3.2.1.434	+OIL.BM-JB1-X1	+OIL.BM-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.434 oil-pressure blower
+OIL.BM-W_TE_3.2.3.431	+OIL.BM-B91	+OIL.BM-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.431 oil temperature blower
+OIL.BM-W_TIT_3.2.3.431	+OIL.BM-JB1-X1	+OIL.BM-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

ELOG Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH
Nordbrucher Straße 6
31559 Hohnhorst / Germany
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email info@elog-gmbh.de
Homepage http://www.elog-gmbh.de

Auftraggeber customer

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Fax +49 (0)5154 / 81-9191
email info@aerzen.com
homepage http://www.aerzen.com

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP11	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 5 GQ blower Unit 5

Erstellt am
Created on 16.06.2022

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200050|EAV2101639
H. Stöber

Anzahl der Seiten
Number of pages 16

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			Ed.	OLMA	
			Appr		
Modification	Date	Name	Original		ePLAN-Version 2.9.4

ELOG Elektrotechnik GmbH Schaumburg

Deckblatt
Cover sheet

Instrumentation rack Unit

2022-094-1-SP11

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F26_ELOG_Info

Typenschild
name plate

ELOG
Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH

Nordbrucher Straße 6
31559 Hohnhorst / Germany
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E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP11
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

AERZEN

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Page name	Page x of 16	Page description	supplementary page field	Date	Edited by	X
/1	1	Deckblatt Cover sheet		16.06.2022	OlMa	X
/1.1	2	Allgemeine Informationen general information		16.06.2022	OlMa	X
/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
=GQ+OIL.BM/1	4	Deckblatt Cover sheet		16.06.2022	OlMa	X
=GQ+OIL.BM/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.BM/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.BM/5	7	Ölpumpe / Ölheizung Gebläse oil pump / oil heater blower		16.06.2022	OlMa	
=GQ+OIL.BM/6	8	Niveauschalter Öltank Gebläse level switch oil-vessel blower		16.06.2022	OlMa	
=GQ+OIL.BM/7	9	Differenzdruck Ölfilter Gebläse differential pressure oil filter blower		16.06.2022	OlMa	
=GQ+OIL.BM/8	10	Öldruck Gebläse oil-pressure blower		16.06.2022	OlMa	
=GQ+OIL.BM/9	11	Öltemperatur Gebläse oil temperature blower		16.06.2022	OlMa	
=GQ+OIL.BM/10	12	Durchfluss Kühlwasserauslass Ölkühler Gebläse flow cooling water outlet oil cooler blower		16.06.2022	OlMa	
=GQ+TS/1	13	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1		16.06.2022	OlMa	
=GQ+TS/1.1	14	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1		16.06.2022	OlMa	
=GQ+BOM/1	15	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	16	Kabelübersicht : =GQ+OIL.BM-W_FIT_3.5.5.531 - =GQ+OIL.BM-W_TIT_3.2.3.531 Cable overview : =GQ+OIL.BM-W_FIT_3.5.5.531 - =GQ+OIL.BM-W_TIT_3.2.3.531		16.06.2022	OlMa	

1.1 =GQ+OIL.BM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Inhaltsverzeichnis Table of contents	Instrumentation rack Unit	=
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F26_ELOG_1_AM_Deckblatt_leer

Hersteller Manufacturer

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Elektrotechnik GmbH
Schaumburg

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Auftraggeber customer

AERZEN

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Fax +49 (0)5154 / 81-9191

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP11	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 5

Klemmenkasten Ölanlage Gebläse Einheit 5
Junction box oil unit blower Unit 5

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH Instrumentengerüst Einheit Instrumentation rack Unit	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP11	= GQ + OIL.BM
			Ed.	OlMa					
			Appr					GQ blower Unit 5	Page 1
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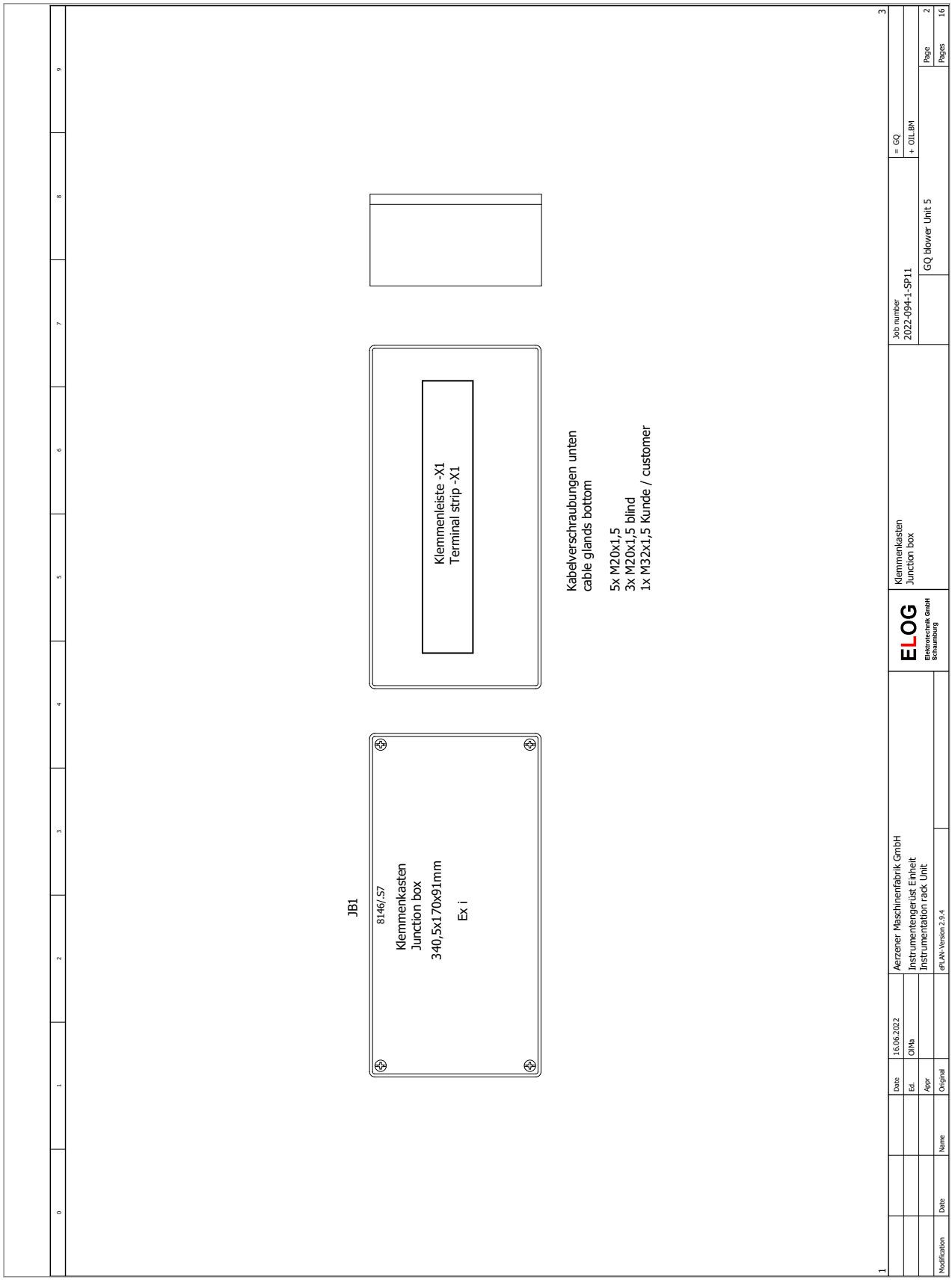
JB1
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X1
Terminal strip -X1
Kabelverschraubungen unten
cable glands bottom
5x M20x1,5
3x M20x1,5 blind
1x M32x1,5 Kunde / customer
Date 16.06.2022
Ed. OlMa
Appr
Original
Name
Date
Modification
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schlaumburg
Klemmenkasten
Junction box
Job number
2022-094-1-SP11
GQ Blower Unit 5
= GQ
+ OIL.BM
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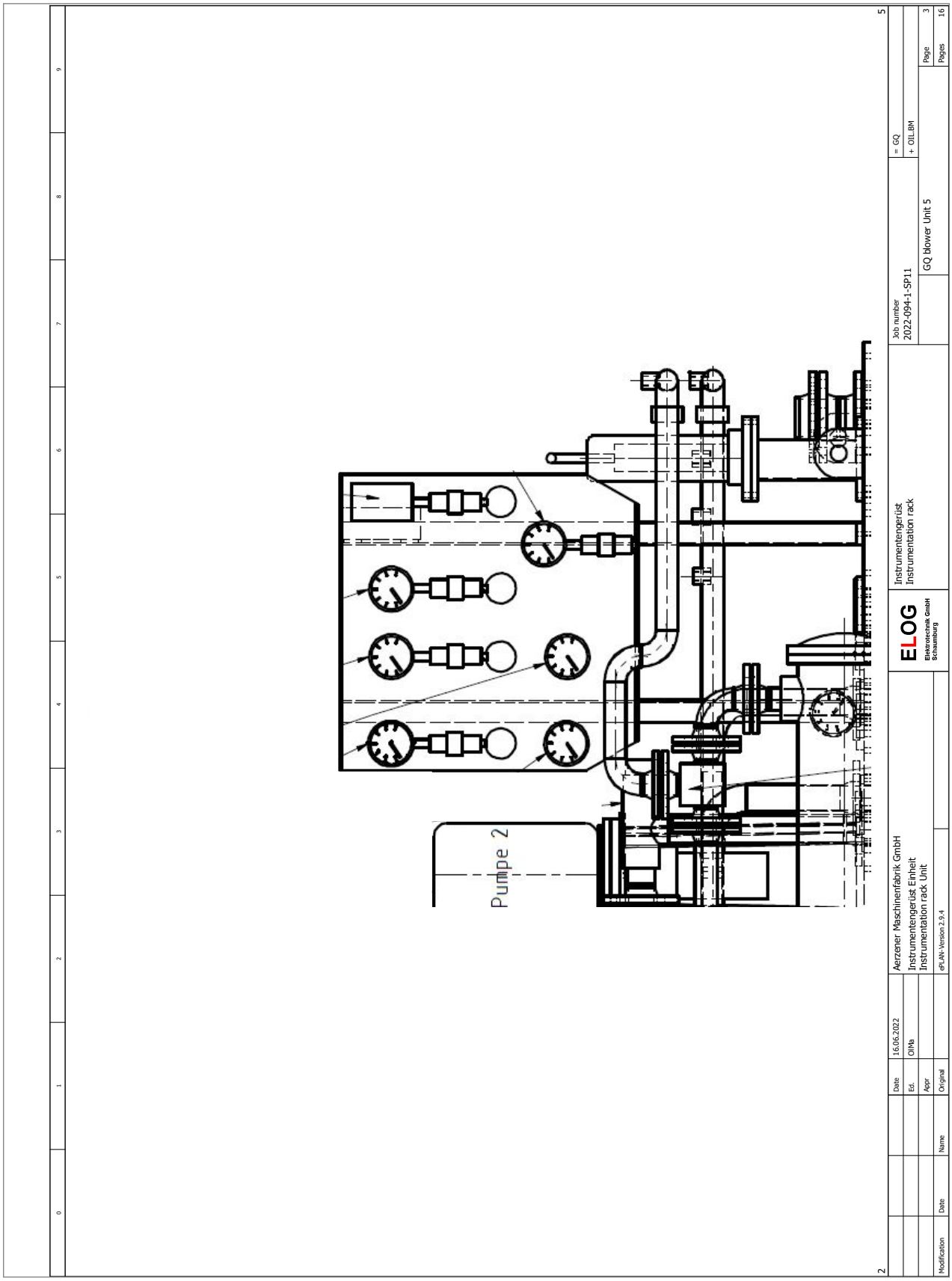
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Instrumentengerüst Einheit
Instrumentation rack Unit
Date
16.06.2022
Ed.
OlMa
Appr
Original
Name
Date
Modification
ELOG
Elektrotechnik GmbH
Schaumburg
Instrumentengerüst
Instrumentation rack
Job number
2022-094-1-SP11
GQ Blower Unit 5
= GQ
+ OIL.BM
Page
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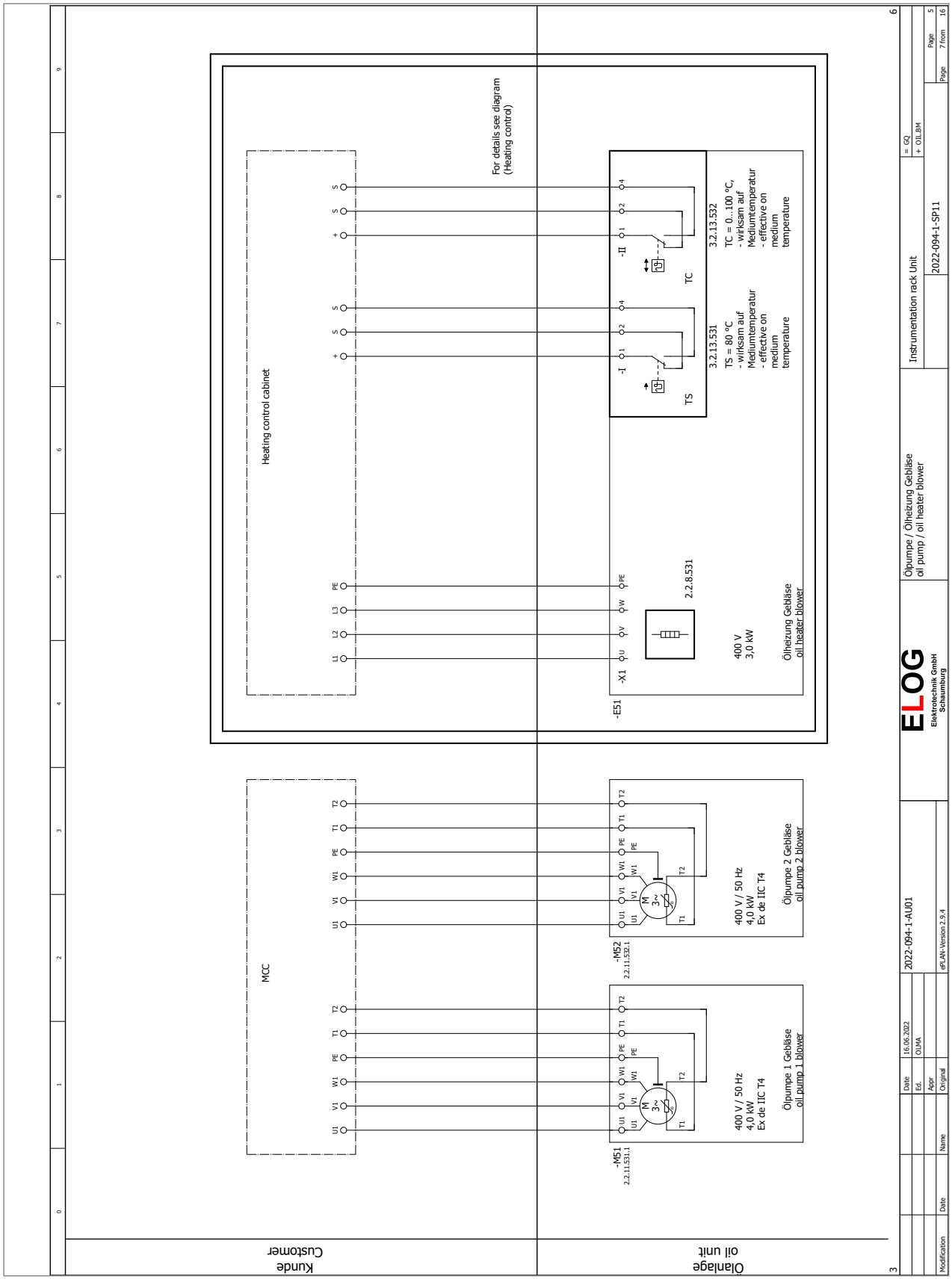
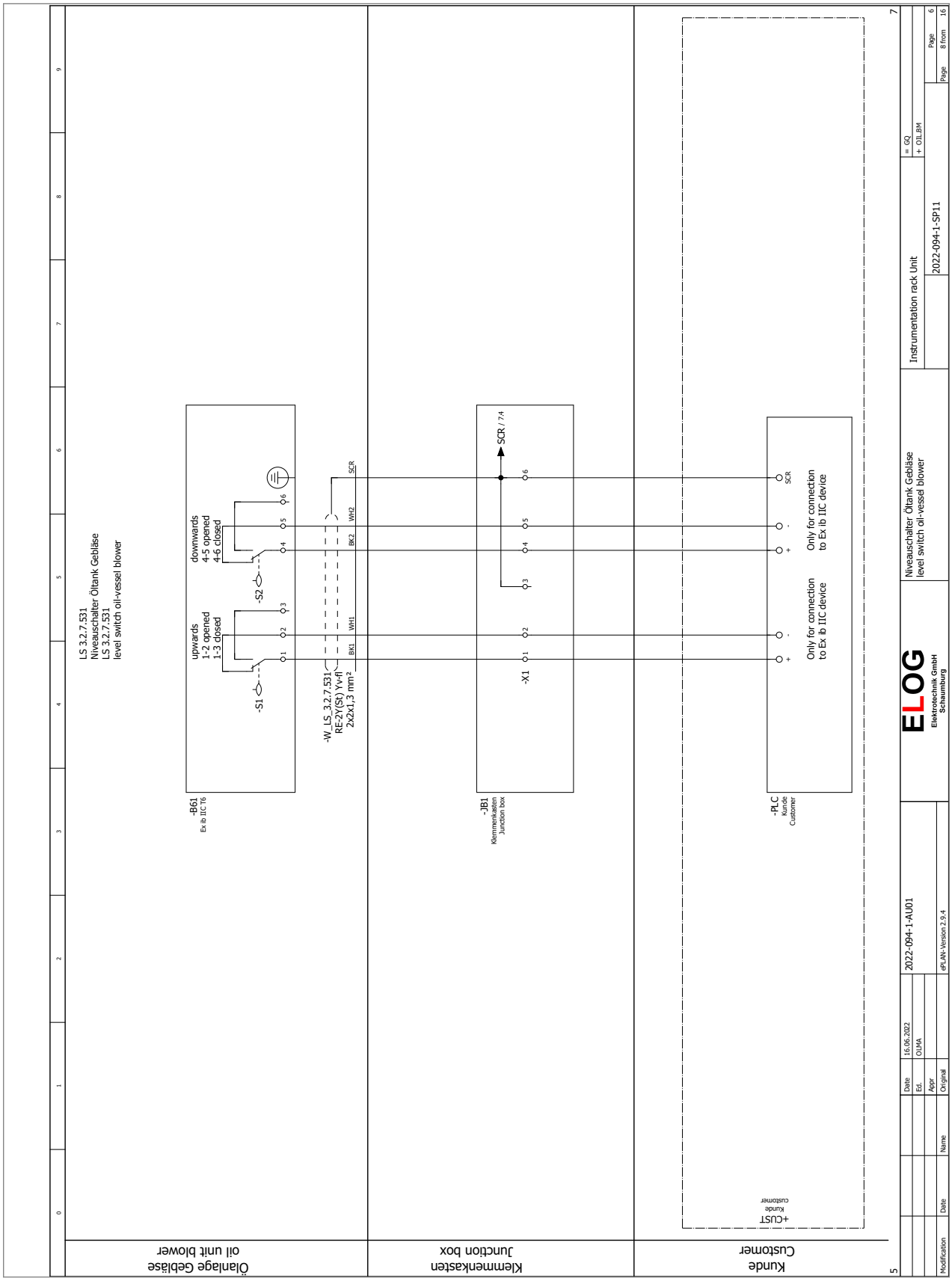

Heating control cabinet
For details see diagram
(Heating control)
-E51
-X1
TS
TC
-I
-II
3.2.13.531
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.532
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
2.2.8.531
400 V
3,0 kW
Ölheizung Gebläse
oil heater blower
MCC
-M52
2.2.11.532.1
400 V / 50 Hz
4,0 kW
Ex de IIC T4
Ölpumpe 2 Gebläse
oil pump 2 blower
-M51
2.2.11.531.1
Ölpumpe 1 Gebläse
oil pump 1 blower
Kunde
Customer
Ölanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
Ölpumpe / Ölheizung Gebläse
oil pump / oil heater blower
Instrumentation rack Unit
2022-094-1-SP11
2022-094-1-AU01
16.06.2022
OLMA
Original
ePLAN-Version 2.9.4
Modification
Date
Name


LS 3.2.7.531
Niveauschalter Öltank Gebläse
LS 3.2.7.531
level switch oil-vessel blower
-B61
Ex ib IIC T6
upwards
1-2 opened
1-3 closed
downwards
4-5 opened
4-6 closed
-S1
-S2
-W_LS_3.2.7.531
RE-2Y(St) Yv-fl
2x2x1,3 mm²
BK1
WH1
BK2
WH2
SCR
-JB1
Klemmenkasten
Junction box
-X1
SCR / 7.4
-PLC
Kunde
Customer
Only for connection
to Ex ib IIC device
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Niveauschalter Öltank Gebläse
level switch oil-vessel blower
Instrumentation rack Unit
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= GQ
+ OILBM
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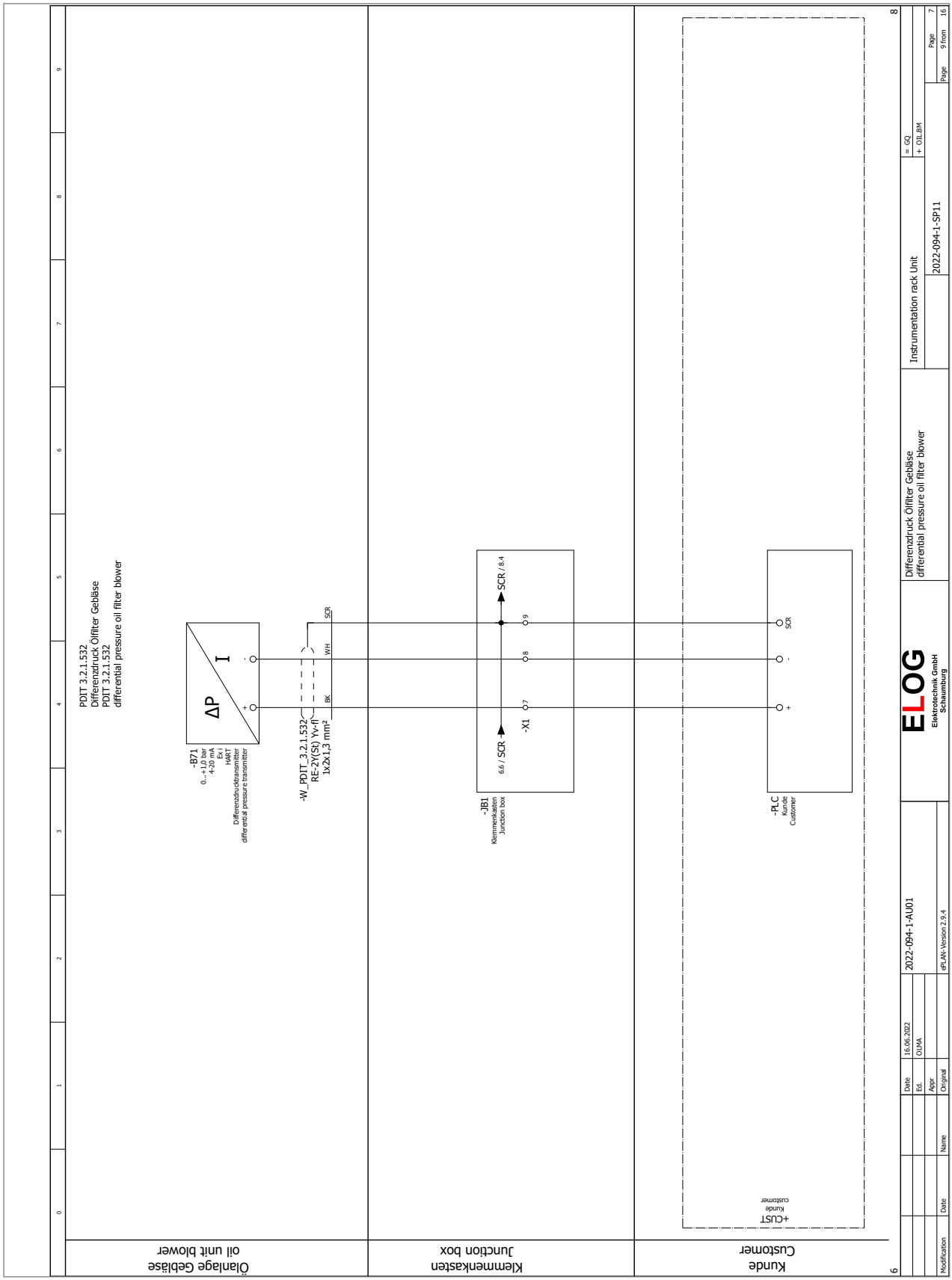
Agpr
Original


PDIT 3.2.1.532
Differenzdruck Ölfilter Gebläse
PDIT 3.2.1.532
differential pressure oil filter blower
ΔP
I
-B71
0...+1,0 bar
4-20 mA
Ex i
HART
Differenzdrucktransmitter
differential pressure transmitter
-W_PDIT_3.2.1.532
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB1
Klemmenkasten
Junction box
6.6 / SCR
SCR / 8.4
-X1
7
8
9
-PLC
Kunde
Customer
SCR
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Gebläse
differential pressure oil filter blower
Instrumentation rack Unit
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= GQ
+ OIL.BM
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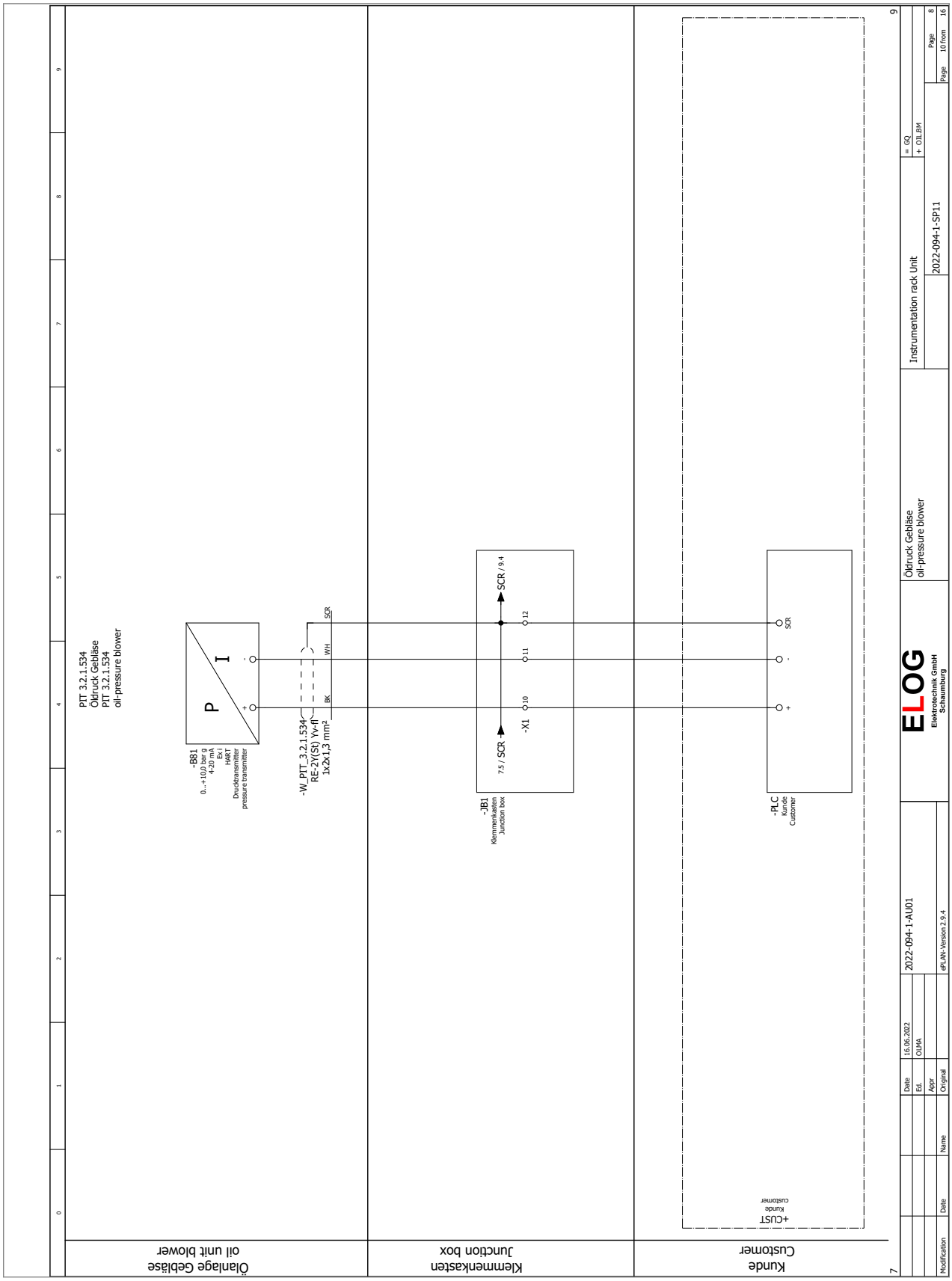
Original
Name
Date
Modification
ePLAN-Version 2.9.4


PIT 3.2.1.534
Öldruck Gebläse
PIT 3.2.1.534
oil-pressure blower
-B81
0...+10,0 bar g
4-20 mA
Ex i
HART
Drucktransmitter
pressure transmitter
-W_PIT_3.2.1.534
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB1
Klemmenkasten
Junction box
7.5 / SCR
SCR / 9.4
-X1
12
11
10
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Gebläse
oil-pressure blower
Instrumentation rack Unit
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= GQ
+ OIL.BM
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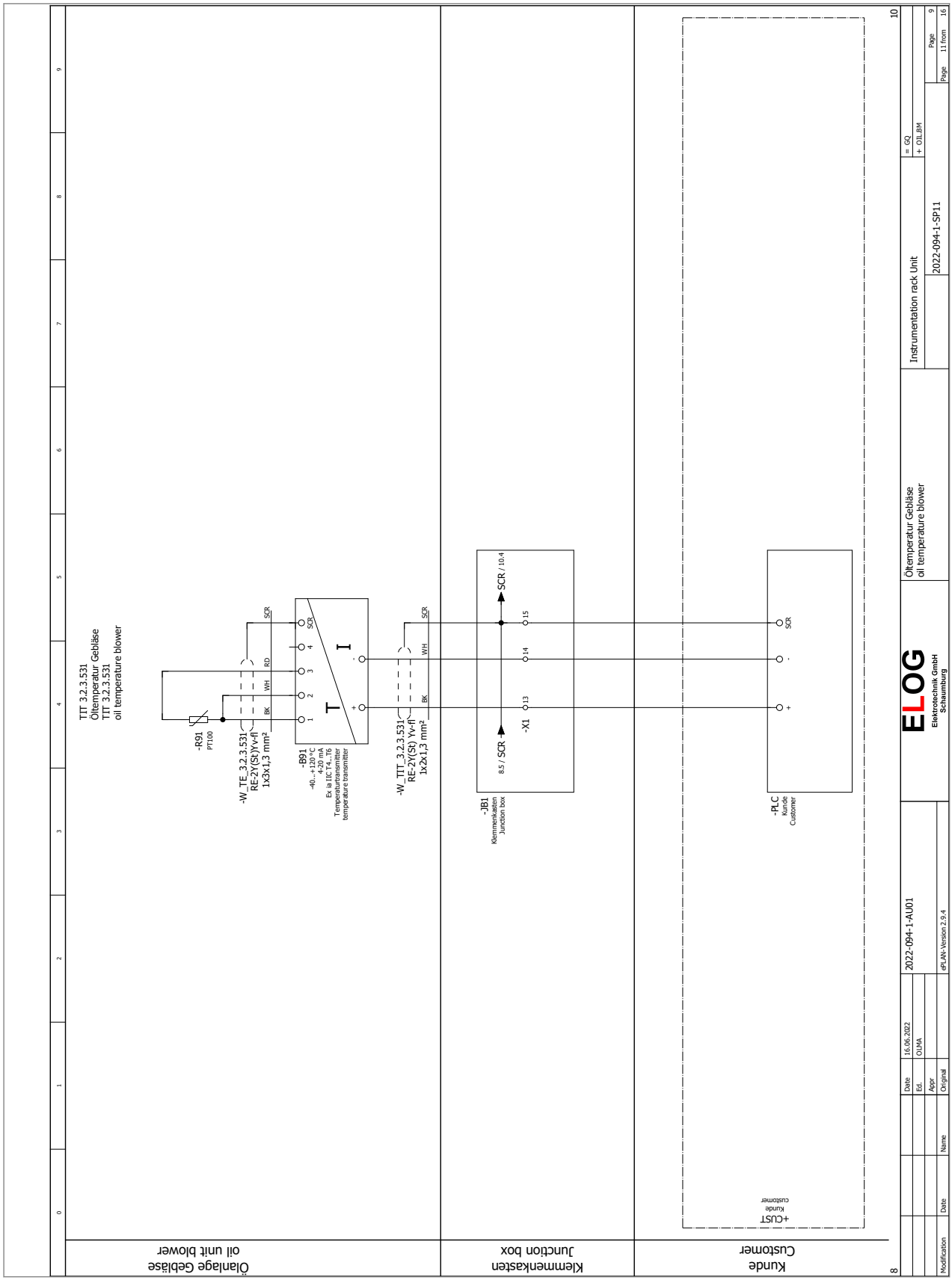
TIT 32.3.531
Ölemperatur Gebläse
TIT 32.3.531
oil temperature blower
-R91
PT100
-W_TE_3.2.3.531
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+120 °C
4-20 mA
Ex ia IIC T4...T6
Temperaturmessumformer
temperature transmitter
-W_TIT_3.2.3.531
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB1
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X1
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Ölemperatur Gebläse
oil temperature blower
Instrumentation rack Unit
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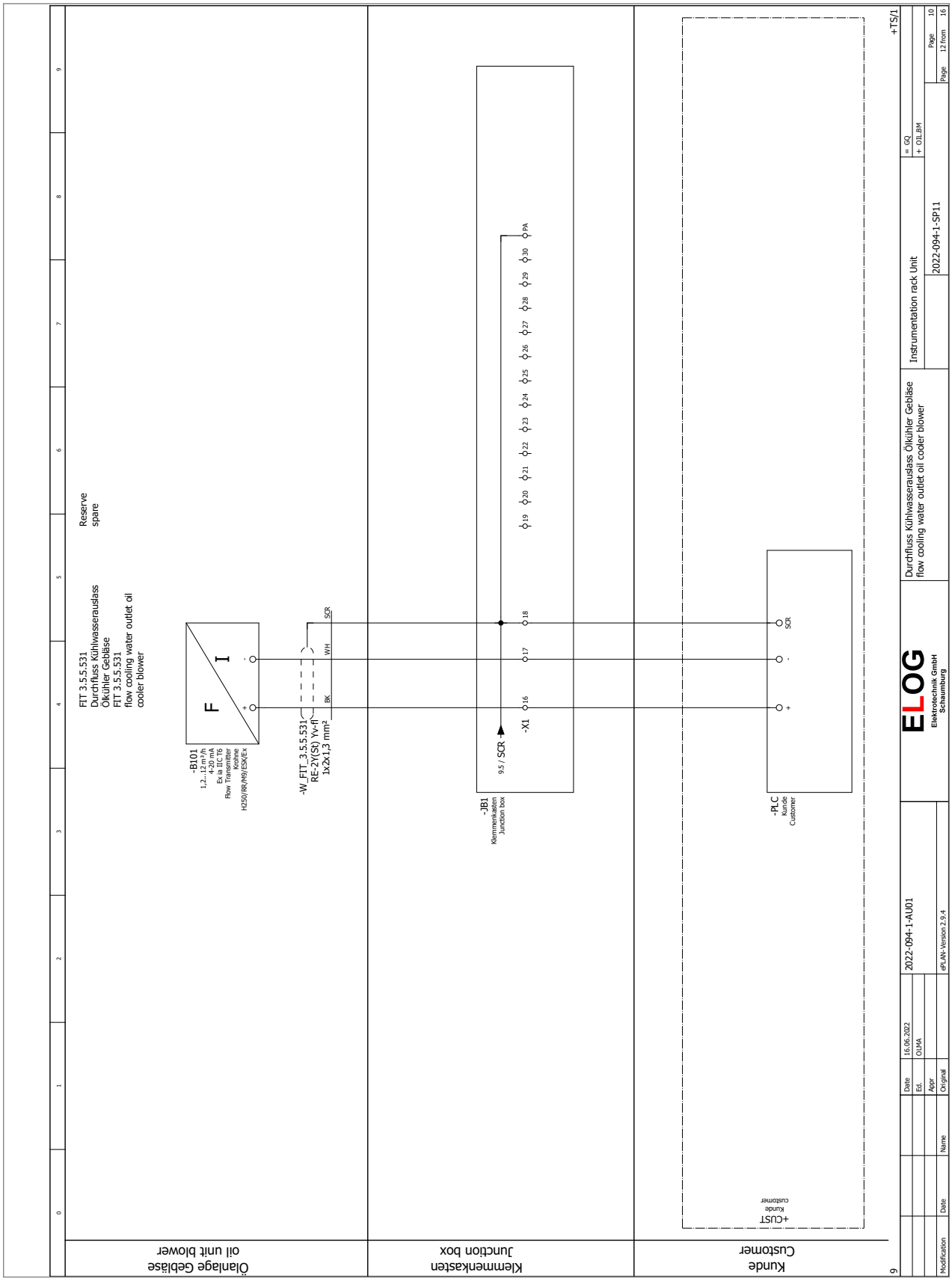
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
FIT 3.5.5.531
Durchfluss Kühlwasserauslass
Ölkühler Gebläse
FIT 3.5.5.531
flow cooling water outlet oil
cooler blower
Reserve
spare
-B101
1,2...12 m³/h
4-20 mA
Ex ia IIC T6
Flow Transmitter
Krohne
H250/R6/M9/ESK/Ex
F
I
-W_FIT_3.5.5.531
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB1
Klemmenkasten
Junction box
9.5 / SCR
-X1
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
PA
+CUST
Kunde
customer
-PLC
Kunde
Customer
SCR
+TS/1
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler Gebläse
flow cooling water outlet oil cooler blower
Instrumentation rack Unit
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+ OILBM
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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	-W_FIT_3.5.5.531	-W_TIT_3.2.3.531	-W_PIT_3.2.1.534	-W_PDIT_3.2.1.532	-W_LS_3.2.7.531	Cable name	cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name	cable type	Page / column
	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl	RE-ZY(SS) Yv-fl											
LS 3.2.7.531 Niveauschalter Öltank Gebläse LS 3.2.7.531 level switch oil-vessel blower					BK1		-B61	1	1		+CUST-PLC	+				/6.4
=					WH1		-B61	2	2		+CUST-PLC	-				/6.5
=									3							/6.5
=					BK2		-B61	4	4		+CUST-PLC	+				/6.5
=					WH2		-B61	5	5		+CUST-PLC	-				/6.5
=					SCR				6		+CUST-PLC	SCR				/6.6
PDIT 3.2.1.532 Differenzdruck Ölfilter Gebläse PDIT 3.2.1.532 differential pressure oil filter blower				BK			-B71	+	7		+CUST-PLC	+				/7.4
=				WH			-B71	-	8		+CUST-PLC	-				/7.4
=				SCR					9		+CUST-PLC	SCR				/7.5
PIT 3.2.1.534 Öldruck Gebläse PIT 3.2.1.534 oil-pressure blower			BK				-B81	+	10		+CUST-PLC	+				/8.4
=			WH				-B81	-	11		+CUST-PLC	-				/8.4
=			SCR						12		+CUST-PLC	SCR				/8.5
TIT 3.2.3.531 Öltemperatur Gebläse TIT 3.2.3.531 oil temperature blower		BK					-B91	+	13		+CUST-PLC	+				/9.4
=		WH					-B91	-	14		+CUST-PLC	-				/9.4
=		SCR							15		+CUST-PLC	SCR				/9.5
FIT 3.5.5.531 Durchfluss Kühlwasserauslass Ölkühler Gebläse FIT 3.5.5.531 flow cooling water outlet oil cooler blower	BK						-B101	+	16		+CUST-PLC	+				/10.4
=	WH						-B101	-	17		+CUST-PLC	-				/10.4
=	SCR								18		+CUST-PLC	SCR				/10.5
Reserve spare									19							/10.5
=									20							/10.6
=									21							/10.6
=									22							/10.6
=									23							/10.6
=									24							/10.6
=									25							/10.7

+OIL.BM/10 1.1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1	Instrumentation rack Unit	= GQ + TS
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			Appr						Page 13 from 16
Modification	Date	Name	Original		ePLAN-Version 2.9.4				

Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	Target designation	Connection point	terminal	jumper	Target designation	Connection point	cable type	Cable name	Page / column
Reserve spare			26	-					/10.7
=			27	-					/10.7
=			28	-					/10.7
=			29	-					/10.7
=			30	-					/10.8
=			PA						/10.8

+BOM/1

ELOG Elektrotechnik GmbH Schaumburg

Klemmenplan =GQ+OIL.BM-JB1-X1
Terminal diagram =GQ+OIL.BM-JB1-X1

Instrumentation rack Unit

2022-094-1-SP11

= GQ
+ TS

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				Appr	OLMA
				Original	

ePLAN-Version 2.9.4

Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.BM-JB1	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

		Date	16.06.2022
		Ed.	OLMA
		Appr	
Modification	Date	Name	Original

2022-094-1-AU01

ELOG Elektrotechnik GmbH Schaumburg

Artikelstückliste : STAHL.8146/2S71 - STAHL.814 6/2S71
Parts list : STAHL.8146/2S71 - STAHL.8146/2S71

Instrumentation rack Unit

2022-094-1-SP11

+CAB/1

= GQ
+ BOM

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Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.BM-W_FIT_3.5.5.531	+OIL.BM-JB1-X1	+OIL.BM-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.531 flow cooling water outlet oil cooler blower
+OIL.BM-W_LS_3.2.7.531	+OIL.BM-B61	+OIL.BM-JB1-X1	RE-2Y(St) Yv-fl	2x2	4	1,3 mm²	LS 3.2.7.531 level switch oil-vessel blower
+OIL.BM-W_PDIT_3.2.1.532	+OIL.BM-JB1-X1	+OIL.BM-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.532 differential pressure oil filter blower
+OIL.BM-W_PIT_3.2.1.534	+OIL.BM-JB1-X1	+OIL.BM-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.534 oil-pressure blower
+OIL.BM-W_TE_3.2.3.531	+OIL.BM-B91	+OIL.BM-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.531 oil temperature blower
+OIL.BM-W_TIT_3.2.3.531	+OIL.BM-JB1-X1	+OIL.BM-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

F26_ELOG_AM_Deckblatt neu

Hersteller Manufacturer

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Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP12	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 6 GQ blower Unit 6

Erstellt am
Created on 16.06.2022

Bearbeitet am
Edit date 16.06.2022 von from OlMa

Emmerthaler Apparatebau GmbH
Best.-Nr.: BST2200960/0
GPFA2200045|EAV2101639
H. Stöber

Anzahl der Seiten
Number of pages 16

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			Appr		
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ELOG Elektrotechnik GmbH Schaumburg

Deckblatt
Cover sheet

Instrumentation rack Unit

2022-094-1-SP12

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F26_ELOG_Info

Typenschild
name plate

ELOG
Elektrotechnik GmbH Schaumburg

ELOG Elektrotechnik GmbH

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E-mail info@elog-gmbh.de
http://www.elog-gmbh.de

Auftragnummer Commission	2022-094-1-AU01
Zeichnungsnummer Job number	2022-094-1-SP12
Baujahr Manufacturing date	05 / 2022
Betriebsspannung Operating voltage	
Steuerspannung AC Control voltage AC	
Steuerspannung DC Control voltage DC	DC 24 V

Verdrahtungsfarben
wiring colors

Leitungsart Wiring type		Farbe Color
Hauptstromkreis L1 / L2 / L3 main circuit L1 / L2 / L3		schwarz black
Neutralleiter N Neutral conductor N		hellblau light blue
Schutzleiter PE Protective wire PE		grün-gelb green-yellow
Steuerspannung AC Control voltage AC		rot red
Steuerspannung DC Control voltage DC	DC 24 V	dunkelblau dark blue
Mess- und Fühlerleitungen Measuring wire		weiß white
Fremdspannung External voltage		orange orange

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/2	3	Inhaltsverzeichnis Table of contents		16.06.2022	OlMa	
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=GQ+OIL.BM/2	5	Klemmenkasten Junction box		16.06.2022	OlMa	
=GQ+OIL.BM/3	6	Instrumentengerüst Instrumentation rack		16.06.2022	OlMa	
=GQ+OIL.BM/5	7	Ölpumpe / Ölheizung Gebläse oil pump / oil heater blower		16.06.2022	OlMa	
=GQ+OIL.BM/6	8	Niveauschalter Öltank Gebläse level switch oil-vessel blower		16.06.2022	OlMa	
=GQ+OIL.BM/7	9	Differenzdruck Ölfilter Gebläse differential pressure oil filter blower		16.06.2022	OlMa	
=GQ+OIL.BM/8	10	Öldruck Gebläse oil-pressure blower		16.06.2022	OlMa	
=GQ+OIL.BM/9	11	Öltemperatur Gebläse oil temperature blower		16.06.2022	OlMa	
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=GQ+BOM/1	15	Artikelstückliste : STAHL.8146/2S71 - STAHL.8146/2S71 Parts list : STAHL.8146/2S71 - STAHL.8146/2S71		16.06.2022	OlMa	
=GQ+CAB/1	16	Kabelübersicht : =GQ+OIL.BM-W_FIT_3.5.5.631 - =GQ+OIL.BM-W_TIT_3.2.3.631 Cable overview : =GQ+OIL.BM-W_FIT_3.5.5.631 - =GQ+OIL.BM-W_TIT_3.2.3.631		16.06.2022	OlMa	

F26_ELOG_1_AM_Deckblatt_leer

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Schaumburg

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Fax +49 (0)5154 / 81-9191

Projektverantwortlicher Responsible for project	Mr. Matthias	Projektverantwortlicher Responsible for project	Mr. Schwekendiek
Auftragnummer Commission	2022-094-1-AU01	Auftragsnummer Commission	4000369
Zeichnungsnummer Job number	2022-094-1-SP12	Bestellnummer Order number	
		Materialnummer Ident number	
		Typ Type	GQ Gebläse Einheit 6

Klemmenkasten Ölanlage Gebläse Einheit 6
Junction box oil unit blower Unit 6

=+/2 2

			Date	16.06.2022	Aerzener Maschinenfabrik GmbH Instrumentengerüst Einheit Instrumentation rack Unit	ELOG Elektrotechnik GmbH Schaumburg	Deckblatt Cover sheet	Job number 2022-094-1-SP12	= GQ + OIL.BM
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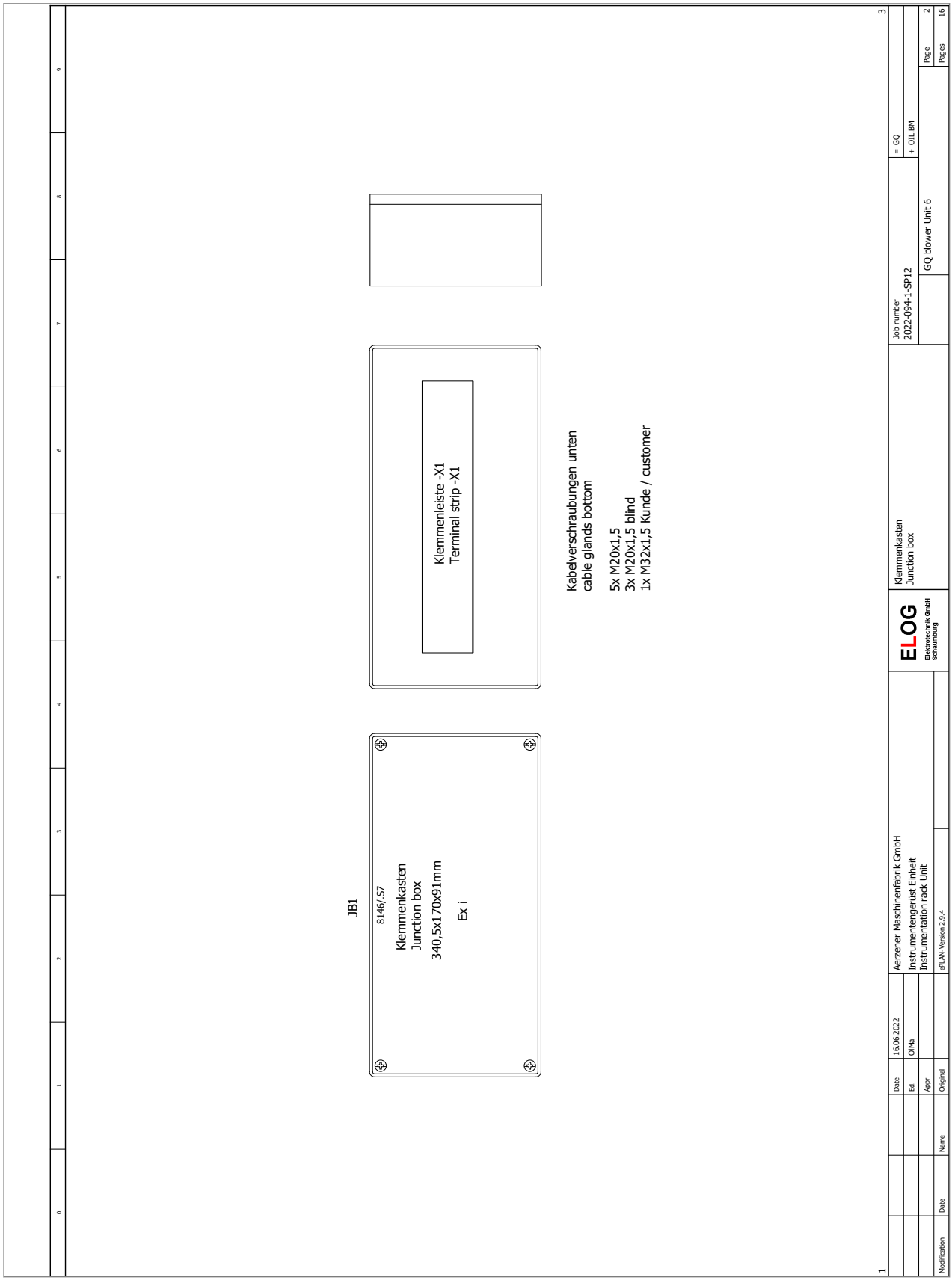
JB1
8146/.S7
Klemmenkasten
Junction box
340,5x170x91mm
Ex i
Klemmenleiste -X1
Terminal strip -X1
Kabelverschraubungen unten
cable glands bottom
5x M20x1,5
3x M20x1,5 blind
1x M32x1,5 Kunde / customer
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Original
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Date
Modification
Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
ePLAN-Version 2.9.4
ELOG
Elektrotechnik GmbH
Schlaumburg
Klemmenkasten
Junction box
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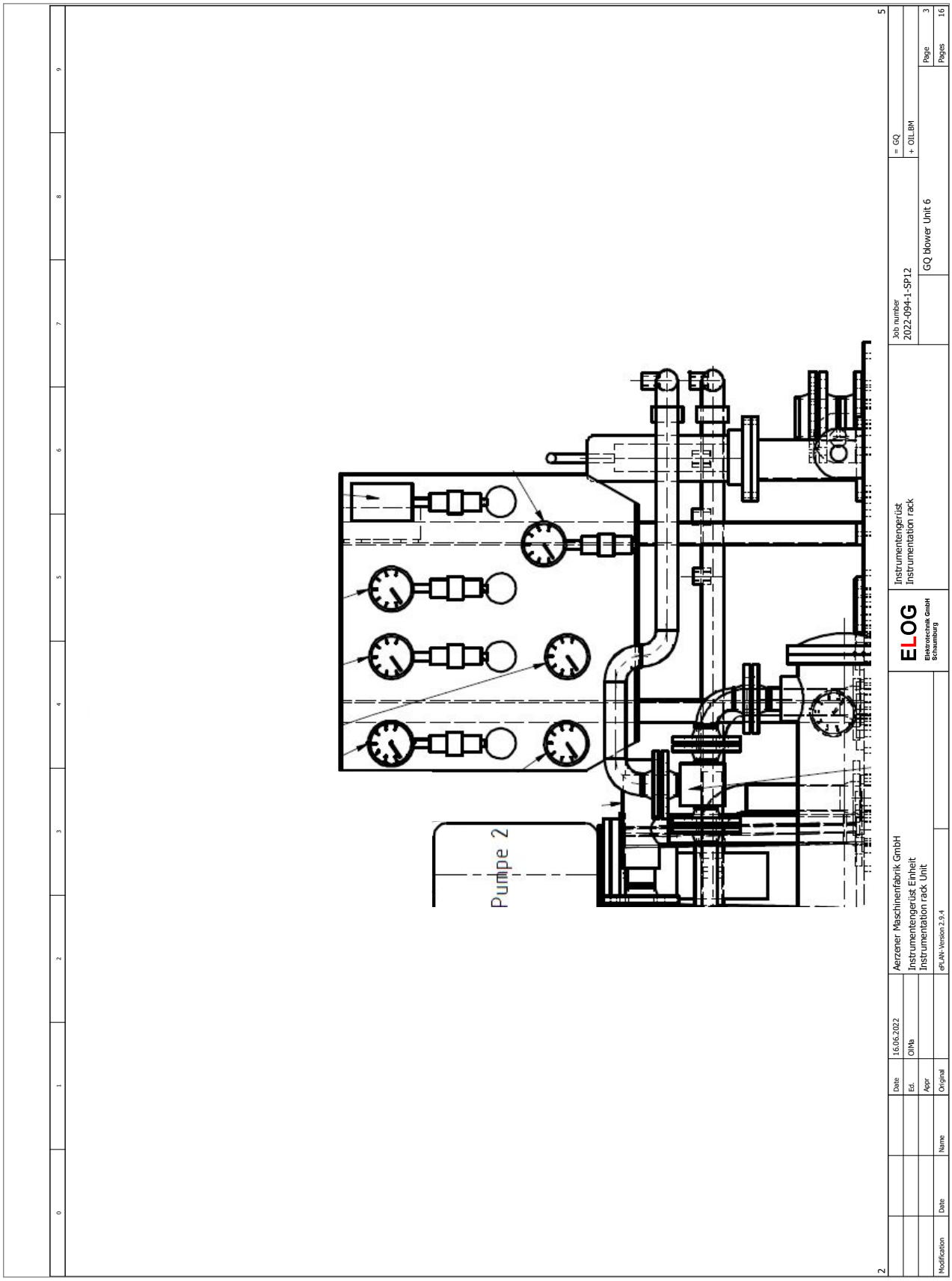
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Aerzener Maschinenfabrik GmbH
Instrumentengerüst Einheit
Instrumentation rack Unit
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ELOG
Elektrotechnik GmbH
Schaumburg
Instrumentengerüst
Instrumentation rack
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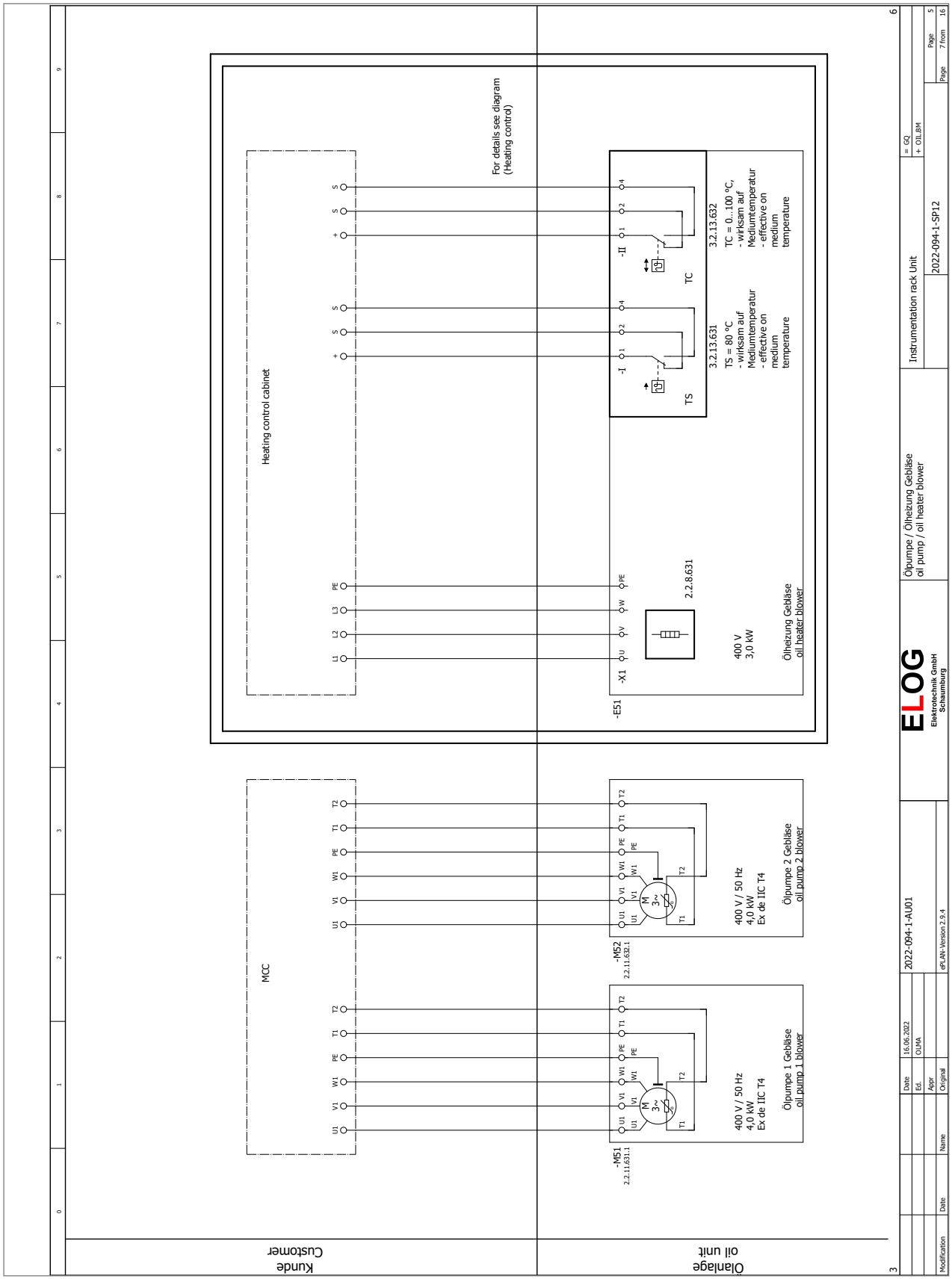
Heating control cabinet
For details see diagram
(Heating control)
-E51
-X1
2.2.8.631
400 V
3,0 kW
Ölheizung Gebläse
oil heater blower
TS
TC
-I
-II
3.2.13.631
TS = 80 °C
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
3.2.13.632
TC = 0...100 °C,
- wirksam auf
Mediumtemperatur
- effective on
medium
temperature
MCC
-M51
2.2.11.631.1
-M52
2.2.11.632.1
400 V / 50 Hz
4,0 kW
Ex de IIC T4
Ölpumpe 1 Gebläse
oil pump 1 blower
Ölpumpe 2 Gebläse
oil pump 2 blower
Kunde
Customer
Olanlage
oil unit
ELOG
Elektrotechnik GmbH
Schaumburg
Ölpumpe / Ölheizung Gebläse
oil pump / oil heater blower
Instrumentation rack Unit
2022-094-1-SP12
2022-094-1-AU01
Date 16.06.2022
Ed. OLMA
Appr.
Original
Modification
Date
Name
ePLAN-Version 2.9.4
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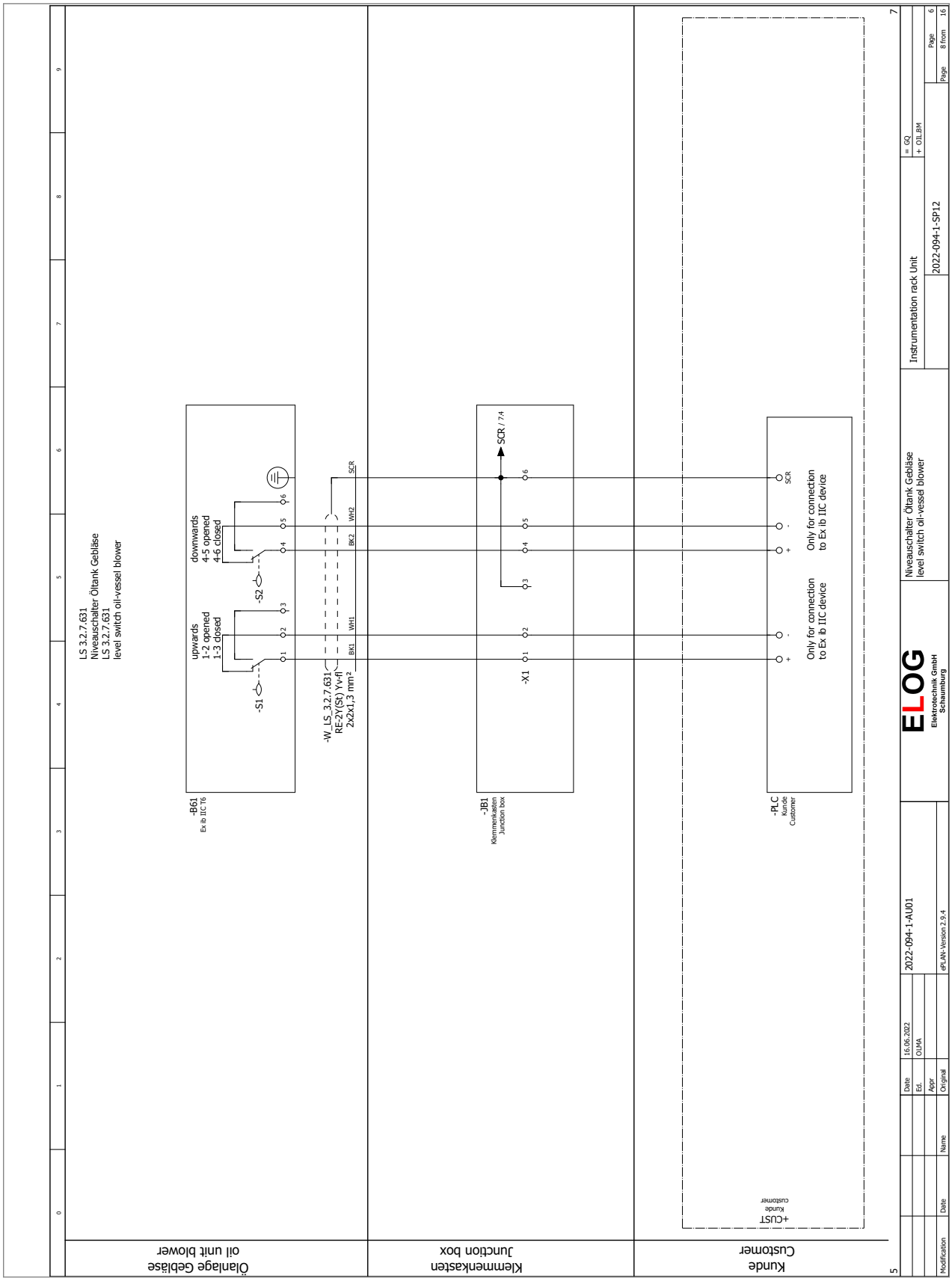
LS 3.2.7.631
Niveauschalter Öltank Gebläse
LS 3.2.7.631
level switch oil-vessel blower
-B61
Ex ib IIC T6
upwards
1-2 opened
1-3 closed
downwards
4-5 opened
4-6 closed
-S1
-S2
-W_LS_3.2.7.631
RE-2Y(St) Yv-fl
2x2x1,3 mm²
BK1
WH1
BK2
WH2
SCR
-JB1
Klemmenkasten
Junction box
-X1
SCR / 7.4
-PLC
Kunde
Customer
Only for connection
to Ex ib IIC device
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Niveauschalter Öltank Gebläse
level switch oil-vessel blower
Instrumentation rack Unit
2022-094-1-SP12
= GQ
+ OILBM
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2022-094-1-AU01
16.06.2022
OUMA
ePLAN-Version 2.9.4
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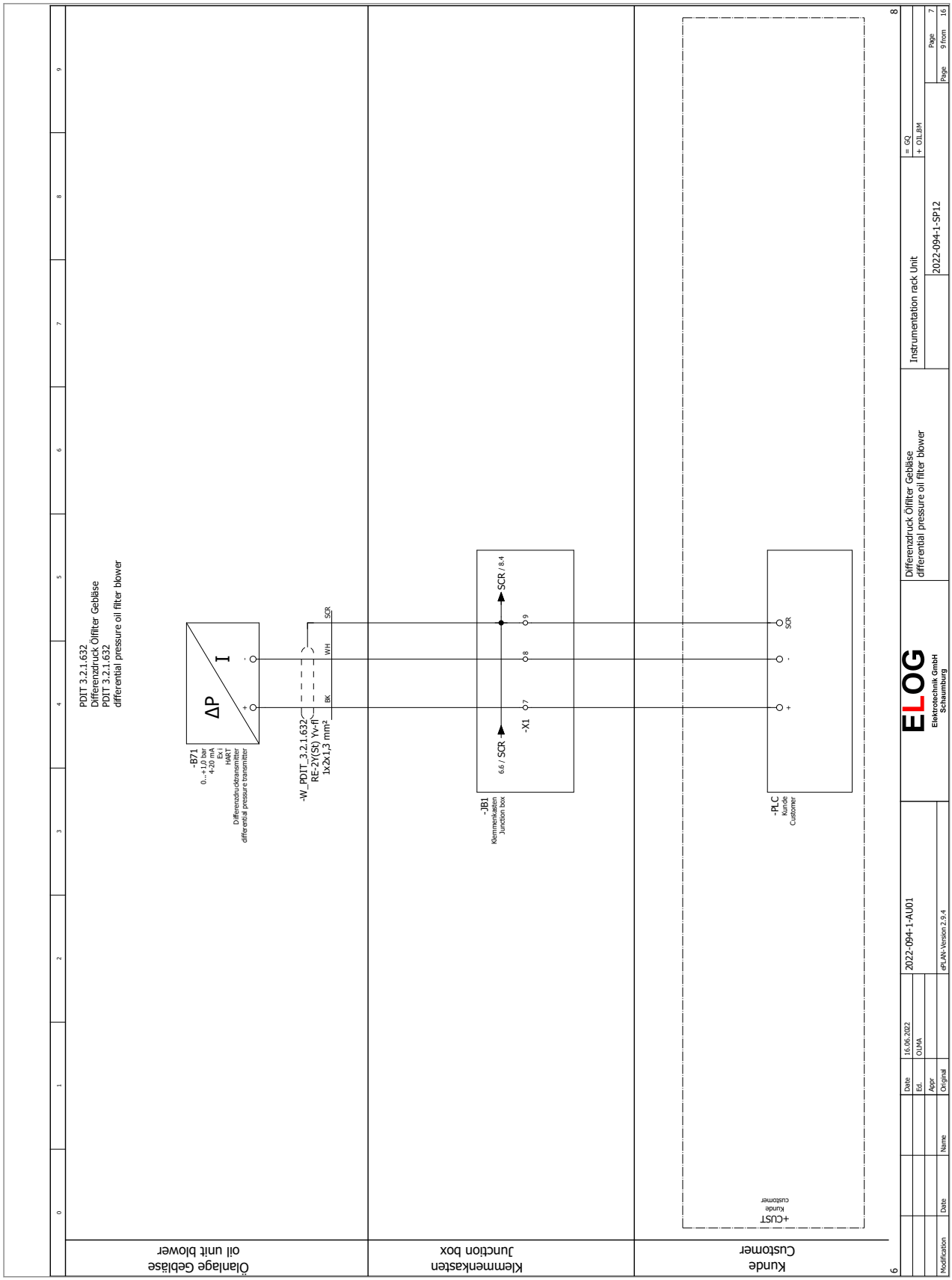
Date
Name
Original
Ed.
Agpr


PDIT 3.2.1.632
Differenzdruck Ölfilter Gebläse
PDIT 3.2.1.632
differential pressure oil filter blower
-B71
0...+1,0 bar
4-20 mA
Ex i
HART
Differenzdruckdtransmitter
differential pressure e transmitter
ΔP
I
+
-
-W_PDIT_3.2.1.632
RE-2Y(St) Yv-fl
1x2x1,3 mm²
BK
WH
SCR
-JB1
Klemmenkasten
Junction box
6.6 / SCR
SCR / 8.4
-X1
7
8
9
-PLC
Kunde
Customer
SCR
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Differenzdruck Ölfilter Gebläse
differential pressure oil filter blower
Instrumentation rack Unit
2022-094-1-SP12
= GQ
+ OIL.BM
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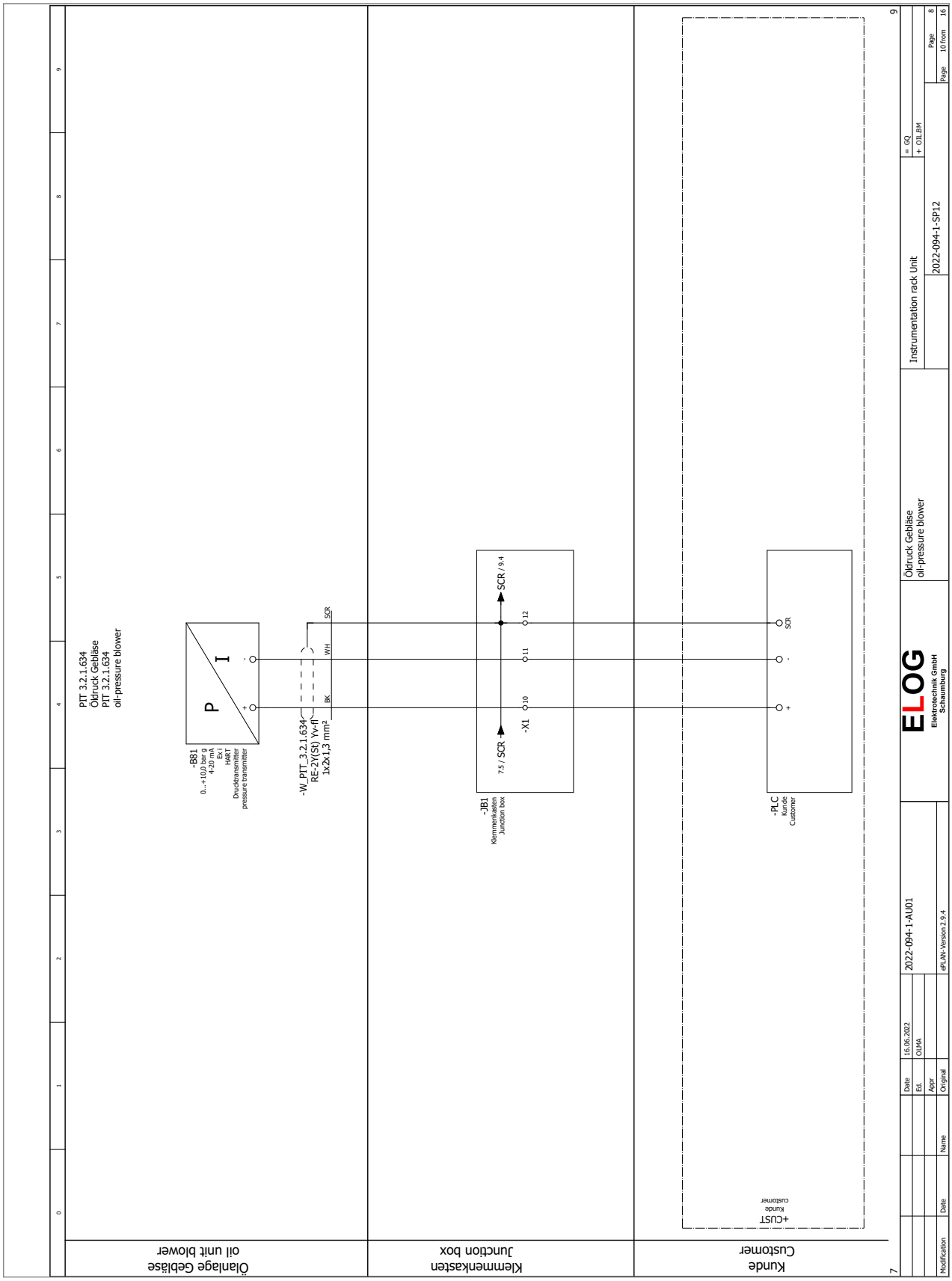
Date
Name


PIT 3.2.1.634
Öldruck Gebläse
PIT 3.2.1.634
oil-pressure blower
-B81
0...+10,0 bar g
4-20 mA
Ex i
HART
Drucktransmitter
pressure transmitter
-W_PIT_3.2.1.634
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB1
Klemmenkasten
Junction box
7.5 / SCR
SCR / 9.4
-X1
12
11
10
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Öldruck Gebläse
oil-pressure blower
Instrumentation rack Unit
2022-094-1-SP12
= GQ
+ OIL.BM
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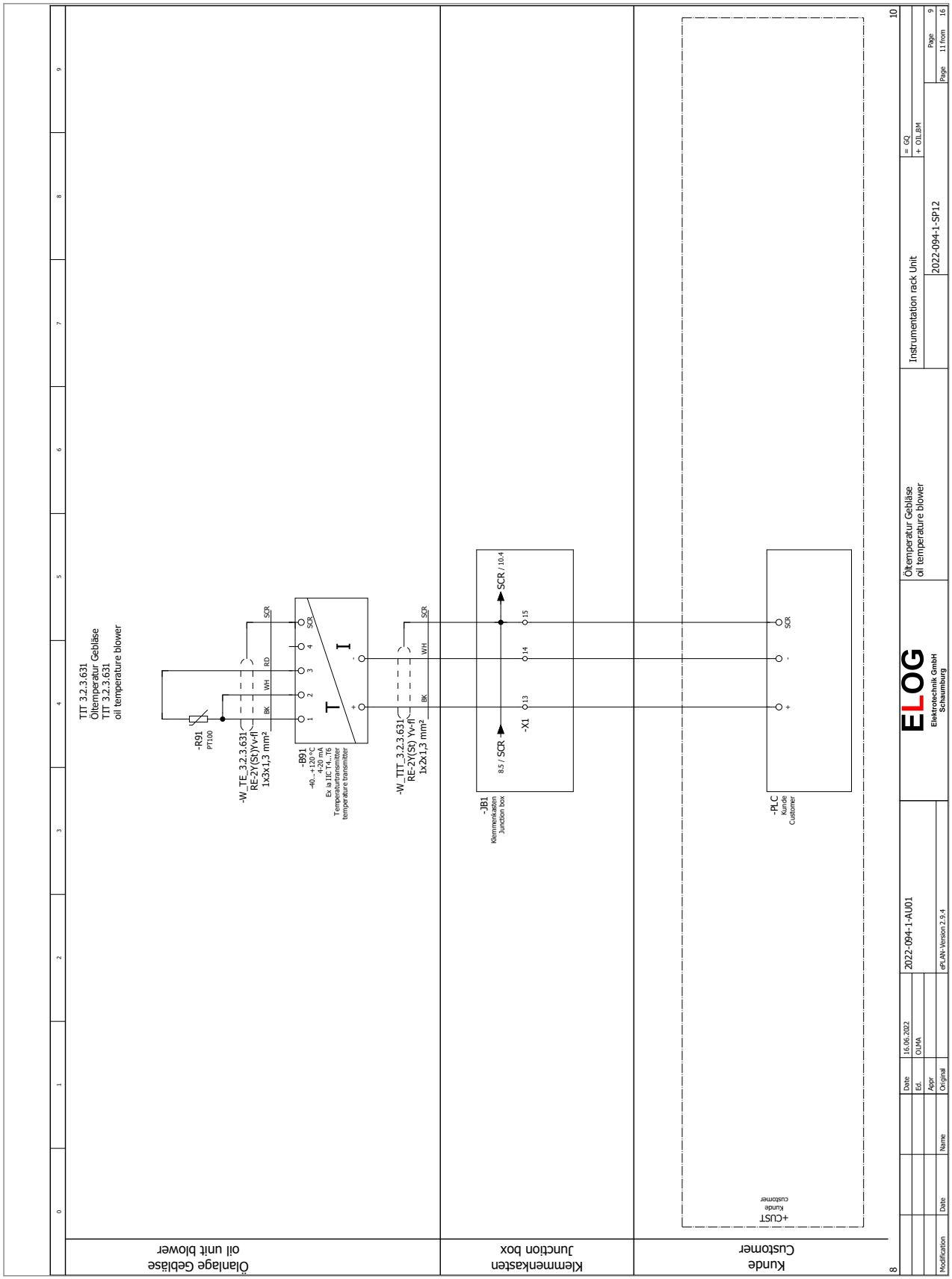
Date
Name
Ed.
Agpr
Original


TIT 32.3.631
Ölemperatur Gebläse
TIT 32.3.631
oil temperature blower
-R91
PT100
-W_TE_32.3.631
RE-2Y(St)Yv-fl
1x3x1,3 mm²
BK
WH
RD
SCR
-B91
-40...+120 °C
4-20 mA
Ex ia IIC T4...T6
Temperaturmessumformer
temperature transmitter
-W_TIT_3.2.3.631
RE-2Y(St) Yv-fl
1x2x1,3 mm²
-JB1
Klemmenkasten
Junction box
8.5 / SCR
SCR / 10.4
-X1
13
14
15
-PLC
Kunde
Customer
+CUST
Kunde
customer
Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
ELOG
Elektrotechnik GmbH
Schaumburg
Ölemperatur Gebläse
oil temperature blower
Instrumentation rack Unit
2022-094-1-SP12
= GQ
+ OIL.BM
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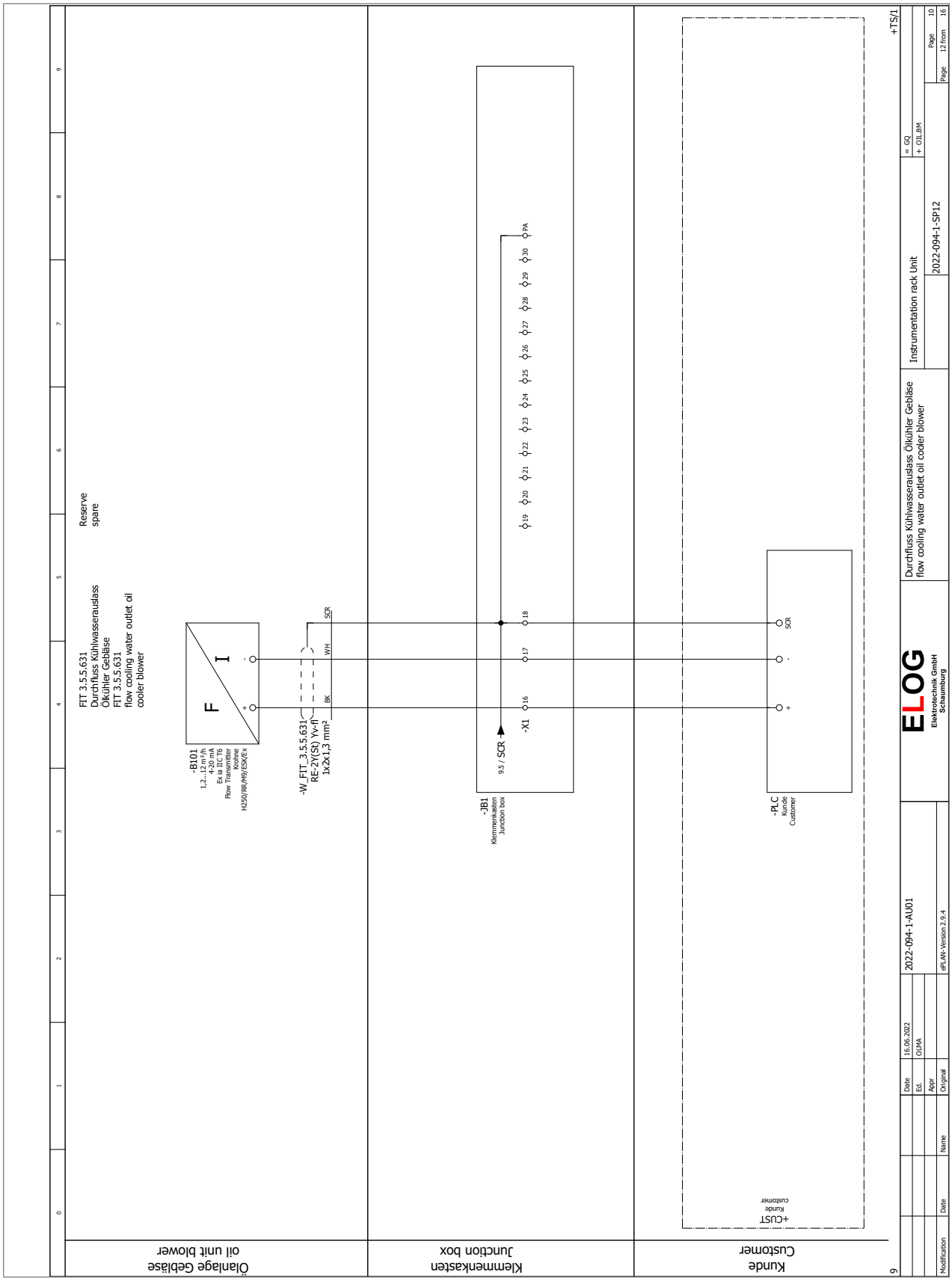
Ed.
Appr
Original
Modification
Name


Ölanlage Gebläse
oil unit blower
Klemmenkasten
Junction box
Kunde
Customer
FIT 3.5.5.631
Durchfluss Kühlwasserauslass
Ölkühler Gebläse
FIT 3.5.5.631
flow cooling water outlet oil
cooler blower
Reserve
spare
-B101
1,2...12 m³/h
4-20 mA
Ex ia IIC T6
Flow Transmitter
Krohne
H250/R6/M9/ESK/Ex
-W_FIT_3.5.5.631
RE-2Y(St) Yv-fl
1x2x1,3 mm²
SCR
WH
BK
-JB1
Klemmenkasten
Junction box
9.5 / SCR
-X1
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
PA
+CUST
Kunde
customer
-PLC
Kunde
Customer
SCR
+TS/1
ELOG
Elektrotechnik GmbH
Schaumburg
Durchfluss Kühlwasserauslass Ölkühler Gebläse
flow cooling water outlet oil cooler blower
Instrumentation rack Unit
2022-094-1-SP12
= GQ
+ OILBM
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Date
Modification
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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	-W_FIT_3.5.5.631	-W_TIT_3.2.3.631	-W_PIT_3.2.1.634	-W_PDIT_3.2.1.632	-W_LS_3.2.7.631	Cable name / cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name / cable type	Page / column
	RE-ZY(SI) Yv-fl	RE-ZY(SI) Yv-fl	RE-ZY(SI) Yv-fl	RE-ZY(SI) Yv-fl	RE-ZY(SI) Yv-fl									
LS 3.2.7.631 Niveauschalter Öltank Gebläse LS 3.2.7.631 level switch oil-vessel blower					BK1		-B61	1	1		+CUST-PLC	+		/6.4
=					WH1		-B61	2	2		+CUST-PLC	-		/6.5
=									3					/6.5
=					BK2		-B61	4	4		+CUST-PLC	+		/6.5
=					WH2		-B61	5	5		+CUST-PLC	-		/6.5
=					SCR				6		+CUST-PLC	SCR		/6.6
PDIT 3.2.1.632 Differenzdruck Ölfilter Gebläse PDIT 3.2.1.632 differential pressure oil filter blower				BK			-B71	+	7		+CUST-PLC	+		/7.4
=				WH			-B71	-	8		+CUST-PLC	-		/7.4
=				SCR					9		+CUST-PLC	SCR		/7.5
PIT 3.2.1.634 Öldruck Gebläse PIT 3.2.1.634 oil-pressure blower			BK				-B81	+	10		+CUST-PLC	+		/8.4
=			WH				-B81	-	11		+CUST-PLC	-		/8.4
=			SCR						12		+CUST-PLC	SCR		/8.5
TIT 3.2.3.631 Öltemperatur Gebläse TIT 3.2.3.631 oil temperature blower		BK					-B91	+	13		+CUST-PLC	+		/9.4
=		WH					-B91	-	14		+CUST-PLC	-		/9.4
=		SCR							15		+CUST-PLC	SCR		/9.5
FIT 3.5.5.631 Durchfluss Kühlwasserauslass Ölkühler Gebläse FIT 3.5.5.631 flow cooling water outlet oil cooler blower	BK						-B101	+	16		+CUST-PLC	+		/10.4
=	WH						-B101	-	17		+CUST-PLC	-		/10.4
=	SCR								18		+CUST-PLC	SCR		/10.5
Reserve spare									19					/10.5
=									20					/10.6
=									21					/10.6
=									22					/10.6
=									23					/10.6
=									24					/10.6
=									25					/10.7

+OIL.BM/10 1.1

Modification	Date	Name			
			Date	16.06.2022	2022-094-1-AU01
			Ed.	OLMA	
			Appr		
			Original		ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Klemmenplan =GQ+OIL.BM-JB1-X1
Terminal diagram =GQ+OIL.BM-JB1-X1

Instrumentation rack Unit
2022-094-1-SP12

= GQ
+ TS

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Terminal diagram

F13_JODR2-OLMA

Strip
=GQ+OIL.BM-JB1-X1

function text	Cable name / cable type	Target designation	Connection point	terminal	jumper	Target designation	Connection point	Cable name / cable type	Page / column
Reserve spare				26					/10.7
=				27					/10.7
=				28					/10.7
=				29					/10.7
=				30					/10.8
=				PA					/10.8

1

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Klemmenplan =GQ+OIL.BM-JB1-X1 Terminal diagram =GQ+OIL.BM-JB1-X1	Instrumentation rack Unit
			Ed.	OLMA				= GQ + TS
			Appr					2022-094-1-SP12
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Parts list

F01_ELOG_001

Device tag	Quantity	designation	Type number	supplier	order number
+OIL.BM-JB1	1	Terminal box Ex i	8146/2S71	R. Stahl Schaltgeräte GmbH	8146/2S71

+TS/1.1

		Date	16.06.2022
		Ed.	OLMA
		Appr	
Modification	Date	Name	Original

2022-094-1-AU01

ePLAN-Version 2.9.4

ELOG
Elektrotechnik GmbH
Schaumburg

Artikelstückliste : STAHL.8146/2S71 - STAHL.814
6/2S71
Parts list : STAHL.8146/2S71 - STAHL.8146/2S71

Instrumentation rack Unit

2022-094-1-SP12

+CAB/1

= GQ
+ BOM

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Cable overview

F10_OLMA002

Cable name	Source (from)	Target (to)	cable type	all conductors	Conductors used	Cross-section [mm]	function text
+OIL.BM-W_FIT_3.5.5.631	+OIL.BM-JB1-X1	+OIL.BM-B101	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	FIT 3.5.5.631 flow cooling water outlet oil cooler blower
+OIL.BM-W_LS_3.2.7.631	+OIL.BM-B61	+OIL.BM-JB1-X1	RE-2Y(St) Yv-fl	2x2	4	1,3 mm²	LS 3.2.7.631 level switch oil-vessel blower
+OIL.BM-W_PDIT_3.2.1.632	+OIL.BM-JB1-X1	+OIL.BM-B71	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PDIT 3.2.1.632 differential pressure oil filter blower
+OIL.BM-W_PIT_3.2.1.634	+OIL.BM-JB1-X1	+OIL.BM-B81	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	PIT 3.2.1.634 oil-pressure blower
+OIL.BM-W_TE_3.2.3.631	+OIL.BM-B91	+OIL.BM-R91	RE-2Y(St)Yv-fl	1x3	3	1,3 mm²	TIT 3.2.3.631 oil temperature blower
+OIL.BM-W_TIT_3.2.3.631	+OIL.BM-JB1-X1	+OIL.BM-B91	RE-2Y(St) Yv-fl	1x2	2	1,3 mm²	=

+BOM/1

			Date	16.06.2022	2022-094-1-AU01	ELOG Elektrotechnik GmbH Schaumburg	Kabelübersicht : =GQ+OIL.BM-W_FIT_3.5.5.631 - =GQ+OIL.BM-W_TIT_3.2.3.631	Instrumentation rack Unit	= GQ
			Ed.	OLMA			Cable overview : =GQ+OIL.BM-W_FIT_3.5.5.631 - =GQ+OIL.BM-W_TIT_3.2.3.631		+ CAB
			Appr					2022-094-1-SP12	Page 1
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F.2 Gearbox

F.2.1 Sub-Supplier - Serial-No. List

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Best. Nr.: 4500499297 AM Nr.: 2000064848 EAV Nr.: 2101639 Zeichnung: 4000849671Vers05		Auflistung Lieferantenserien-Nr. Ölanlage Gebläse		EMMERTHAL
	Zugehörig zu Anlage :	SN.: 2000064848-3 FA2200506		
Art.Nr.	Beschreibung Ident-Maß Zusatztext	Lieferantenseriennummer (Fabrik-Nr.)		
L 711676	Rohrbündelwärmetauscher Typ BCF 804-0-4 weg	989952		
L 716189	E-Motor **(2x) Loher Chemstar** 400 / 690V, 50Hz. 1500U/min, IP55 EEx de II CT4	SN.1062488196		
		SN.1064954042		
L 716189	Zahnradpumpe **(2x)** Typ KF 3/100 F20B POA 7DP1	2204100749		
		2204100747		
L 712204	Ex-Niveauwächter DNRA00-12-F65 16B-H375-L405	22-0410-012		
L 712184	Druckfilter DU 251.25 G.30.E.P.BFS8 umschaltbar	425906-1 3/6		
L 711707	Druckbegrenzungsventil **(2x)** RSNE 2 / Ausführung ohne Handrad	5102386/10/5		
		5102386/10/11		
L 711680	Sicherheitsventil MU-ECK CC 491 KNBR	3828146		
732080	Schwebekörper-Durchflußmesser Typ H250/RR/M40/ESK-Ex 1,0-10	01138886		
L 715976	Lateralkompensator **(2x)** DN 40 PN 16 Flansche gebohrt 1 1/2" 150lbs	4201279-1-7		
		4201279-1-5		
721331	Ex-Flanschheizkörper Typ DHFB3-3-T6 DN 80 PN 16	22-0410-020		
721327	Drucktransmitter Typ. Cerebar S PMp71 Eex-i, G1/2", 0 - 10 bar	~~2200026/3~~	T202CA0109C	
721326	Differenzdruckmanometer mit Fernbeger Typ. Deltabar S PMD 75, 4 - 20mA PMD 75-1BJ7HB1DHBA	T200620109D		
721328	Widerstandsthermometer mit Transmitter PT100, TR 10-GAD9BHRYC2100 mit Schutzrohr	T304E914152		
L 715753	Temperaturregler M 40 TD 8 A 110 - CC DN 40	2200026/3		
721329	Temperaturtransmitter HART Eex-ia, 4 - 20mA TMT 142-B22131 BBA1	T304170429E		

Datum: 16.8.22

Unterschrift: G. Müller

Seite 1 von 1

Best. Nr.: **4500499297**
AM Nr.: **2000064848**
EAV Nr.: **2101639**
Zeichnung: **4000849671Vers05**

Auflistung Lieferantenserien-Nr.
Ölanlage Gebläse

EMMERTHAL

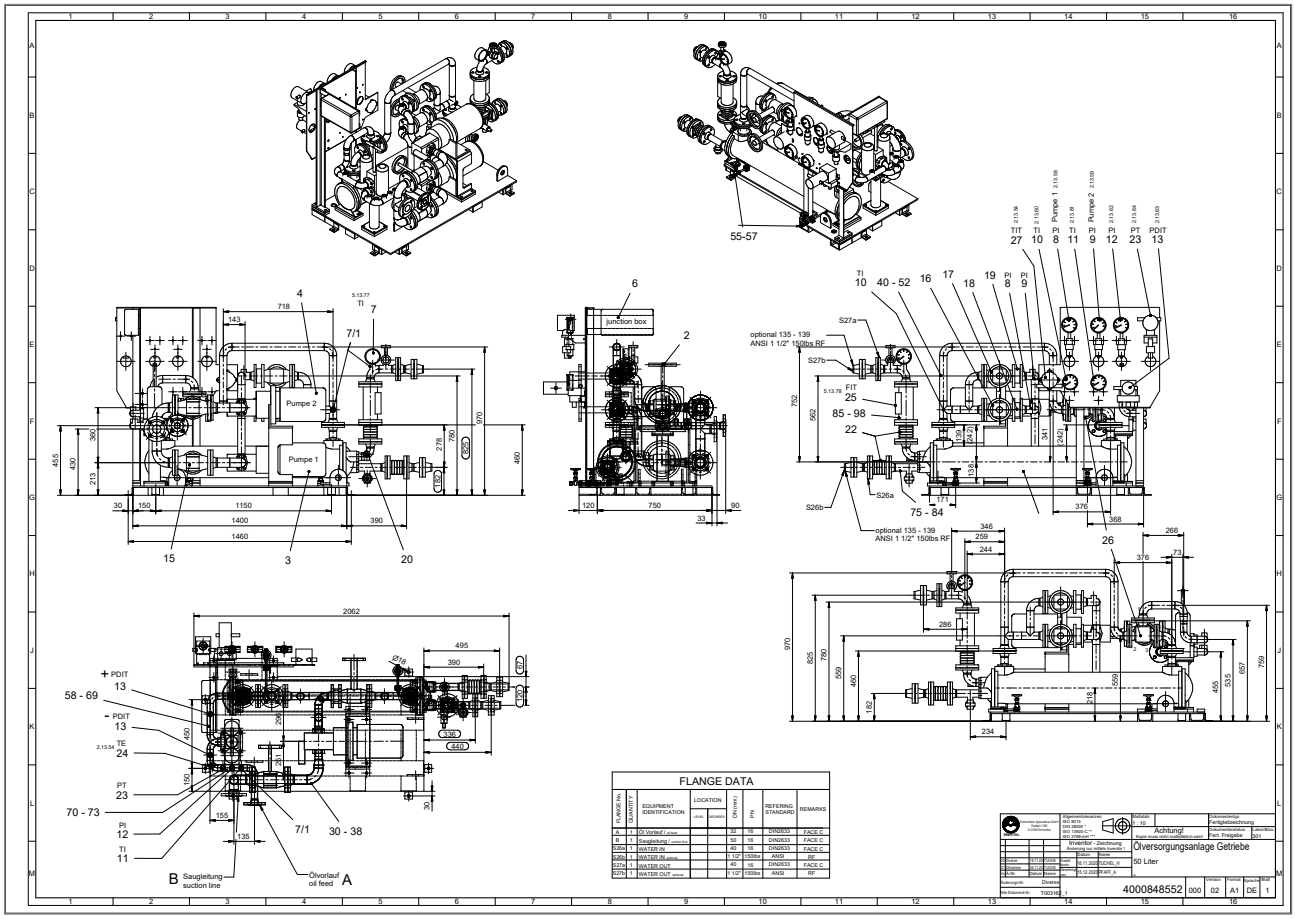
Zugehörig zu Anlage : SN.: 2000064848-4 FA2200507

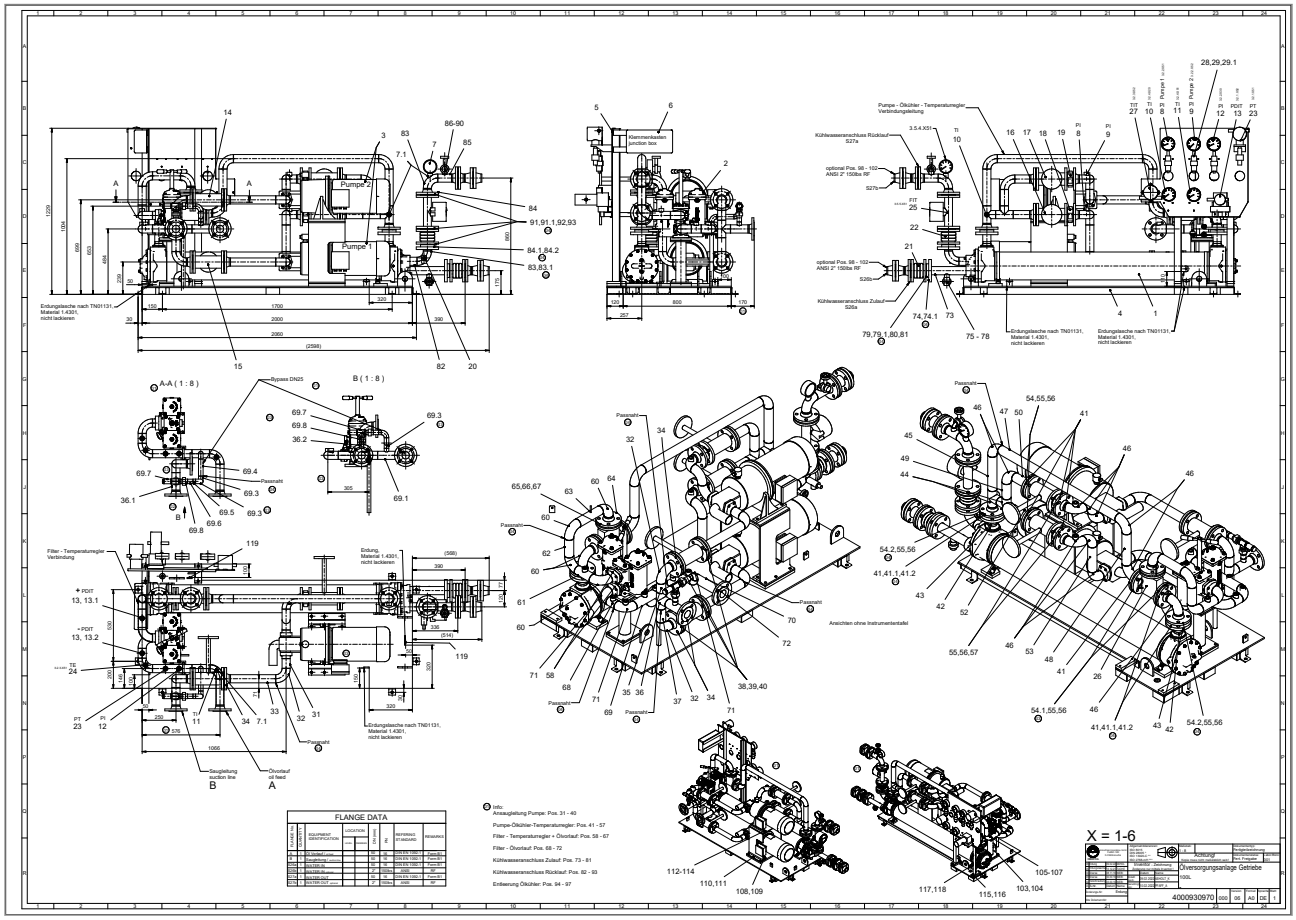
Art.Nr.	Beschreibung Ident-Maß Zusatztext	Lieferantenseriennummer (Fabrik-Nr.)		
L 711676	Rohrbündelwärmetauscher Typ BCF 804-0-4 weg	SN. 989953		
L 716189	E-Motor **(2x) Loher Chemstar** 400 / 690V, 50Hz. 1500U/min, IP55 EEx de II CT4	SN 2 1066 28 49 26		
		SN 2 1066 28 49 24		
L 716189	Zahnradpumpe **(2x)** Typ KF 3/100 F20B POA 7DP1	—	2206104888	
		—	2206104890	
L 712204	Ex-Niveauwächter DNRA00-12-F65 16B-H375-L405	22-0410-015		
L 712184	Druckfilter DU 251.25 G.30.E.P.BFS8 umschaltbar	425906-1	6/6	
L 711707	Druckbegrenzungsventil **(2x)** RSNE 2 / Ausführung ohne Handrad	5102386/10	/13	
		5102386/10	/12	
L 711680	Sicherheitsventil MU-ECK CC 491 KNBR	SN.3828145		
732080	Schwebekörper-Durchflußmesser Typ H250/RR/M40/ESK-Ex 1,0-10	SN.01138883		
L 715976	Lateralkompensator **(2x)** DN 40 PN 16 Flansche gebohrt 1 1/2" 150lbs	SN.4201279-1-1		
		SN.4201279-1-10		
721331	Ex-Flanschheizkörper Typ DHFB3-3-T6 DN 80 PN 16	No. 22-0410-027		
721327	Drucktransmitter Typ. Cerebar S PMp71 Eex-i, G1/2", 0 - 10 bar	T203C2010	9C	
721326	Differenzdruckmanometer mit Ferngeber Typ. Deltabar S PMD 75, 4 - 20mA PMD 75-1BJ7HB1DHBA	200630109	D	
721328	Widerstandsthermometer mit Transmitter PT100, TR 10-GAD9BHRYC2100 mit Schutzrohr	T304E 814	152	
L 715753	Temperaturregler M 40 TD 8 A 110 - CC DN 40	SN.2200026/6		
721329	Temperaturtransmitter HART Eex-ia, 4 - 20mA TMT 142-B22131 BBA1	T304190429	E	

Datum: 15.8.22

Unterschrift: G. [illegible]

F.2.2 Drawing


55-57
junction box
Pumpe 1
Pumpe 2
optional 135 - 139
ANSI 1 1/2" 150lbs RF
75 - 84
85 - 98
58 - 69
70 - 73
30 - 38
B Saugleitung suction line
Ölvorlauf oil feed A
FLANGE DATA
Ölversorgungsanlage Getriebe
50 Liter
4000848552


A-A (1 : 8)
B (1 : 8)
Pumpe 2
Pumpe 1
Klemmenkasten
junction box
Pumpe - Ölkühler - Temperaturregler
Verbindungsleitung
Kühlwasseranschluss Rücklauf
S27a
optional Pos. 98 - 102
ANSI 2" 150lbs RF
S27b
Kühlwasseranschluss Zulauf
S26a
optional Pos. 98 - 102
ANSI 2" 150lbs RF
S26b
Erdungsblache nach TN01131,
Material 1.4301,
nicht lackieren
Bypass DN25
Passnaht
Filter - Temperaturregler
Verbindung
Saugleitung
suction line
Ölvorlauf
oil feed
Ansichten ohne Instrumententafel
FLANGE DATA
Info:
Anlagleitung Pumpe: Pos. 31 - 40
Pumpe-Ölkühler-Temperaturregler: Pos. 41 - 57
Filter - Temperaturregler + Ölvorlauf: Pos. 58 - 67
Filter - Ölvorlauf: Pos. 68 - 72
Kühlwasseranschluss Zulauf: Pos. 73 - 81
Kühlwasseranschluss Rücklauf: Pos. 82 - 93
Entleerung Ölkühler: Pos. 94 - 97
X = 1-6
Ölversorgungsanlage Getriebe
100L
4000930970

F.2.3 Parts lists

Emmerthaler Apparatebau GmbH
Langes Feld 4
31860 Emmerthal

Teileliste
part list

Ölversorgungsanlage Getriebe

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Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
				Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
1		1	L711676	DEU: Rohrbündelwärmetauscher ENU: tubular heat exchanger									51,00
2		1	L712718	DEU: Druckfilter ENU: pressure filter									23,00
3		1	L716190	DEU: Zahnradpumpe SF 3/32 RD-LFM m. E-Motor Loher Chemstar + Dach 400/690V, 3KW, 50Hz, 1500U/min IP55 ENU: gear type pump									20,00
4		1	L716190	DEU: Zahnradpumpe SF 3/32 RD-LFM m. E-Motor Loher Chemstar + Dach 400/690V, 3KW, 50Hz, 1500U/min IP55 ENU: gear type pump									20,00
6		1	721321	DEU: Klemmenkasten JB1 Fabrikat : Stahl Beistellung ELOC				PVC					1,00
7		1	721279	DEU: Bimetall-Thermometer 100D G 1/2" U Fa.WIKA R5502/4, -40... +60°C ENU: bimetal thermometer				VA					0,20
7/1		3	721280	DEU: Einschraubschutzrohr TW45-F Form 5 Fa.WIKA G 1/2"; EBL 63mm (U1) ENU: screwing in protection tube				1.4571					
8		1	721282	DEU: Rohrfedermanometer 100D R1/2"U; 0...6 Bar Fa.WIKA Typ 233.50.100, Anschluß R1/2" AG unten ENU: tube pressure gauge				VA					0,10

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Zeichnungsnummer: drawingnumber — 4000848552Vers02

Gewicht (kg): weight (kg) — 299,85

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9		1	721282	DEU: Rohrfedermanometer 100D R1/2"U; 0...6 Bar Fa.WIKA Typ 233.50.100, Anschluß R1/2" AG unten ENU: tube pressure gauge				VA					0,10
10		1	721283	DEU: Fernthrmometer mit Halter F73.100; Fa.WIKA -40...+120°C, Typ F73.100 ENU: telethermometer with holder				VA					0,20
11		1	721283	DEU: Fernthrmometer mit Halter F73.100; Fa.WIKA -40...+120°C, Typ F73.100 ENU: telethermometer with holder				VA					0,20
12		1	721285	DEU: Rohrfedermanometer 100D R1/2"U, 0..2,5 bar Fa.WIKA Typ 233.50.100 ENU: tube pressure gauge				VA					0,20
13		1	721294	DEU: Differenzdruckmanometer Exi mit Ferngeber 4 - 20mA Fa. E+H Typ Deltabar S PMD75, PDIT2.13.63 PMD75-1BJ7HB1DHBA ENU: differential manometer				VA					1,00
14		1	L712200	DEU: Absperrventil DN 50 PN 16 ENU: shut-off valve				GG 25					13,20
15		1	L712200	DEU: Absperrventil DN 50 PN 16 ENU: shut-off valve				GG 25					13,20
16		1	L711683	DEU: Absperrventil econosto Fig.241 DN 40 PN 16 ENU: shut-off valve				GRAUGUß					10,20
17		1	L711683	DEU: Absperrventil econosto Fig.241 DN 40 PN 16 ENU: shut-off valve				GRAUGUß					10,20

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pos.	index	piece	article-no.	designation and dimensions	drawing-no.	length	width	material	DIN EN	standard	AD-W	WAZ	Weight (kg)
18		1	L711681	DEU: Rückschlagventil RK 86 ENU: non return valve									1,00
19		1	L711681	DEU: Rückschlagventil RK 86 ENU: non return valve									1,00
20		1	L711680	DEU: Sicherheitsventil MU-ECK ENU: safety relief valve									1,80
22		2	L715976	DEU: Lateralkompensator DN40 PN16 ENU: lateral compensator				1.4571					3,00
23		1	721295	DEU: Drucktransmitter EEx-i G1/2", 0..10Bar, Fa. E+H Typ Cerebar S PMP71, PIT2.13.64 PMP71-1BA1PB1GAABU ENU: pressure transmitter				VA					0,20
24		1	721296	DEU: Wiederstandsthermometer PT100 EEx-i Fa.E+H Type Wiederstandsthermometer TR 10, TE2.13.54 TR10-GAD9BHRYC2100 ENU: resistance thermometer				VA					0,20
25		1	732080	DEU: Schwebekörper-Durchflußmesser Typ H250/RR/M40/ESK-Ex 1,0-10 m3/h				VA					5,00
26		1	L715740	DEU: Temperaturregler M40TD110-A38 DN40 reduziert ENU: temperature controller				GG40.3					
27		1	721297	DEU: Temperaturtransmitter HART EEx-ia, 4-20mA, Fa E+H Typ iTEMP TMT142, Feldtransmitter HART, TIT2.1354 TMT142-B22131BBA1 ENU: temperature transmitter				VA					0,10

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28		3	721319	DEU: Manometerabsperrventil Fa.Swagelok G 1/2", 1x D12 ENU: manometer gauge valve				1.4571		16270B			0,30
29		3	721320	DEU: Messgerätehalter Fa. WIKA Form H Auslad. 100mm ENU: measuring instrument holder				ALU		16281			0,15
29/2		4	714234	DEU: Winkeladapter CAL-12M Hy-Lok ENU: angle adapter				1.4401					0,04
				Ansaugltg - Pumpe									
30		5	700154	DEU: V-Flansch C 50 x 60,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	12,65
31		1	701037	DEU: T-Stück 60,3 x 2,9 ENU: T-piece				1.0305	10216-2	2615-1/10253-2 Typ A	4	3.1	0,90
32		1	705027	DEU: Rohr d = 60,3 x 2,9 ENU: pipe		400		1.0305	10216-2	10220	4	3.1	1,64
33		4	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	1,96
34		2	701146	DEU: Red.-Stück K 60,3 x 2,9/ 48,3 x 2,6 ENU: pipe reducer				1.0305	10216-2	2616-1/10253-2 Typ A	4	3.1	0,56
35		4	707863	DEU: Dichtung 2 x 61 / 107 DN50 ENU: gasket				C 4400	1514-1	2690			0,20
36		14	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		1,61
37		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
38		2	706746	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		933	7		0,25
				Pumpe - Ölkühler-Temperaturregler									

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40		6	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	1,56
41		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		550		1.0305	10216-2	10220	4	3.1	1,61
42		4	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9		7,44
43		4	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	1,04
44		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		800		1.0305	10216-2	10220	4	3.1	2,34
45		2	701046	DEU: T-Stück 48,3 x 2,6 ENU: T-piece				1.0305	10216-2	2615-1/10253-2 Typ A	4	3.1	1,18
46		3	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,42
46		3	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	5,58
47		1	715720	DEU: Red.-Stück Sechskant Nr.33 3" - 1 1/2" ENU: hexagon reducer						2990			
48		8	707427	DEU: Dichtung 2 x 49 / 92 ENU: gasket				C 4400		2690			
49		12	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		1,38
50		8	705301	DEU: Sechskantschraube M 16 x 90 ENU: screw				5.6 GAL. ZN		933	7		1,26
51		20	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,67
52		12	708875	DEU: Sechskantschraube M 16 x 50 ENU: screw				5.6 GAL. ZN		933	7		1,24

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Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
				Entleerung Ölkühler									
55		2	712754	DEU: Winkeleinschraubverschraubung WE 10-PLM ENU: elbow screw fitting				ST. VERZ.					
56		2	711858	DEU: Durchgangsventil DV 10-L ENU: globe valve				ST. VERZ.					
57		2	711628	DEU: Verschlußkegel VKA 10 ENU: locking cone				ST. VERZ.					
		1	707186	DEU: Rohr d = 10,0 x 1,5 ENU: pipe		650		1.4541	10216-5	DIN EN ISO 1127	2		0,20
				Ölkühler -Temperaturregler- Filter									
58		1	715720	DEU: Red.-Stück Sechskant Nr.33 3" - 1 1/2" ENU: hexagon reducer				ST.		2990			0,70
59		4	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	7,44
60		3	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,78
61		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		200		1.0305	10216-2	10220	4	3.1	0,59
62		1	701155	DEU: Red.-Stück K 48,3 x 2,6/ 42,4 x 2,6 ENU: pipe reducer				1.0305	10216-2	2616-1/10253-2 Typ A	4	3.1	0,17
63		1	705039	DEU: Rohr d = 42,4 x 2,6 ENU: pipe		300		1.0305	10216-2	10220	4	3.1	0,77
64		3	700959	DEU: Rohrbogen 90°-3- 42,4 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,57
65		1	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,14

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pos.	index	piece	article-no.	designation and dimensions	drawing-no.	length	width	material	DIN EN	standard	AD-W	WAZ	Weight (kg)
66		3	707427	DEU: Dichtung 2 x 49 / 92 DN40 PN16-40 ENU: gasket				C 4400		2690			
67		4	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		0,46
68		4	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,13
69		1	721653	DEU: Rohrdoppelnippel Nr. 23 1 1/2 Zoll x 200 mit Gewinde DIN 259 ENU: pipe double nipple				ST.					0,35
				Filter - Ölvorlauf									
70		3	704805	DEU: Rohrbogen 90°-3- 42,4 x 2,6 ENU: elbow				1.4541	10216-5	2605-1/10253-4 Typ A	2	3.1	0,57
71		1	712571	DEU: Rohr d = 42,4 x 2,6 ENU: pipe		500		1.4541	10216-5	DIN EN ISO 1127	2	3.1	1,72
72		1	704613	DEU: V-Flansch C 32 x 42,4 ENU: welding neck flange				1.4541	10222-5	2633	2	3.1	1,69
73		5	710711	DEU: Muffe G 1/2 Zoll ENU: socket				1.4571		2986	2	3.1	0,70
				Kühlwasseranschluss Zulauf								3.1	
75		1	711837	DEU: Red.-Stückm. Sechskant Nr.33 2 x 1 1/2 Zoll ENU: hexagon reducer				ST.		2990			0,41
76		1	721653	DEU: Rohrdoppelnippel Nr. 23 1 1/2 Zoll x 200 mit Gewinde DIN 259 ENU: pipe double nipple				ST.					0,35
77		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		160		1.0305	10216-2	10220	4	3.1	0,47
78		1	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	1,86

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79		1	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,14
80		1	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			
81		1	711870	DEU: Absperrventil 1/2 Zoll ENU: shut-off valve				RG5					
82		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
83		8	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		0,92
84		20	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,67
				Rücklauf									
85		1	711837	DEU: Red.-Stückm. Sechskant Nr.33 2 x 1 1/2 Zoll ENU: hexagon reducer				ST.		2990			0,41
86		1	721653	DEU: Rohrdoppelnippel Nr. 23 1 1/2 Zoll x 200 mit Gewinde DIN 259 ENU: pipe double nipple				ST.					0,35
87		2	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,52
88		3	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	5,58
89		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		160		1.0305	10216-2	10220	4	3.1	0,47
90		3	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,42
91		1	711864	DEU: Winkel 90°- 1/2 Zoll - I/A ENU: angle									

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92		1	711870	DEU: Absperrventil 1/2 Zoll ENU: shut-off valve				RG5					
93		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
94		2	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			
95		5	707427	DEU: Dichtung 2 x 49 / 92 DN40 PN16-40 ENU: gasket				C 4400		2690			
96		16	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		1,84
97		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
98		24	702913	DEU: Scheibe A 17,0 ENU: washer				A2		125			0,27
				optional ANSI 1 1/2" 150 lbs Anschluß									
135		2	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	3,72
136		4	705317	DEU: V-Flansch 1 1/2 Zoll 150 lbs ENU: welding neck flange				SA 105/C21		ASME B16.5-2009 RF	9	3.1	7,20
137		2	711703	DEU: Flachdichtung 1 1/2 Zoll 150 lbs (83 x 48) ENU: gasket				C 4400		ASME B16.21			
138		8	712561	DEU: Sechskantschraube M 14 x 60 ENU: screw				5.6 GAL. ZN		933	7		0,70
139		8	712562	DEU: Sechskantmutter M 14 ENU: screw nut				5-2 GAL. ZN		934	7		0,20
				Schilder Insrumente									

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Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
				Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos.	Index	Stück	Artikel-Nr.	Benennung und Abmessung	Zeichnungs-Nr.	Länge	Breite	Werkstoff	DIN EN	Standard	AD-W	WAZ	Gewicht (kg)
pos.	index	piece	article-no.	designation and dimensions	drawing-no.	length	width	material	DIN EN	standard	AD-W	WAZ	Weight (kg)
		1	721713	DEU: Schilder Instrumente Getriebe ca. 75 x 18 mm ENU: signs instruments gearbox	4000590723VERS01/T006327			PVC					
		1	721751	DEU: Schild nach Vorlage (Fabriknummer) ca. 75 x 18 mm ENU: Label from pattern				PVC					
				***									
		2	706300	DEU: Schelle HRL 1 A 8 ENU: clip				PP					
		2	707373	DEU: Schelle HRL 1 A 10 ENU: clip				PP					
		6	711645	DEU: Schelle HRL 1 A 12 ENU: clip				PP					
		4	714545	DEU: Winkelverschraubung SS-12MO-9 ENU: angular pipe fitting				AISI 316					
		14	712037	DEU: Dichtkantring G 1/2 Zoll ENU: sealing edge ring				1.4571					
		6	714542	DEU: Einschraubverschraubung SS-12MO-1-8RS G 1/2 ENU: Tube Fitting, Male Connector				AISI 316					
		1	707187	DEU: Rohr d = 12,0 x 1,5 ENU: pipe		6.500		1.4541	10216-5	EN 10305-1	2		2,54
		1	717919	DEU: Rundstahlbügelschelle HRRBS 4 L 42,4 PP VA ENU: round steel clip				VA					
		4	707654	DEU: Verschlussschraube G 1/2 Zoll ENU: locking screw				GAL. ZN		910			0,27
		1	707863	DEU: Dichtung 2 x 61 / 107 DN 50 PN6-40 ENU: gasket				C 4400	1514-1	2690			0,05

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Artikel-Nr.: part list — T003162_1
Revision: revision — REV_B

Zeichnungsnummer: drawingnumber — 4000848552Vers02
Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
		1	707768	DEU: Flachstahl 40 x 6 ENU: flat profile		250	40	1.0037		1017			0,47
		20	707658	DEU: Scheibe A 13,0 ENU: washer				GAL. ZN		125			0,13
		16	716011	DEU: Scheibe B 10,5 ENU: washer				ST. GAL. ZN		ISO 7090			0,10
		1	713200	DEU: Flachdichtung DN 32 PN 40 s = 2,0 ENU: gasket				C 4400/1.4571		1514-1			
		4	708830	DEU: Sechskantschraube M 12 x 25 ENU: screw				5.6 GAL. ZN		933	7		0,14
		8	709789	DEU: Sechskantschraube M 12 x 30 ENU: screw				5.6 GAL. ZN		933	7		0,30
		4	709563	DEU: Sechskantschraube M 10 x 30 ENU: screw				5.6 GAL. ZN		933	7		0,10
		4	711047	DEU: Sechskantschraube M 10 x 45 ENU: screw				5.6 GAL. ZN		933	7		0,13
		4	703502	DEU: Sechskantschraube M 12 x 40 ENU: screw				5.6 GAL. ZN		933	7		0,18
		4	709564	DEU: Sechskantschraube M 10 x 35 ENU: screw				5.6 GAL. ZN		933	7		0,11
		4	707564	DEU: Sechskantmutter M 12 ENU: screw nut				5-2 GAL. ZN		934			0,07
		4	709765	DEU: Sechskantmutter M 10 ENU: screw nut				5-2 GAL. ZN		934			0,05
		1	T002881	DEU: Grundrahmen Ölversorgungsanlage Getriebe ENU: base frame for oil supply system	4000848036/T002881 "a"			ST.					
		1	T004585	DEU: Instrumententafel Getriebe Gebläse ENU: console for instruments / tools	4000846299/T004585			ST.					26,00

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Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
				Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
		1	710419	DEU: Rohr d = 26,9 x 3,2 ENU: pipe		400		1.0305	10216-2	10220	4		0,75
		1	706428	DEU: Blech s = 5,0 ENU: sheet plate		150	300	1.0425	10028-2	10029-A	1	3.1	1,77

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Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
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Pos.	Index	Stück	Artikel-Nr.	Benennung und Abmessung	Zeichnungs-Nr.	Länge	Breite	Werkstoff	DIN EN	Standard	AD-W	WAZ	Gewicht (kg)
pos.	index	piece	article-no.	designation and dimensions	drawing-no.	length	width	material	DIN EN	standard	AD-W	WAZ	Weight (kg)
1		1	L711676	DEU: Rohrbündelwärmetauscher ENU: tubular heat exchanger									51,00
2		1	L712718	DEU: Druckfilter ENU: pressure filter									23,00
3		1	L716190	DEU: Zahnradpumpe SF 3/32 RD-LFM m. E-Motor Loher Chemstar + Dach 400/690V, 3KW, 50Hz, 1500U/min IP55 ENU: gear type pump									20,00
4		1	L716190	DEU: Zahnradpumpe SF 3/32 RD-LFM m. E-Motor Loher Chemstar + Dach 400/690V, 3KW, 50Hz, 1500U/min IP55 ENU: gear type pump									20,00
6		1	721321	DEU: Klemmenkasten JB1 Fabrikat : Stahl Beistellung ELOC				PVC					1,00
7		1	721279	DEU: Bimetall-Thermometer 100D G 1/2" U Fa.WIKA R5502/4, -40... +60°C ENU: bimetal thermometer				VA					0,20
7/1		3	721280	DEU: Einschraubschutzrohr TW45-F Form 5 Fa.WIKA G 1/2"; EBL 63mm (U1) ENU: screwing in protection tube				1.4571					
8		1	721282	DEU: Rohrfedermanometer 100D R1/2"U; 0...6 Bar Fa.WIKA Typ 233.50.100, Anschluß R1/2" AG unten ENU: tube pressure gauge				VA					0,10

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Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
				Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos.	Index	Stück	Artikel-Nr.	Benennung und Abmessung	Zeichnungs-Nr.	Länge	Breite	Werkstoff	DIN EN	Standard	AD-W	WAZ	Gewicht (kg)
pos.	index	piece	article-no.	designation and dimensions	drawing-no.	length	width	material	DIN EN	standard	AD-W	WAZ	Weight (kg)
9		1	721282	DEU: Rohrfedermanometer 100D R1/2"U; 0...6 Bar Fa.WIKA Typ 233.50.100, Anschluß R1/2" AG unten ENU: tube pressure gauge				VA					0,10
10		1	721283	DEU: Fernthrmometer mit Halter F73.100; Fa.WIKA -40...+120°C, Typ F73.100 ENU: telethermometer with holder				VA					0,20
11		1	721283	DEU: Fernthrmometer mit Halter F73.100; Fa.WIKA -40...+120°C, Typ F73.100 ENU: telethermometer with holder				VA					0,20
12		1	721285	DEU: Rohrfedermanometer 100D R1/2"U, 0..2,5 bar Fa.WIKA Typ 233.50.100 ENU: tube pressure gauge				VA					0,20
13		1	721294	DEU: Differenzdruckmanometer Exi mit Ferngeber 4 - 20mA Fa. E+H Typ Deltabar S PMD75, PDIT2.13.63 PMD75-1BJ7HB1DHBA ENU: differential manometer				VA					1,00
14		1	L712200	DEU: Absperrventil DN 50 PN 16 ENU: shut-off valve				GG 25					13,20
15		1	L712200	DEU: Absperrventil DN 50 PN 16 ENU: shut-off valve				GG 25					13,20
16		1	L711683	DEU: Absperrventil econosto Fig.241 DN 40 PN 16 ENU: shut-off valve				GRAUGUß					10,20
17		1	L711683	DEU: Absperrventil econosto Fig.241 DN 40 PN 16 ENU: shut-off valve				GRAUGUß					10,20

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Artikel-Nr.: T003162_1
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Revision: REV_B
revision

Zeichnungsnummer: 4000848552Vers02
drawingnumber

Gewicht (kg): 299,85
weight (kg)

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
18		1	L711681	DEU: Rückschlagventil RK 86 ENU: non return valve									1,00
19		1	L711681	DEU: Rückschlagventil RK 86 ENU: non return valve									1,00
20		1	L711680	DEU: Sicherheitsventil MU-ECK ENU: safety relief valve									1,80
22		2	L715976	DEU: Lateralkompensator DN40 PN16 ENU: lateral compensator				1.4571					3,00
23		1	721295	DEU: Drucktransmitter EEx-i G1/2", 0..10Bar, Fa. E+H Typ Cerebar S PMP71, PIT2.13.64 PMP71-1BA1PB1GAABU ENU: pressure transmitter				VA					0,20
24		1	721296	DEU: Wiederstandsthermometer PT100 EEx-i Fa.E+H Type Wiederstandsthermometer TR 10, TE2.13.54 TR10-GAD9BHRYC2100 ENU: resistance thermometer				VA					0,20
25		1	732080	DEU: Schwebekörper-Durchflußmesser Typ H250/RR/M40/ESK-Ex 1,0-10 m3/h				VA					5,00
26		1	L715740	DEU: Temperaturregler M40TD110-A38 DN40 reduziert ENU: temperature controller				GG40.3					
27		1	721297	DEU: Temperaturtransmitter HART EEx-ia, 4-20mA, Fa E+H Typ iTEMP TMT142, Feldtransmitter HART, TIT2.1354 TMT142-B22131BBA1 ENU: temperature transmitter				VA					0,10

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Artikel-Nr.: part list — T003162_1

Revision: revision — REV_B

Zeichnungsnummer: drawingnumber — 4000848552Vers02

Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
28		3	721319	DEU: Manometerabsperrventil Fa.Swagelok G 1/2", 1x D12 ENU: manometer gauge valve				1.4571		16270B			0,30
29		3	721320	DEU: Messgerätehalter Fa. WIKA Form H Auslad. 100mm ENU: measuring instrument holder				ALU		16281			0,15
29/2		4	714234	DEU: Winkeladapter CAL-12M Hy-Lok ENU: angle adapter				1.4401					0,04
				Ansaugltg - Pumpe									
30		5	700154	DEU: V-Flansch C 50 x 60,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	12,65
31		1	701037	DEU: T-Stück 60,3 x 2,9 ENU: T-piece				1.0305	10216-2	2615-1/10253-2 Typ A	4	3.1	0,90
32		1	705027	DEU: Rohr d = 60,3 x 2,9 ENU: pipe		400		1.0305	10216-2	10220	4	3.1	1,64
33		4	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	1,96
34		2	701146	DEU: Red.-Stück K 60,3 x 2,9/ 48,3 x 2,6 ENU: pipe reducer				1.0305	10216-2	2616-1/10253-2 Typ A	4	3.1	0,56
35		4	707863	DEU: Dichtung 2 x 61 / 107 DN50 ENU: gasket				C 4400	1514-1	2690			0,20
36		14	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		1,61
37		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
38		2	706746	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		933	7		0,25
				Pumpe - Ölkühler-Temperaturregler									

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Ölversorgungsanlage Getriebe

Artikel-Nr.: part list — T003162_1
Revision: revision — REV_B
Zeichnungsnummer: drawingnumber — 4000848552Vers02
Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
40		6	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	1,56
41		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		550		1.0305	10216-2	10220	4	3.1	1,61
42		4	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9		7,44
43		4	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	1,04
44		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		800		1.0305	10216-2	10220	4	3.1	2,34
45		2	701046	DEU: T-Stück 48,3 x 2,6 ENU: T-piece				1.0305	10216-2	2615-1/10253-2 Typ A	4	3.1	1,18
46		3	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,42
46		3	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	5,58
47		1	715720	DEU: Red.-Stück Sechskant Nr.33 3" - 1 1/2" ENU: hexagon reducer						2990			
48		8	707427	DEU: Dichtung 2 x 49 / 92 ENU: gasket				C 4400		2690			
49		12	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		1,38
50		8	705301	DEU: Sechskantschraube M 16 x 90 ENU: screw				5.6 GAL. ZN		933	7		1,26
51		20	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,67
52		12	708875	DEU: Sechskantschraube M 16 x 50 ENU: screw				5.6 GAL. ZN		933	7		1,24

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Revision: revision — REV_B

Zeichnungsnummer: drawingnumber — 4000848552Vers02

Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
				Entleerung Ölkühler									
55		2	712754	DEU: Winkeleinschraubverschraubung WE 10-PLM ENU: elbow screw fitting				ST. VERZ.					
56		2	711858	DEU: Durchgangsventil DV 10-L ENU: globe valve				ST. VERZ.					
57		2	711628	DEU: Verschlußkegel VKA 10 ENU: locking cone				ST. VERZ.					
		1	707186	DEU: Rohr d = 10,0 x 1,5 ENU: pipe		650		1.4541	10216-5	DIN EN ISO 1127	2		0,20
				Ölkühler -Temperaturregler- Filter									
58		1	715720	DEU: Red.-Stück Sechskant Nr.33 3" - 1 1/2" ENU: hexagon reducer				ST.		2990			0,70
59		4	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	7,44
60		3	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,78
61		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		200		1.0305	10216-2	10220	4	3.1	0,59
62		1	701155	DEU: Red.-Stück K 48,3 x 2,6/ 42,4 x 2,6 ENU: pipe reducer				1.0305	10216-2	2616-1/10253-2 Typ A	4	3.1	0,17
63		1	705039	DEU: Rohr d = 42,4 x 2,6 ENU: pipe		300		1.0305	10216-2	10220	4	3.1	0,77
64		3	700959	DEU: Rohrbogen 90°-3- 42,4 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,57
65		1	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,14

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				Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
66		3	707427	DEU: Dichtung 2 x 49 / 92 DN40 PN16-40 ENU: gasket				C 4400		2690			
67		4	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		0,46
68		4	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,13
69		1	721653	DEU: Rohrdoppelnippel Nr. 23 1 1/2 Zoll x 200 mit Gewinde DIN 259 ENU: pipe double nipple				ST.					0,35
				Filter - Ölvorlauf									
70		3	704805	DEU: Rohrbogen 90°-3- 42,4 x 2,6 ENU: elbow				1.4541	10216-5	2605-1/10253-4 Typ A	2	3.1	0,57
71		1	712571	DEU: Rohr d = 42,4 x 2,6 ENU: pipe		500		1.4541	10216-5	DIN EN ISO 1127	2	3.1	1,72
72		1	704613	DEU: V-Flansch C 32 x 42,4 ENU: welding neck flange				1.4541	10222-5	2633	2	3.1	1,69
73		5	710711	DEU: Muffe G 1/2 Zoll ENU: socket				1.4571		2986	2	3.1	0,70
				Kühlwasseranschluss Zulauf								3.1	
75		1	711837	DEU: Red.-Stückm. Sechskant Nr.33 2 x 1 1/2 Zoll ENU: hexagon reducer				ST.		2990			0,41
76		1	721653	DEU: Rohrdoppelnippel Nr. 23 1 1/2 Zoll x 200 mit Gewinde DIN 259 ENU: pipe double nipple				ST.					0,35
77		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		160		1.0305	10216-2	10220	4	3.1	0,47
78		1	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	1,86

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Teileliste
part list

Ölversorgungsanlage Getriebe

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Artikel-Nr.: part list — T003162_1

Revision: revision — REV_B

Zeichnungsnummer: drawingnumber — 4000848552Vers02

Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
79		1	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,14
80		1	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			
81		1	711870	DEU: Absperrventil 1/2 Zoll ENU: shut-off valve				RG5					
82		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
83		8	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		0,92
84		20	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,67
				Rücklauf									
85		1	711837	DEU: Red.-Stückm. Sechskant Nr.33 2 x 1 1/2 Zoll ENU: hexagon reducer				ST.		2990			0,41
86		1	721653	DEU: Rohrdoppelnippel Nr. 23 1 1/2 Zoll x 200 mit Gewinde DIN 259 ENU: pipe double nipple				ST.					0,35
87		2	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,52
88		3	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	5,58
89		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		160		1.0305	10216-2	10220	4	3.1	0,47
90		3	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,42
91		1	711864	DEU: Winkel 90°- 1/2 Zoll - I/A ENU: angle									

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Teileliste
part list

Ölversorgungsanlage Getriebe

Artikel-Nr.: T003162_1
part list

Revision: REV_B
revision

Zeichnungsnummer: 4000848552Vers02
drawingnumber

Gewicht (kg): 299,85
weight (kg)

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
92		1	711870	DEU: Absperrventil 1/2 Zoll ENU: shut-off valve				RG5					
93		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
94		2	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			
95		5	707427	DEU: Dichtung 2 x 49 / 92 DN40 PN16-40 ENU: gasket				C 4400		2690			
96		16	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		1,84
97		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
98		24	702913	DEU: Scheibe A 17,0 ENU: washer				A2		125			0,27
				optional ANSI 1 1/2" 150 lbs Anschluß									
135		2	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	3,72
136		4	705317	DEU: V-Flansch 1 1/2 Zoll 150 lbs ENU: welding neck flange				SA 105/C21		ASME B16.5-2009 RF	9	3.1	7,20
137		2	711703	DEU: Flachdichtung 1 1/2 Zoll 150 lbs (83 x 48) ENU: gasket				C 4400		ASME B16.21			
138		8	712561	DEU: Sechskantschraube M 14 x 60 ENU: screw				5.6 GAL. ZN		933	7		0,70
139		8	712562	DEU: Sechskantmutter M 14 ENU: screw nut				5-2 GAL. ZN		934	7		0,20
				Schilder Insrumente									

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Teileliste
part list

Ölversorgungsanlage Getriebe

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Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
				Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos.	Index	Stück	Artikel-Nr.	Benennung und Abmessung	Zeichnungs-Nr.	Länge	Breite	Werkstoff	DIN EN	Standard	AD-W	WAZ	Gewicht (kg)
pos.	index	piece	article-no.	designation and dimensions	drawing-no.	length	width	material	DIN EN	standard	AD-W	WAZ	Weight (kg)
		1	721713	DEU: Schilder Instrumente Getriebe ca. 75 x 18 mm ENU: signs instruments gearbox	4000590723VERS01/T006327			PVC					
		1	721751	DEU: Schild nach Vorlage (Fabriknummer) ca. 75 x 18 mm ENU: Label from pattern				PVC					
				***									
		2	706300	DEU: Schelle HRL 1 A 8 ENU: clip				PP					
		2	707373	DEU: Schelle HRL 1 A 10 ENU: clip				PP					
		6	711645	DEU: Schelle HRL 1 A 12 ENU: clip				PP					
		4	714545	DEU: Winkelverschraubung SS-12MO-9 ENU: angular pipe fitting				AISI 316					
		14	712037	DEU: Dichtkantring G 1/2 Zoll ENU: sealing edge ring				1.4571					
		6	714542	DEU: Einschraubverschraubung SS-12MO-1-8RS G 1/2 ENU: Tube Fitting, Male Connector				AISI 316					
		1	707187	DEU: Rohr d = 12,0 x 1,5 ENU: pipe		6.500		1.4541	10216-5	EN 10305-1	2		2,54
		1	717919	DEU: Rundstahlbügelschelle HRRBS 4 L 42,4 PP VA ENU: round steel clip				VA					
		4	707654	DEU: Verschlussschraube G 1/2 Zoll ENU: locking screw				GAL. ZN		910			0,27
		1	707863	DEU: Dichtung 2 x 61 / 107 DN 50 PN6-40 ENU: gasket				C 4400	1514-1	2690			0,05

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Teileliste
part list

Ölversorgungsanlage Getriebe

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Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
				Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
		1	707768	DEU: Flachstahl 40 x 6 ENU: flat profile		250	40	1.0037		1017			0,47
		20	707658	DEU: Scheibe A 13,0 ENU: washer				GAL. ZN		125			0,13
		16	716011	DEU: Scheibe B 10,5 ENU: washer				ST. GAL. ZN		ISO 7090			0,10
		1	713200	DEU: Flachdichtung DN 32 PN 40 s = 2,0 ENU: gasket				C 4400/1.4571		1514-1			
		4	708830	DEU: Sechskantschraube M 12 x 25 ENU: screw				5.6 GAL. ZN		933	7		0,14
		8	709789	DEU: Sechskantschraube M 12 x 30 ENU: screw				5.6 GAL. ZN		933	7		0,30
		4	709563	DEU: Sechskantschraube M 10 x 30 ENU: screw				5.6 GAL. ZN		933	7		0,10
		4	711047	DEU: Sechskantschraube M 10 x 45 ENU: screw				5.6 GAL. ZN		933	7		0,13
		4	703502	DEU: Sechskantschraube M 12 x 40 ENU: screw				5.6 GAL. ZN		933	7		0,18
		4	709564	DEU: Sechskantschraube M 10 x 35 ENU: screw				5.6 GAL. ZN		933	7		0,11
		4	707564	DEU: Sechskantmutter M 12 ENU: screw nut				5-2 GAL. ZN		934			0,07
		4	709765	DEU: Sechskantmutter M 10 ENU: screw nut				5-2 GAL. ZN		934			0,05
		1	T002881	DEU: Grundrahmen Ölversorgungsanlage Getriebe ENU: base frame for oil supply system	4000848036/T002881 "a"			ST.					
		1	T004585	DEU: Instrumententafel Getriebe Gebläse ENU: console for instruments / tools	4000846299/T004585			ST.					26,00

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Ölversorgungsanlage Getriebe

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Artikel-Nr.: T003162_1
part list

Revision: REV_B
revision

Zeichnungsnummer: 4000848552Vers02
drawingnumber

Gewicht (kg): 299,85
weight (kg)

Erstellt developed	Datum date	19.02.2021	Name name: Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name: Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name: Ahlers

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN	Standard / standard	AD-W	WAZ	Gewicht (kg) / Weight (kg)
		1	710419	DEU: Rohr d = 26,9 x 3,2 ENU: pipe		400		1.0305	10216-2	10220	4		0,75
		1	706428	DEU: Blech s = 5,0 ENU: sheet plate		150	300	1.0425	10028-2	10029-A	1	3.1	1,77

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Teileliste
part list

Ölversorgungsanlage Getriebe
100l/min

Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
				Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos.	Index	Stück	Artikel-Nr.	Benennung und Abmessung	Zeichnungs-Nr.	Länge	Breite	Werkstoff	DIN EN	Standard	AD-W	WAZ	Gewicht (kg)
pos.	index	piece	article-no.	designation and dimensions	drawing-no.	length	width	material	DIN EN	standard	AD-W	WAZ	Weight (kg)
1		1	733885	DEU: Rohrbündelwärmetauscher Typ BCF 806-0-B15-4 weg ENU: tubular heat exchanger				ST.					134,00
2		1	733886	DEU: Druckfilter DU 251.25 G.30.E.P.FS8 DN50 PN32 ENU: pressure filter				ST.					39,00
3		2	733887	DEU: Zahnradpumpenaggregat SF4/80 RD-VLFM Art.Nr.: SF4/80RD-VLFM ATEX Drehstrommotor, Pumpenträger mit Fuß, SAE-Flansche	DPA054D-PA190849R			ST.					50,00
4		1	4000923770	DEU: Grundrahmen Ölversorgungsanlage Getriebe 100L	4000923770VERS08			ST.					295,00
5		1	721296	DEU: Wiederstandsthermometer PT100 EEx-i Fa.E+H Type Wiederstandsthermometer TR 10, TE2.13.54 TR10-GAD9BHRYC2100 ENU: resistance thermometer				VA					0,20
				Instrumentenaufbau IDW 4001365403									
6		1	T004585	DEU: Instrumententafel Getriebe Gebläse ENU: console for instruments / tools	4000846299/Vers.02			ST.					26,00
6.1		1	721321	DEU: Klemmenkasten JB1 Fabrikat : Stahl Beistellung ELOC				PVC					1,00
7		1	721282	DEU: Rohrfedermanometer 0...6 bar Typ 233.50.100, R1/2 Zoll AG unten ENU: tube pressure gauge				VA					0,10
8		1	721282	DEU: Rohrfedermanometer 0...6 bar Typ 233.50.100, R1/2 Zoll AG unten ENU: tube pressure gauge				VA					0,10

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Teileliste
part list

Ölversorgungsanlage Getriebe
100l/min

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
9		1	721283	DEU: Fernthermometer -40...+120°C Typ F73.100 mit Halter ENU: telethermometer with holder				VA					0,20
10		1	721283	DEU: Fernthermometer -40...+120°C Typ F73.100 mit Halter ENU: telethermometer with holder				VA					0,20
11		1	721285	DEU: Rohrfedermanometer 0..2,5 bar Typ 233.50.100, R 1/2 Zoll unten ENU: tube pressure gauge				VA					0,20
12		1	721294	DEU: Differenzdruckmanometer Exi mit Ferngeber 4 - 20mA Fa. E+H Typ Deltabar S PMD75, PDIT2.13.63 PMD75-1BJ7HB1DHBA ENU: differential manometer				VA					1,00
12.1		4	710037	DEU: Sechskantschraube M 10 x 25 ENU: screw				5.6 GAL. ZN		933	7		0,09
12.2		4	709765	DEU: Sechskantmutter M 10 ENU: screw nut				5-2 GAL. ZN		934			0,05
12.3		8	707657	DEU: Scheibe A10,5 10,5x20x2 ENU: washer				GAL. ZN		125			0,03
13		1	721295	DEU: Drucktransmitter EEx-i G1/2", 0..10Bar, Fa. E+H Typ Cerebar S PMP71, PIT2.13.64 PMP71-1BA1PB1GAABU ENU: pressure transmitter				VA					0,20
14		1	721297	DEU: Temperaturtransmitter HART EEx-ia, 4-20mA, Fa E+H Typ iTEMP TMT142, Feldtransmitter HART, TIT2.1354 TMT142-B22131BBA1 ENU: temperature transmitter				VA					0,10

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
15		3	721319	DEU: Absperrventil für Manometer G 1/2", 1x D12 M02EKL12swLG12 ENU: manometer gauge valve				1.4571		16270B			0,30
16		3	721320	DEU: Messgerätehalter Typ 910.16 GRT-HLT H100 Form H Auslad. 100mm ENU: measuring instrument holder				ALU		16281			0,15
17		4	714234	DEU: Winkeladapter CAL-12M Hy-Lok ENU: angle adapter				1.4401					0,04
17.1		3	712037	DEU: Dichtkantring G 1/2 Zoll Typ 9092099 / Innenzentriert ENU: sealing edge ring				1.4571					0,15
17.2		24	703428	DEU: Sechskantschraube M 6 x 25 ENU: screw				8.8 GAL. ZN		933			0,16
17.3		24	708692	DEU: Sechskantmutter M 6 ENU: screw nut				8.8 GAL. ZN		934			0,06
17.4		24	708871	DEU: Federring A 6 ENU: spring washer				GAL. ZN		127			0,02
				Ansaugleitung Pumpe IDW4001363136									
18		2	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		77		1.0345	10216-2	10220	4	3.1	0,63
19		4	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 nahtlos ENU: elbow				1.0345	10216-2	2605-1/10253-2 Typ A	4	3.1	1,96
20		2	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		337		1.0345	10216-2	10220	4	3.1	2,77
21		5	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	7,15

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Teileliste
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Ölversorgungsanlage Getriebe
100l/min

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Artikel-Nr.: part list 4000930970

Revision: revision REV_I

Zeichnungsnummer: drawingnumber 4000930970 Vers.07

Gewicht (kg): weight (kg) 741,55

Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
22		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		74		1.0345	10216-2	10220	4	3.1	0,30
23		1	717587	DEU: T-Stück 60,3 x 2,9 nahtlos ENU: T-piece				1.0345	10216-2	2615-1/10253-2 Typ A	4	3.1	0,90
24		1	704578	DEU: T-Stück 60,3 x 2,9/ 33,7 x 2,6 ENU: T-piece				1.0345	10216-2	2615-1/10253-2 Typ A	4	3.1	0,90
25		1	707734	DEU: Rohrdoppelnippel Nr.23 1 Zoll x 100 (Länge angepasst) ENU: pipe double nipple				ST.		2982	4		0,24
26		1	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		105		1.0345	10216-2	10220	4	3.1	0,43
27		16	707664	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		931	7		2,10
28		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
29		5	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,50
30		2	L712200	DEU: Absperrventil DN 50 PN 16 ENU: shut-off valve				GG 25					26,40
31		1	734311	DEU: Verschraubung DN25 G1 Zoll Innen / Außen flach dichtend				1.4571					0,20
				Pumpe-Ölkühler-Temperaturregler IDW 4001363067									
32		8	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	11,44

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
33		2	720000	DEU: Loser Flansch Typ 02 DN50 PN16 ENU: lapped flange				1.0460	10222-2	1092-1	9	3.1	5,04
34		2	719588	DEU: Glatter Bund Typ32 DN50 PN16 ENU: plain collar				1.0460	10222-2	1092-1	9	3.1	1,31
35		2	733929	DEU: Red.-Stück Sechskant Nr.33 3 Zoll x 2 Zoll 3 Zoll Außengewinde, 2 Zoll Innengewinde ENU: hexagon reducer				ST.		2990			1,80
36		2	711861	DEU: Rohrdoppelnippel Nr.23 2 Zoll x 200 (Länge angepasst) ENU: pipe double nipple				1.0345		2982	4	3.1	1,96
37		2	717587	DEU: T-Stück 60,3 x 2,9 nahtlos ENU: T-piece				1.0345	10216-2	2615-1/10253-2 Typ A	4	3.1	1,80
37.1		1	721280	DEU: Schutzrohr Typ TW 45-F 5 G1/2 Zoll U1=63 ENU: screwing in protection tube				1.4571					1,00
38		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		280		1.0345	10216-2	10220	4	3.1	1,15
39		11	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 nahtlos ENU: elbow				1.0345	10216-2	2605-1/10253-2 Typ A	4	3.1	5,39
40		1	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		1.105		1.0345	10216-2	10220	4	3.1	4,54
41		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		255		1.0345	10216-2	10220	4	3.1	1,05
42		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		130		1.0345	10216-2	10220	4	3.1	0,53

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Teileliste
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Ölversorgungsanlage Getriebe
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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
43		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		120		1.0345	10216-2	10220	4	3.1	0,49
44		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		135		1.0345	10216-2	10220	4	3.1	0,55
45		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		185		1.0345	10216-2	10220	4	3.1	0,76
46		8	707664	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		931	7		1,05
47		8	707663	DEU: Sechskantschraube M 16 x 60 ENU: screw				5.6 GAL. ZN		931	7		0,98
48		8	717895	DEU: Sechskantschraube M 16 x 85 ENU: screw				5.6 GAL. ZN		931	7		1,20
49		32	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		1,07
50		10	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				1,00
51		8	703259	DEU: Sechskantschraube M 16 x 110 ENU: screw				5.6 GAL. ZN		931	7		1,62
52		1	L712200	DEU: Absperrventil DN 50 PN 16 ENU: shut-off valve				GG 25					13,20
53		3	705769	DEU: Muffe G1/2 Zoll D=26,4 ; L=34 ENU: socket				1.0345	17175	2986	4	3.1	0,42
54		2	714542	DEU: Einschraubverschraubung SS-12M0-1-8RS 12 mm Rohrverschrb. - 1/2 Zoll ISO-Außengew. zyl. ENU: Tube Fitting, Male Connector				SS 316					0,20
55		1	733896	DEU: Temperaturregler M 50TD 3 G 110 38 A DN5 ENU: temperature controller				GG40.3					5,00

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
56		2	733893	DEU: Rückschlagventil RK 86 DN 50 PN 16 ENU: non return valve				OHNE					4,00
				Filter-Temperaturregler IDW 4001363140									
57		1	719820	DEU: SAE-Anschweißflansch AFX-108-STRE-60,3-MX 2 Zoll Lochbild 3000 PSI ENU: welding flange				1.4404/316L		SAE J518 C, ISO 6162		3.1	1,19
58		4	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 nahtlos ENU: elbow				1.0345	10216-2	2605-1/10253-2 Typ A	4	3.1	1,96
59		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		140		1.0345	10216-2	10220	4	3.1	0,58
60		1	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		160		1.0345	10216-2	10220	4	3.1	0,66
61		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		210		1.0345	10216-2	10220	4	3.1	0,86
62		1	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	1,43
63		1	705769	DEU: Muffe G1/2 Zoll D=26,4 ; L=34 ENU: socket				1.0345	17175	2986	4	3.1	0,14
64		1	714542	DEU: Einschraubverschraubung SS-12M0-1-8RS 12 mm Rohrverschrb. - 1/2 Zoll ISO-Außengew. zyl. ENU: Tube Fitting, Male Connector				SS 316					0,10
				Filter-Ölvorlauf IDW 4001363150									

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Ölversorgungsanlage Getriebe
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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
65		1	705911	DEU: T-Stück 60,3 x 2,9/ 33,7 x 2,6 nahtlos ENU: T-piece				1.4541	10216-5	2615-1/10253-4 Typ A	2	3.1	0,90
66		3	717578	DEU: Rohrbogen 90°-3- 33,7 x 2,6 nahtlos ENU: elbow				1.4541	10216-5	2605-1/10253-4 Typ A	2	3.1	0,36
67		1	711525	DEU: Rohr d = 33,7 x 2,6 (Länge anpassen) nahtlos ENU: pipe		140		1.4571	10216-5	DIN EN ISO 1127	2	3.1	0,28
68		1	711525	DEU: Rohr d = 33,7 x 2,6 (Länge anpassen) nahtlos ENU: pipe		50		1.4571	10216-5	DIN EN ISO 1127	2	3.1	0,10
69		1	733985	DEU: Rohrdoppelnippel Nr.23 1 Zoll x 100 (Länge angepasst) ENU: pipe double nipple				1.4571					0,30
70		1	733982	DEU: Überströmventil Typ 06195 G1 Zoll Werkstoff CC491K				OHNE					0,65
71		1	706698	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		188		1.4541	10216-5	DIN EN ISO 1127	2	3.1	0,78
72		3	716809	DEU: Rohrbogen 90°-3- 60,3 x 2,9 nahtlos ENU: elbow				1.4541	10216-5	2605-1/10253-4 Typ A	2	3.1	1,47
73		1	714881	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.4541	10222-5	1092-1	2	3.1	2,82
73.1		1	719820	DEU: SAE-Anschweißflansch AFX-108-STRE-60,3-MX 2 Zoll Lochbild 3000 PSI ENU: welding flange				1.4404/316L		SAE J518 C, ISO 6162		3.1	1,19
74		5	710711	DEU: Muffe G1/2 Zoll D=26,4 ; L=34 ENU: socket				1.4571		2986	2	3.1	0,70

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
74.1		1	721280	DEU: Schutzrohr Typ TW 45-F 5 G1/2 Zoll U1=63 ENU: screwing in protection tube				1.4571					1,00
75		3	714542	DEU: Einschraubverschraubung SS-12M0-1-8RS 12 mm Rohrverschrb. - 1/2 Zoll ISO-Außengew. zyl. ENU: Tube Fitting, Male Connector				SS 316					0,30
76		1	706698	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		80		1.4541	10216-5	DIN EN ISO 1127	2	3.1	0,33
77		1	706698	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		300		1.4541	10216-5	DIN EN ISO 1127	2	3.1	1,25
78		1	734311	DEU: Verschraubung DN25 G1 Zoll Innen / Außen flach dichtend				1.4571					0,20
				Kühlwasserzulauf IDW 4001363194									
79		1	711861	DEU: Rohrdoppelnippel Nr.23 2 Zoll x 200 (Länge angepasst) ENU: pipe double nipple		100		1.0345		2982	4	3.1	0,98
79.1		1	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		184		1.0345	10216-2	10220	4	3.1	0,76
80		1	720000	DEU: Loser Flansch Typ 02 DN50 PN16 ENU: lapped flange				1.0460	10222-2	1092-1	9	3.1	2,52
81		1	719588	DEU: Glatter Bund Typ32 DN50 PN16 ENU: plain collar				1.0460	10222-2	1092-1	9	3.1	0,65
82		1	705769	DEU: Muffe G1/2 Zoll D=26,4 ; L=34 ENU: socket				1.0345	17175	2986	4	3.1	0,14

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Ölversorgungsanlage Getriebe
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Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
83		1	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			0,10
84		1	711870	DEU: Absperrventil 1/2 Zoll PN16 DAVR216 ENU: shut-off valve				RG5					0,10
85		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
86		4	707664	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		931	7		0,52
86.1		8	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,27
87		4	717895	DEU: Sechskantschraube M 16 x 85 ENU: screw				5.6 GAL. ZN		931	7		0,60
88		1	733894	DEU: Lateralkompensator DN50 PN16 BL=114 ENU: lateral compensator				1.4571					2,00
89		2	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,20
				Optional Anschluss ANSI 1 1/2 zoll 150 lbs									
90		2	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	2,86
91		4	706028	DEU: V-Flansch 2 Zoll 150 lbs Std s = 3,91 ENU: welding neck flange				SA 105/C21		ASME B16.5-2013 RF		3.1	10,80
92		2	713145	DEU: Flachdichtung 2 Zoll 150 lbs Form RF s=2 ENU: gasket				C 4400		ASME B16.21			0,20

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
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Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
93		8	707665	DEU: Sechskantschraube M 16 x 70 ENU: screw				5.6 GAL. ZN		931	7		1,11
94		8	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,27
				Kühlwasserrücklauf IDW 4001363212									
96		1	711861	DEU: Rohrdoppelnippel Nr.23 2 Zoll x 200 (Länge angepasst) ENU: pipe double nipple		51		1.0345		2982	4	3.1	0,98
97		2	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 nahtlos ENU: elbow				1.0345	10216-2	2605-1/10253-2 Typ A	4	3.1	0,98
98		1	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		50		1.0345	10216-2	10220	4	3.1	0,21
99		2	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	2,86
100		1	720000	DEU: Loser Flansch Typ 02 DN50 PN16 ENU: lapped flange				1.0460	10222-2	1092-1	9	3.1	2,52
101		1	719588	DEU: Glatter Bund Typ32 DN50 PN16 ENU: plain collar				1.0460	10222-2	1092-1	9	3.1	0,65
102		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		100		1.0345	10216-2	10220	4	3.1	0,41
103		2	705769	DEU: Muffe G1/2 Zoll D=26,4 ; L=34 ENU: socket				1.0345	17175	2986	4	3.1	0,28
104		1	711864	DEU: Winkel 90°- 1/2 Zoll - I/A ENU: angle				1.4401					0,10

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Ölversorgungsanlage Getriebe
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Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
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Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
105		1	711870	DEU: Absperrventil 1/2 Zoll PN16 DAVR216 ENU: shut-off valve				RG5					0,10
106		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
107		2	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			0,20
108		12	707664	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		931	7		1,57
109		4	717895	DEU: Sechskantschraube M 16 x 85 ENU: screw				5.6 GAL. ZN		931	7		0,60
110		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
111		24	702913	DEU: Scheibe A17 ENU: washer				A2		125			0,27
112		4	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,40
113		1	733894	DEU: Lateralkompensator DN50 PN16 BL=114 ENU: lateral compensator				1.4571					2,00
114		1	721279	DEU: Bimetall-Thermometer -40... +60°C Typ R5502/4 / G 1/2 Zoll unten ENU: bimetal thermometer				VA					0,20
115		1	721280	DEU: Schutzrohr Typ TW 45-F 5 G1/2 Zoll U1=63 ENU: screwing in protection tube				1.4571					1,00
116		1	L711680	DEU: Sicherheitsventil MU-ECK G 1/2 Zoll ENU: safety relief valve				ST.					3,00

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Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
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Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
117		1	733895	DEU: Schwebekörper-Durchflußmesser Typ H250/RR/M40/ESK-Ex 1,0-10 m3/h DN50 PN16				VA					6,00
				Entleerung Ölkühler									
118		2	711628	DEU: Verschlußkegel VKA10-CF ENU: locking cone				ST. VERZ.					0,20
119		2	707186	DEU: Rohr d = 10,0 x 1,5 nahtlos ENU: pipe		100		1.4541	10216-5	DIN EN ISO 1127	2	3.1	0,06
119.1		2	707373	DEU: Schelle HRL 1 A 10 ENU: clip				PP					
120		2	712754	DEU: Winkeleinschraubverschraubung WE10-LM-CF ENU: elbow screw fitting				ST. VERZ.					
121		2	711858	DEU: Durchgangsventil DV 10-L ENU: globe valve				MESSING					2,00
				Schraubverbind./ Befestigungen									
122		4	707663	DEU: Sechskantschraube M 16 x 60 ENU: screw				5.6 GAL. ZN		931	7		0,49
123		4	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,13
124		1	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,10
124		4	709563	DEU: Sechskantschraube M 10 x 30 ENU: screw				5.6 GAL. ZN		933	7		0,10
125		4	716011	DEU: Scheibe B10 10,5x20x2 ENU: washer				ST. GAL. ZN		ISO 7090			0,03
126		4	711047	DEU: Sechskantschraube M 10 x 45 ENU: screw				5.6 GAL. ZN		933	7		0,13

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
127		8	716011	DEU: Scheibe B10 10,5x20x2 ENU: washer				ST. GAL. ZN		ISO 7090			0,05
128		4	709765	DEU: Sechskantmutter M 10 ENU: screw nut				5-2 GAL. ZN		934			0,05
129		6	703502	DEU: Sechskantschraube M 12 x 40 ENU: screw				5.6 GAL. ZN		933	7		0,27
130		6	707658	DEU: Scheibe A13 ENU: washer				GAL. ZN		125			0,04
131		6	709789	DEU: Sechskantschraube M 12 x 30 ENU: screw				5.6 GAL. ZN		933	7		0,23
132		6	707658	DEU: Scheibe A13 ENU: washer				GAL. ZN		125			0,04
133		6	708902	DEU: Sechskantschraube M 12 x 55 ENU: screw				5.6 GAL. ZN		931	7		0,28
134		12	707658	DEU: Scheibe A13 ENU: washer				GAL. ZN		125			0,08
135		6	707564	DEU: Sechskantmutter M 12 ENU: screw nut				5-2 GAL. ZN		934			0,10
136		4	709564	DEU: Sechskantschraube M 10 x 35 ENU: screw				5.6 GAL. ZN		933	7		0,11
137		4	716011	DEU: Scheibe B10 10,5x20x2 ENU: washer				ST. GAL. ZN		ISO 7090			0,03
138		4	708830	DEU: Sechskantschraube M 12 x 25 ENU: screw				5.6 GAL. ZN		933	7		0,14
139		4	707658	DEU: Scheibe A13 ENU: washer				GAL. ZN		125			0,03
				Instrumentenleitungen									
140		6	711645	DEU: Schelle HRL 1 A 12 ENU: clip				PP					

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
141		4	714545	DEU: Winkelverschraubung SS-12M0-9 12 mm Rohrverschraubung ENU: angular pipe fitting				SS 316					0,80
142		3	707768	DEU: Flachstahl 40 x 6 ENU: flat profile		90	40	1.0037		1017			0,51
144		1	707187	DEU: Rohr / PI Pumpe 2 d = 12,0 x 1,5 nahtlos ENU: pipe		1.500		1.4541	10216-5	EN 10305-1	2	3.1	0,59
145		1	707187	DEU: Rohr / -PIDT d = 12,0 x 1,5 nahtlos ENU: pipe		750		1.4541	10216-5	EN 10305-1	2	3.1	0,29
146		1	707187	DEU: Rohr / +PIDT d = 12,0 x 1,5 nahtlos ENU: pipe		750		1.4541	10216-5	EN 10305-1	2	3.1	0,29
147		1	707187	DEU: Rohr / PI Ölvorlauf d = 12,0 x 1,5 nahtlos ENU: pipe		1.000		1.4541	10216-5	EN 10305-1	2	3.1	0,39
148		1	707187	DEU: Rohr / PT Transmitter Ölvorlauf d = 12,0 x 1,5 nahtlos ENU: pipe		1.000		1.4541	10216-5	EN 10305-1	2	3.1	0,39
149		1	707187	DEU: Rohr / PI Pumpe 1 d = 12,0 x 1,5 nahtlos ENU: pipe		1.500		1.4541	10216-5	EN 10305-1	2	3.1	0,59
				Halterung								3.1	
150		1	712769	DEU: Rundstahlbügelschelle HRRBS 6 L 60,3 PP A2 ENU: round steel clip				PP / 1.4301					
151		1	706428	DEU: Blech s = 5,0 ENU: sheet plate		150	300	1.0425	10028-2	10029-A	1	3.1	1,77
152		1	710419	DEU: Rohr d = 26,9 x 3,2 nahtlos ENU: pipe		400		1.0345	10216-2	10220	4	3.1	0,75

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Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
1		1	733885	DEU: Rohrbündelwärmetauscher Typ BCF 806-0-B15-4 weg ENU: tubular heat exchanger				ST.					134,00
2		1	733886	DEU: Druckfilter DU 251.25 G.30.E.P.FS8 DN50 PN32 ENU: pressure filter				ST.					39,00
3		2	733887	DEU: Zahnradpumpenaggregat SF4/80 RD-VLFM Art.Nr.: SF4/80RD-VLFM ATEX Drehstrommotor, Pumpenträger mit Fuß, SAE-Flansche	DPA054D-PA190849R			ST.					50,00
4		1	4000923770	DEU: Grundrahmen Ölversorgungsanlage Getriebe 100L	4000923770VERS08			ST.					295,00
5		1	721296	DEU: Wiederstandsthermometer PT100 EEx-i Fa.E+H Type Wiederstandsthermometer TR 10, TE2.13.54 TR10-GAD9BHRYC2100 ENU: resistance thermometer				VA					0,20
				Instrumentenaufbau IDW 4001365403									
6		1	T004585	DEU: Instrumententafel Getriebe Gebläse ENU: console for instruments / tools	4000846299/Vers.02			ST.					26,00
6.1		1	721321	DEU: Klemmenkasten JB1 Fabrikat : Stahl Beistellung ELOC				PVC					1,00
7		1	721282	DEU: Rohrfedermanometer 0...6 bar Typ 233.50.100, R1/2 Zoll AG unten ENU: tube pressure gauge				VA					0,10
8		1	721282	DEU: Rohrfedermanometer 0...6 bar Typ 233.50.100, R1/2 Zoll AG unten ENU: tube pressure gauge				VA					0,10

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
9		1	721283	DEU: Fernthermometer -40...+120°C Typ F73.100 mit Halter ENU: telethermometer with holder				VA					0,20
10		1	721283	DEU: Fernthermometer -40...+120°C Typ F73.100 mit Halter ENU: telethermometer with holder				VA					0,20
11		1	721285	DEU: Rohrfedermanometer 0..2,5 bar Typ 233.50.100, R 1/2 Zoll unten ENU: tube pressure gauge				VA					0,20
12		1	721294	DEU: Differenzdruckmanometer Exi mit Ferngeber 4 - 20mA Fa. E+H Typ Deltabar S PMD75, PDIT2.13.63 PMD75-1BJ7HB1DHBA ENU: differential manometer				VA					1,00
12.1		4	710037	DEU: Sechskantschraube M 10 x 25 ENU: screw				5.6 GAL. ZN		933	7		0,09
12.2		4	709765	DEU: Sechskantmutter M 10 ENU: screw nut				5-2 GAL. ZN		934			0,05
12.3		8	707657	DEU: Scheibe A10,5 10,5x20x2 ENU: washer				GAL. ZN		125			0,03
13		1	721295	DEU: Drucktransmitter EEx-i G1/2", 0..10Bar, Fa. E+H Typ Cerebar S PMP71, PIT2.13.64 PMP71-1BA1PB1GAABU ENU: pressure transmitter				VA					0,20
14		1	721297	DEU: Temperaturtransmitter HART EEx-ia, 4-20mA, Fa E+H Typ iTEMP TMT142, Feldtransmitter HART, TIT2.1354 TMT142-B22131BBA1 ENU: temperature transmitter				VA					0,10

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Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
15		3	721319	DEU: Absperrventil für Manometer G 1/2", 1x D12 M02EKL12swLG12 ENU: manometer gauge valve				1.4571		16270B			0,30
16		3	721320	DEU: Messgerätehalter Typ 910.16 GRT-HLT H100 Form H Auslad. 100mm ENU: measuring instrument holder				ALU		16281			0,15
17		4	714234	DEU: Winkeladapter CAL-12M Hy-Lok ENU: angle adapter				1.4401					0,04
17.1		3	712037	DEU: Dichtkantring G 1/2 Zoll Typ 9092099 / Innenzentriert ENU: sealing edge ring				1.4571					0,15
17.2		24	703428	DEU: Sechskantschraube M 6 x 25 ENU: screw				8.8 GAL. ZN		933			0,16
17.3		24	708692	DEU: Sechskantmutter M 6 ENU: screw nut				8.8 GAL. ZN		934			0,06
17.4		24	708871	DEU: Federring A 6 ENU: spring washer				GAL. ZN		127			0,02
				Ansaugleitung Pumpe IDW4001363136									
18		2	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		77		1.0345	10216-2	10220	4	3.1	0,63
19		4	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 nahtlos ENU: elbow				1.0345	10216-2	2605-1/10253-2 Typ A	4	3.1	1,96
20		2	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		337		1.0345	10216-2	10220	4	3.1	2,77
21		5	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	7,15

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
22		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		74		1.0345	10216-2	10220	4	3.1	0,30
23		1	717587	DEU: T-Stück 60,3 x 2,9 nahtlos ENU: T-piece				1.0345	10216-2	2615-1/10253-2 Typ A	4	3.1	0,90
24		1	704578	DEU: T-Stück 60,3 x 2,9/ 33,7 x 2,6 ENU: T-piece				1.0345	10216-2	2615-1/10253-2 Typ A	4	3.1	0,90
25		1	707734	DEU: Rohrdoppelnippel Nr.23 1 Zoll x 100 (Länge angepasst) ENU: pipe double nipple				ST.		2982	4		0,24
26		1	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		105		1.0345	10216-2	10220	4	3.1	0,43
27		16	707664	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		931	7		2,10
28		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
29		5	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,50
30		2	L712200	DEU: Absperrventil DN 50 PN 16 ENU: shut-off valve				GG 25					26,40
31		1	734311	DEU: Verschraubung DN25 G1 Zoll Innen / Außen flach dichtend				1.4571					0,20
				Pumpe-Ölkühler-Temperaturregler IDW 4001363067									
32		8	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	11,44

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Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
33		2	720000	DEU: Loser Flansch Typ 02 DN50 PN16 ENU: lapped flange				1.0460	10222-2	1092-1	9	3.1	5,04
34		2	719588	DEU: Glatter Bund Typ32 DN50 PN16 ENU: plain collar				1.0460	10222-2	1092-1	9	3.1	1,31
35		2	733929	DEU: Red.-Stück Sechskant Nr.33 3 Zoll x 2 Zoll 3 Zoll Außengewinde, 2 Zoll Innengewinde ENU: hexagon reducer				ST.		2990			1,80
36		2	711861	DEU: Rohrdoppelnippel Nr.23 2 Zoll x 200 (Länge angepasst) ENU: pipe double nipple				1.0345		2982	4	3.1	1,96
37		2	717587	DEU: T-Stück 60,3 x 2,9 nahtlos ENU: T-piece				1.0345	10216-2	2615-1/10253-2 Typ A	4	3.1	1,80
37.1		1	721280	DEU: Schutzrohr Typ TW 45-F 5 G1/2 Zoll U1=63 ENU: screwing in protection tube				1.4571					1,00
38		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		280		1.0345	10216-2	10220	4	3.1	1,15
39		11	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 nahtlos ENU: elbow				1.0345	10216-2	2605-1/10253-2 Typ A	4	3.1	5,39
40		1	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		1.105		1.0345	10216-2	10220	4	3.1	4,54
41		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		255		1.0345	10216-2	10220	4	3.1	1,05
42		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		130		1.0345	10216-2	10220	4	3.1	0,53

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Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
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Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
43		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		120		1.0345	10216-2	10220	4	3.1	0,49
44		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		135		1.0345	10216-2	10220	4	3.1	0,55
45		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		185		1.0345	10216-2	10220	4	3.1	0,76
46		8	707664	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		931	7		1,05
47		8	707663	DEU: Sechskantschraube M 16 x 60 ENU: screw				5.6 GAL. ZN		931	7		0,98
48		8	717895	DEU: Sechskantschraube M 16 x 85 ENU: screw				5.6 GAL. ZN		931	7		1,20
49		32	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		1,07
50		10	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				1,00
51		8	703259	DEU: Sechskantschraube M 16 x 110 ENU: screw				5.6 GAL. ZN		931	7		1,62
52		1	L712200	DEU: Absperrventil DN 50 PN 16 ENU: shut-off valve				GG 25					13,20
53		3	705769	DEU: Muffe G1/2 Zoll D=26,4 ; L=34 ENU: socket				1.0345	17175	2986	4	3.1	0,42
54		2	714542	DEU: Einschraubverschraubung SS-12M0-1-8RS 12 mm Rohrverschrb. - 1/2 Zoll ISO-Außengew. zyl. ENU: Tube Fitting, Male Connector				SS 316					0,20
55		1	733896	DEU: Temperaturregler M 50TD 3 G 110 38 A DN5 ENU: temperature controller				GG40.3					5,00

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Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
56		2	733893	DEU: Rückschlagventil RK 86 DN 50 PN 16 ENU: non return valve				OHNE					4,00
				Filter-Temperaturregler IDW 4001363140									
57		1	719820	DEU: SAE-Anschweißflansch AFX-108-STRE-60,3-MX 2 Zoll Lochbild 3000 PSI ENU: welding flange				1.4404/316L		SAE J518 C, ISO 6162		3.1	1,19
58		4	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 nahtlos ENU: elbow				1.0345	10216-2	2605-1/10253-2 Typ A	4	3.1	1,96
59		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		140		1.0345	10216-2	10220	4	3.1	0,58
60		1	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		160		1.0345	10216-2	10220	4	3.1	0,66
61		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		210		1.0345	10216-2	10220	4	3.1	0,86
62		1	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	1,43
63		1	705769	DEU: Muffe G1/2 Zoll D=26,4 ; L=34 ENU: socket				1.0345	17175	2986	4	3.1	0,14
64		1	714542	DEU: Einschraubverschraubung SS-12M0-1-8RS 12 mm Rohrverschrb. - 1/2 Zoll ISO-Außengew. zyl. ENU: Tube Fitting, Male Connector				SS 316					0,10
				Filter-Ölvorlauf IDW 4001363150									

Emmerthaler Apparatebau GmbH Langes Feld 4 31860 Emmerthal	Teileliste part list	Ölversorgungsanlage Getriebe 100l/min	8 / 15

Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
65		1	705911	DEU: T-Stück 60,3 x 2,9/ 33,7 x 2,6 nahtlos ENU: T-piece				1.4541	10216-5	2615-1/10253-4 Typ A	2	3.1	0,90
66		3	717578	DEU: Rohrbogen 90°-3- 33,7 x 2,6 nahtlos ENU: elbow				1.4541	10216-5	2605-1/10253-4 Typ A	2	3.1	0,36
67		1	711525	DEU: Rohr d = 33,7 x 2,6 (Länge anpassen) nahtlos ENU: pipe		140		1.4571	10216-5	DIN EN ISO 1127	2	3.1	0,28
68		1	711525	DEU: Rohr d = 33,7 x 2,6 (Länge anpassen) nahtlos ENU: pipe		50		1.4571	10216-5	DIN EN ISO 1127	2	3.1	0,10
69		1	733985	DEU: Rohrdoppelnippel Nr.23 1 Zoll x 100 (Länge angepasst) ENU: pipe double nipple				1.4571					0,30
70		1	733982	DEU: Überströmventil Typ 06195 G1 Zoll Werkstoff CC491K				OHNE					0,65
71		1	706698	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		188		1.4541	10216-5	DIN EN ISO 1127	2	3.1	0,78
72		3	716809	DEU: Rohrbogen 90°-3- 60,3 x 2,9 nahtlos ENU: elbow				1.4541	10216-5	2605-1/10253-4 Typ A	2	3.1	1,47
73		1	714881	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.4541	10222-5	1092-1	2	3.1	2,82
73.1		1	719820	DEU: SAE-Anschweißflansch AFX-108-STRE-60,3-MX 2 Zoll Lochbild 3000 PSI ENU: welding flange				1.4404/316L		SAE J518 C, ISO 6162		3.1	1,19
74		5	710711	DEU: Muffe G1/2 Zoll D=26,4 ; L=34 ENU: socket				1.4571		2986	2	3.1	0,70

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Teileliste
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Ölversorgungsanlage Getriebe
100l/min

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
74.1		1	721280	DEU: Schutzrohr Typ TW 45-F 5 G1/2 Zoll U1=63 ENU: screwing in protection tube				1.4571					1,00
75		3	714542	DEU: Einschraubverschraubung SS-12M0-1-8RS 12 mm Rohrverschrb. - 1/2 Zoll ISO-Außengew. zyl. ENU: Tube Fitting, Male Connector				SS 316					0,30
76		1	706698	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		80		1.4541	10216-5	DIN EN ISO 1127	2	3.1	0,33
77		1	706698	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		300		1.4541	10216-5	DIN EN ISO 1127	2	3.1	1,25
78		1	734311	DEU: Verschraubung DN25 G1 Zoll Innen / Außen flach dichtend				1.4571					0,20
				Kühlwasserzulauf IDW 4001363194									
79		1	711861	DEU: Rohrdoppelnippel Nr.23 2 Zoll x 200 (Länge angepasst) ENU: pipe double nipple		100		1.0345		2982	4	3.1	0,98
79.1		1	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		184		1.0345	10216-2	10220	4	3.1	0,76
80		1	720000	DEU: Loser Flansch Typ 02 DN50 PN16 ENU: lapped flange				1.0460	10222-2	1092-1	9	3.1	2,52
81		1	719588	DEU: Glatter Bund Typ32 DN50 PN16 ENU: plain collar				1.0460	10222-2	1092-1	9	3.1	0,65
82		1	705769	DEU: Muffe G1/2 Zoll D=26,4 ; L=34 ENU: socket				1.0345	17175	2986	4	3.1	0,14

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Teileliste
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Ölversorgungsanlage Getriebe
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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
83		1	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			0,10
84		1	711870	DEU: Absperrventil 1/2 Zoll PN16 DAVR216 ENU: shut-off valve				RG5					0,10
85		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
86		4	707664	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		931	7		0,52
86.1		8	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,27
87		4	717895	DEU: Sechskantschraube M 16 x 85 ENU: screw				5.6 GAL. ZN		931	7		0,60
88		1	733894	DEU: Lateralkompensator DN50 PN16 BL=114 ENU: lateral compensator				1.4571					2,00
89		2	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,20
				Optional Anschluss ANSI 1 1/2 zoll 150 lbs									
90		2	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	2,86
91		4	706028	DEU: V-Flansch 2 Zoll 150 lbs Std s = 3,91 ENU: welding neck flange				SA 105/C21		ASME B16.5-2013 RF		3.1	10,80
92		2	713145	DEU: Flachdichtung 2 Zoll 150 lbs Form RF s=2 ENU: gasket				C 4400		ASME B16.21			0,20

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
93		8	707665	DEU: Sechskantschraube M 16 x 70 ENU: screw				5.6 GAL. ZN		931	7		1,11
94		8	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,27
				Kühlwasserrücklauf IDW 4001363212									
96		1	711861	DEU: Rohrdoppelnippel Nr.23 2 Zoll x 200 (Länge angepasst) ENU: pipe double nipple		51		1.0345		2982	4	3.1	0,98
97		2	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 nahtlos ENU: elbow				1.0345	10216-2	2605-1/10253-2 Typ A	4	3.1	0,98
98		1	705027	DEU: Rohr d = 60,3 x 2,9 (Länge anpassen) nahtlos ENU: pipe		50		1.0345	10216-2	10220	4	3.1	0,21
99		2	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	2,86
100		1	720000	DEU: Loser Flansch Typ 02 DN50 PN16 ENU: lapped flange				1.0460	10222-2	1092-1	9	3.1	2,52
101		1	719588	DEU: Glatter Bund Typ32 DN50 PN16 ENU: plain collar				1.0460	10222-2	1092-1	9	3.1	0,65
102		1	705027	DEU: Rohr d = 60,3 x 2,9 nahtlos ENU: pipe		100		1.0345	10216-2	10220	4	3.1	0,41
103		2	705769	DEU: Muffe G1/2 Zoll D=26,4 ; L=34 ENU: socket				1.0345	17175	2986	4	3.1	0,28
104		1	711864	DEU: Winkel 90°- 1/2 Zoll - I/A ENU: angle				1.4401					0,10

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
105		1	711870	DEU: Absperrventil 1/2 Zoll PN16 DAVR216 ENU: shut-off valve				RG5					0,10
106		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
107		2	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			0,20
108		12	707664	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		931	7		1,57
109		4	717895	DEU: Sechskantschraube M 16 x 85 ENU: screw				5.6 GAL. ZN		931	7		0,60
110		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
111		24	702913	DEU: Scheibe A17 ENU: washer				A2		125			0,27
112		4	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,40
113		1	733894	DEU: Lateralkompensator DN50 PN16 BL=114 ENU: lateral compensator				1.4571					2,00
114		1	721279	DEU: Bimetall-Thermometer -40... +60°C Typ R5502/4 / G 1/2 Zoll unten ENU: bimetal thermometer				VA					0,20
115		1	721280	DEU: Schutzrohr Typ TW 45-F 5 G1/2 Zoll U1=63 ENU: screwing in protection tube				1.4571					1,00
116		1	L711680	DEU: Sicherheitsventil MU-ECK G 1/2 Zoll ENU: safety relief valve				ST.					3,00

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Teileliste
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Ölversorgungsanlage Getriebe
100l/min

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
117		1	733895	DEU: Schwebekörper-Durchflußmesser Typ H250/RR/M40/ESK-Ex 1,0-10 m3/h DN50 PN16				VA					6,00
				Entleerung Ölkühler									
118		2	711628	DEU: Verschlußkegel VKA10-CF ENU: locking cone				ST. VERZ.					0,20
119		2	707186	DEU: Rohr d = 10,0 x 1,5 nahtlos ENU: pipe		100		1.4541	10216-5	DIN EN ISO 1127	2	3.1	0,06
119.1		2	707373	DEU: Schelle HRL 1 A 10 ENU: clip				PP					
120		2	712754	DEU: Winkeleinschraubverschraubung WE10-LM-CF ENU: elbow screw fitting				ST. VERZ.					
121		2	711858	DEU: Durchgangsventil DV 10-L ENU: globe valve				MESSING					2,00
				Schraubverbind./ Befestigungen									
122		4	707663	DEU: Sechskantschraube M 16 x 60 ENU: screw				5.6 GAL. ZN		931	7		0,49
123		4	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,13
124		1	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,10
124		4	709563	DEU: Sechskantschraube M 10 x 30 ENU: screw				5.6 GAL. ZN		933	7		0,10
125		4	716011	DEU: Scheibe B10 10,5x20x2 ENU: washer				ST. GAL. ZN		ISO 7090			0,03
126		4	711047	DEU: Sechskantschraube M 10 x 45 ENU: screw				5.6 GAL. ZN		933	7		0,13

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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
127		8	716011	DEU: Scheibe B10 10,5x20x2 ENU: washer				ST. GAL. ZN		ISO 7090			0,05
128		4	709765	DEU: Sechskantmutter M 10 ENU: screw nut				5-2 GAL. ZN		934			0,05
129		6	703502	DEU: Sechskantschraube M 12 x 40 ENU: screw				5.6 GAL. ZN		933	7		0,27
130		6	707658	DEU: Scheibe A13 ENU: washer				GAL. ZN		125			0,04
131		6	709789	DEU: Sechskantschraube M 12 x 30 ENU: screw				5.6 GAL. ZN		933	7		0,23
132		6	707658	DEU: Scheibe A13 ENU: washer				GAL. ZN		125			0,04
133		6	708902	DEU: Sechskantschraube M 12 x 55 ENU: screw				5.6 GAL. ZN		931	7		0,28
134		12	707658	DEU: Scheibe A13 ENU: washer				GAL. ZN		125			0,08
135		6	707564	DEU: Sechskantmutter M 12 ENU: screw nut				5-2 GAL. ZN		934			0,10
136		4	709564	DEU: Sechskantschraube M 10 x 35 ENU: screw				5.6 GAL. ZN		933	7		0,11
137		4	716011	DEU: Scheibe B10 10,5x20x2 ENU: washer				ST. GAL. ZN		ISO 7090			0,03
138		4	708830	DEU: Sechskantschraube M 12 x 25 ENU: screw				5.6 GAL. ZN		933	7		0,14
139		4	707658	DEU: Scheibe A13 ENU: washer				GAL. ZN		125			0,03
				Instrumentenleitungen									
140		6	711645	DEU: Schelle HRL 1 A 12 ENU: clip				PP					

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Teileliste
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Ölversorgungsanlage Getriebe
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Artikel-Nr.: part list	4000930970	Revision: revision	REV_I	Erstellt developed	Datum date	19.05.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000930970 Vers.07	Gewicht (kg): weight (kg)	741,55	Bearbeitet processed	Datum date	30.05.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	30.05.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
141		4	714545	DEU: Winkelverschraubung SS-12M0-9 12 mm Rohrverschraubung ENU: angular pipe fitting				SS 316					0,80
142		3	707768	DEU: Flachstahl 40 x 6 ENU: flat profile		90	40	1.0037		1017			0,51
144		1	707187	DEU: Rohr / PI Pumpe 2 d = 12,0 x 1,5 nahtlos ENU: pipe		1.500		1.4541	10216-5	EN 10305-1	2	3.1	0,59
145		1	707187	DEU: Rohr / -PIDT d = 12,0 x 1,5 nahtlos ENU: pipe		750		1.4541	10216-5	EN 10305-1	2	3.1	0,29
146		1	707187	DEU: Rohr / +PIDT d = 12,0 x 1,5 nahtlos ENU: pipe		750		1.4541	10216-5	EN 10305-1	2	3.1	0,29
147		1	707187	DEU: Rohr / PI Ölvorlauf d = 12,0 x 1,5 nahtlos ENU: pipe		1.000		1.4541	10216-5	EN 10305-1	2	3.1	0,39
148		1	707187	DEU: Rohr / PT Transmitter Ölvorlauf d = 12,0 x 1,5 nahtlos ENU: pipe		1.000		1.4541	10216-5	EN 10305-1	2	3.1	0,39
149		1	707187	DEU: Rohr / PI Pumpe 1 d = 12,0 x 1,5 nahtlos ENU: pipe		1.500		1.4541	10216-5	EN 10305-1	2	3.1	0,59
				Halterung								3.1	
150		1	712769	DEU: Rundstahlbügelschelle HRRBS 6 L 60,3 PP A2 ENU: round steel clip				PP / 1.4301					
151		1	706428	DEU: Blech s = 5,0 ENU: sheet plate		150	300	1.0425	10028-2	10029-A	1	3.1	1,77
152		1	710419	DEU: Rohr d = 26,9 x 3,2 nahtlos ENU: pipe		400		1.0345	10216-2	10220	4	3.1	0,75

F.2.4 Test documentation

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Probelaufprotokoll** **Ölversorgungsanlage für Getriebe** Test load record oelequipment for Gear	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101709 FA2200557 Manufacturer´s job-no.:
Prüfobjekt: Ölversorgungsanlage Getriebe 100L / min Inspection object:	**Zeichnungs-Nr.:** 4000930970 Drawing-no.:
Bestell-Nr.: 4500499295 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200557-1 Serial-no.:	**Datum der Prüfung:** 19.07.2022 Date of inspection:

Betrieb mit Motor 1
Operate with motor 1

Drehzahl: Rotary:	Soll / shall :	1465 U / min
	Ist / is :	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall :	2,0 bar (ü)
	Ist / is :	2,0 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall :	100 l / min
	Ist / is :	115 l / min

Betrieb mit Motor 2
Operate with motor 2

Drehzahl: Rotary:	Soll / shall :	1465 U / min
	Ist / is :	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall :	2,0 bar (ü)
	Ist / is :	2,2/2,0 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall :	100 l / min
	Ist / is :	115 l / min

Test-Medium: Medium:	Mobil SHC 626
Temperatur: Temperature:	Öl: 28°C / Umgebungstemperatur: 25°C
Beide Überströmventile eingestellt auf: Both overflow-valve adjusted at:	3,7 bar (ü)

Im Betriebszustand müssen beide Überströmventile erneut justiert werden.
On operating state must both overflow-valve newly adjusted.

Dauer der Prüfung je Pumpe: 1,0 Std.
Runtime of testing per hour:

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen: ----
Comments:

Datum: 19.07.2022 Date:	**Datum:** 19.07.2022 Date:	**Datum:** Date:
Prüfer: S.Kuhrmeyer Inspector:	**Prüfaufsicht:** M.Stewig Supervisor:	**Abnahmegesellschaft:** Inspection authority:

EA SK

Änderung 0 / 04. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

Emmerthaler Apparatebau GmbH Langes Feld 4 31857 Emmerthal	**Prüfbericht für Ölversorgungsanlagen Getriebe** Inspection for oil equipments	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101709 FA2200557 Manufacturer´s job-no.:
Prüfobjekt: Ölversorgungsanlage Getriebe 100 Liter Inspection object:	**Zeichnungs-Nr.:** 4000930970 Drawing-no.:
Bestell-Nr.: 4500499295 2000064862 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200557-1 Serial-no.:	**Datum der Prüfung:** 19.07.2022 Date of inspection:

Bei den o.g. Anlagen wurden vor der Auslieferung folgende Prüfungen durchgeführt:
At a.c. systems were following inspections implemented:

	Ja / Yes	Nein / No
1. Bei den Drehstrommotoren wurde das Typenschild überprüft: At the three-phase-motors were the rating plate verifies: 1500U/min, Y400V, 50Hz	☒	☐
2. Probelauf mit Mengen- und Druckmessung wurde durchgeführt. Probelaufprotokoll siehe Beiblatt. The run with rate of flow and pressure messure.See test load record.	☒	☐
3. Die werkseitig eingestellten Schaltpunkte des Niveawächters und die Schutzart wurden nach den Aufgaben aus der beiliegenden Skizze überprüft. The switching points from level swich and the protection were check.	☒	☐
4. Die Ölversorgungsanlage wurde komplett entleert (Ölbehälter, Ölkühler, Doppelfilter, Rohrleitung) The oil equipment was completely deflated (container, oilcooler, doublefilter, pipe)	☒	☐
5. Die Rohrleitung wurde mittels Wasserdruckpumpe (15 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The pipe line for oil was verified by hydrostatic test (15 bar) There were no objections according to hydrostatic test.	☒	☐
6. Die komplette Ölversorgungsanlage wurde mittels Luftdruckprobe (0,4 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The complete aggregate was verified by nekal test (0,4 bar (Ü) There were no objections according to necal test.	☒	☐
7. Die Konservierung der Rohrleitung wurden gemäß der Auftragsspezifikation durchgeführt. The preservation of pipe was executed according to specification of commission.	☒	☐

Pos. 1 Pos. 3 Pos. 5 Pos. 7

Pos. 2 Pos. 4 Pos. 6

Probelaufprotokoll siehe Anhang

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen : ----
Comments :

Datum : 19.07.2022 Date : **Prüfer :** Stephan Kuhrneyer Inspector :	**Datum :** 19.07.2022 Date : **Prüfaufsicht :** Michael Stewig Supervisor :	**Datum :** Date : **Abnahmegesellschaft :** Inspection authority :

Änderung 0 / 13. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Probelaufprotokoll** **Ölversorgungsanlage für Getriebe** Test load record oelequipment for Gear	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101709 Manufacturer´s job-no.: FA2200557
Prüfobjekt: Ölversorgungsanlage Getriebe 100L / min Inspection object:	**Zeichnungs-Nr.:** 4000930970 Drawing-no.:
Bestell-Nr.: 4500499295 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200557-1 Serial-no.:	**Datum der Prüfung:** 19.07.2022 Date of inspection:

Betrieb mit Motor 1
Operate with motor 1

Drehzahl: Rotary:	Soll / shall :	1465 U / min
	Ist / is :	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall :	2,0 bar (ü)
	Ist / is :	2,0 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall :	100 l / min
	Ist / is :	115 l / min

Betrieb mit Motor 2
Operate with motor 2

Drehzahl: Rotary:	Soll / shall :	1465 U / min
	Ist / is :	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall :	2,0 bar (ü)
	Ist / is :	2,2/2,0 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall :	100 l / min
	Ist / is :	115 l / min

Test-Medium: Medium:	Mobil SHC 626
Temperatur: Temperature:	Öl: 28°C / Umgebungstemperatur: 25°C
Beide Überströmventile eingestellt auf: Both overflow-valve adjusted at:	3,7 bar (ü)

Im Betriebszustand müssen beide Überströmventile erneut justiert werden.
On operating state must both overflow-valve newly adjusted.

Dauer der Prüfung je Pumpe: 1,0 Std.
Runtime of testing per hour:

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

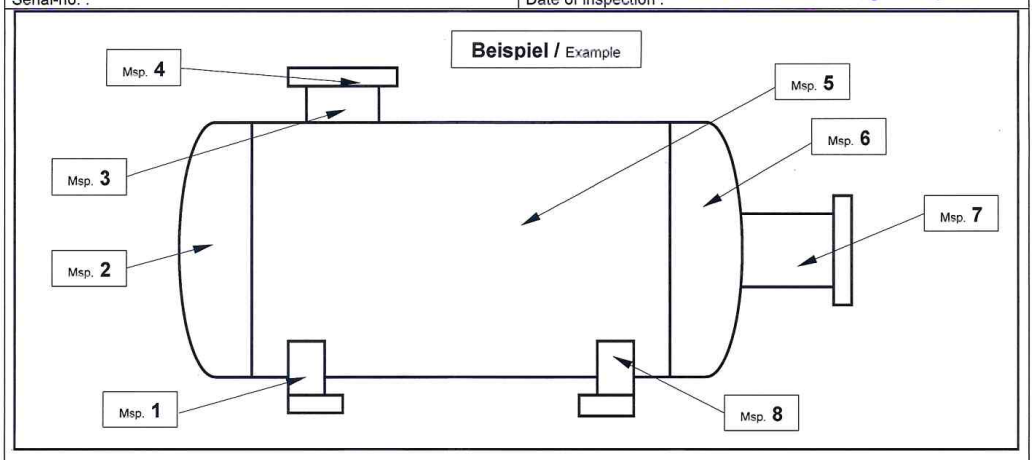
Bemerkungen: ----
Comments:

Datum: 19.07.2022 Date:	**Datum:** 19.07.2022 Date:	**Datum:** Date:
EA SK **Prüfer:** S.Kuhrmeyer Inspector:	**Prüfaufsicht:** M.Stewig Supervisor:	**Abnahmegesellschaft:** Inspection authority:

Änderung 0 / 04. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

Emmerthaler Apparatebau GmbH Langes Feld 4 31860 Emmerthal	**Prüfbericht** **Schichtstärkenmessung** Coating strength testing report	Abnahmeprüfzeugnis 3.1 Inspection certificate 3.1 DIN EN 10204

Kunde : Aerzener Maschinenfabrik GmbH Customer : 4500499295	**Hersteller Auftrags-Nr. :** EAV2101709 Manufacturer`s job no. : FA2200557
Prüfobjekt : Ölversorgungsanlage Getriebe Inspection object : 2000064862	**Zeichnungs-Nr. :** 4000923770 Drawing-no. :
Fabrik-Nr. : Serial-no. :	**Datum der Prüfung :** 01.08.2022 Date of inspection :



Beschichtung / Coating system

Anforderungen : Requirements :		**Messinstrument :** Measuring instrument :
Schicht 1 : VESTOZINK 2K-EP Coat 1 : 734907	**Schicht 2 :** VESTOPOX 2K-EP Coat 2 : 734908	**Schicht 3 :** VESTOPUR 2K-DT Coat 3 : 734967 RAL 5001
Geforderte Stärke : 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :

	Schicht Coat 1	Schicht Coat 2	Schicht Coat 3		Schicht Coat 1	Schicht Coat 2	Schicht Coat 3
Messpunkt Msp. 1	88 µm	176 µm	297 µm	Messpunkt Msp. 11	96 µm	234 µm	328 µm
Messpunkt Msp. 2	83 µm	187 µm	308 µm	Messpunkt Msp. 12	102 µm	248 µm	407 µm
Messpunkt Msp. 3	94 µm	192 µm	314 µm	Messpunkt Msp. 13	87 µm	193 µm	423 µm
Messpunkt Msp. 4	87 µm	198 µm	374 µm	Messpunkt Msp. 14	84 µm	207 µm	398 µm
Messpunkt Msp. 5	103 µm	207 µm	314 µm	Messpunkt Msp. 15	89 µm	214 µm	408 µm
Messpunkt Msp. 6	100 µm	223 µm	317 µm	Messpunkt Msp. 16	80 µm	197 µm	304 µm
Messpunkt Msp. 7	112 µm	240 µm	356 µm	Messpunkt Msp. 17	89 µm	178 µm	302 µm
Messpunkt Msp. 8	83 µm	204 µm	332 µm	Messpunkt Msp. 18	93 µm	187 µm	296 µm
Messpunkt Msp. 9	87 µm	209 µm	347 µm	Messpunkt Msp. 19	96 µm	232 µm	312 µm
Messpunkt Msp. 10	94 µm	232 µm	321 µm	Messpunkt Msp. 20	83 µm	248 µm	336 µm

Besteht die Beschichtung aus nur einer Schicht, werden Typ und Schichtstärke unter **1** eingetragen.
If the coating consists of one layer only, type and thickness of layer are entered under **1**.

Die Zeichnung dient als Beispiel für die Anordnung der Messpunkte an sämtlichen Prüfobjekten, dabei ist die Anzahl und Position der Messpunkte so auszuwählen, dass die gesamte Oberfläche bewertungsfähig ist.
The drawing serves as example for the arrangement of the measuring points on all the test objects, and the number and position of the measuring points is to be selected so, that the entire surface can be evaluated.

Die Messpunkte sind für eine exakte Rückverfolgbarkeit, auf der Oberfläche gekennzeichnet : ☐
The measuring points are marked on the surface for an exact traceability.

Bemerkungen :
Comments :

Bewertung : Evaluation :	**Erfüllt :** ☒ Conform :	**Nicht erfüllt :** ☐ Not conform :	
Datum : 02.08.2022 Date :	02.08.2022		
Prüfer : Inspector :			

Änderung1 / 11. Juli 2012 / M. Stewig

F 8.2.4-15 Prüfbericht Schichtstärkenmessung (Allgemein)

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Prüfbericht für Ölversorgungsanlagen Getriebe** Inspection for oil equipments	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101709 FA2200556 Manufacturer´s job-no.:
Prüfobjekt: Ölversorgungsanlage Getriebe 100 Liter Inspection object:	**Zeichnungs-Nr.:** 4000930970 Drawing-no.:
Bestell-Nr.: 4500499295 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200556 Serial-no.:	**Datum der Prüfung:** 19.08.2022 Date of inspection:

Bei den o.g. Anlagen wurden vor der Auslieferung folgende Prüfungen durchgeführt:
At a.c. systems were following inspections implemented:

	Ja / Yes	Nein / No
1. Bei den Drehstrommotoren wurde das Typenschild überprüft: At the three-phase-motors were the rating plate verifies: 1500U/min, Y400V, 50Hz	☒	☐
2. Probelauf mit Mengen- und Druckmessung wurde durchgeführt. Probelaufprotokoll siehe Beiblatt. The run with rate of flow and pressure messure.See test load record.	☒	☐
3. Die werkseitig eingestellten Schaltpunkte des Niveawächters und die Schutzart wurden nach den Aufgaben aus der beiliegenden Skizze überprüft. The switching points from level swich and the protection were check.	☒	☐
4. Die Ölversorgungsanlage wurde komplett entleert (Ölbehälter, Ölkühler, Doppelfilter, Rohrleitung) The oil equipment was completely deflated (container, oilcooler, doublefilter, pipe)	☒	☐
5. Die Rohrleitung wurde mittels Wasserdruckpumpe (15 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The pipe line for oil was verified by hydrostatic test (15 bar) There were no objections according to hydrostatic test.	☒	☐
6. Die komplette Ölversorgungsanlage wurde mittels Luftdruckprobe (0,4 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The complete aggregate was verified by nekal test (0,4 bar (Ü) There were no objections according to necal test.	☒	☐
7. Die Konservierung der Rohrleitung wurden gemäß der Auftragsspezifikation durchgeführt. The preservation of pipe was executed according to specification of commission.	☒	☐

Pos. 1 Pos. 3 Pos. 5 Pos. 7

Pos. 2 Pos. 4 Pos. 6

Probelaufprotokoll siehe Anhang

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen : ----
Comments :

Datum : 19.08.2022 Date : EA SK **Prüfer :** Stephan Kuhrmeyer Inspector :	**Datum :** 19.08.2022 Date : **Prüfaufsicht :** Michael Stewig Supervisor :	**Datum :** Date : **Abnahmegesellschaft :** Inspection authority :

Änderung 0 / 13. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Prüfbericht für Ölversorgungsanlagen Getriebe** Inspection for oil equipments	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101709 Manufacturer´s job-no.: FA2200560
Prüfobjekt: Ölversorgungsanlage Getriebe 100 Liter Inspection object:	**Zeichnungs-Nr.:** 4000930970 Drawing-no.:
Bestell-Nr.: 4500499295 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200560 Serial-no.:	**Datum der Prüfung:** 19.08.2022 Date of inspection:

Bei den o.g. Anlagen wurden vor der Auslieferung folgende Prüfungen durchgeführt:
At a.c. systems were following inspections implemented:

	Ja / Yes	Nein / No
1. Bei den Drehstrommotoren wurde das Typenschild überprüft: At the three-phase-motors were the rating plate verifies: 1500U/min, Y400V, 50Hz	☒	☐
2. Probelauf mit Mengen- und Druckmessung wurde durchgeführt. Probelaufprotokoll siehe Beiblatt. The run with rate of flow and pressure messure.See test load record.	☒	☐
3. Die werkseitig eingestellten Schaltpunkte des Niveawächters und die Schutzart wurden nach den Aufgaben aus der beiliegenden Skizze überprüft. The switching points from level swich and the protection were check.	☒	☐
4. Die Ölversorgungsanlage wurde komplett entleert (Ölbehälter, Ölkühler, Doppelfilter, Rohrleitung) The oil equipment was completely deflated (container, oilcooler, doublefilter, pipe)	☒	☐
5. Die Rohrleitung wurde mittels Wasserdruckpumpe (15 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The pipe line for oil was verified by hydrostatic test (15 bar) There were no objections according to hydrostatic test.	☒	☐
6. Die komplette Ölversorgungsanlage wurde mittels Luftdruckprobe (0,4 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The complete aggregate was verified by nekal test (0,4 bar (Ü) There were no objections according to necal test.	☒	☐
7. Die Konservierung der Rohrleitung wurden gemäß der Auftragsspezifikation durchgeführt. The preservation of pipe was executed according to specification of commission.	☒	☐

Pos. 1 Pos. 3 Pos. 5 Pos. 7

Pos. 2 Pos. 4 Pos. 6

Probelaufprotokoll siehe Anhang

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen : ----
Comments :

Datum : 19.08.2022 Date :	**Datum :** 19.08.2022 Date :	**Datum :** Date :
Prüfer : Stephan Kuhrmeyer Inspector :	**Prüfaufsicht :** Michael Stewig Supervisor :	**Abnahmegesellschaft :** Inspection authority :

Änderung 0 / 13. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Probelaufprotokoll** **Ölversorgungsanlage für Getriebe** Test load record oelequipment for Gear	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101709 FA2200556 Manufacturer´s job-no.:
Prüfobjekt: Ölversorgungsanlage Getriebe 100L / min Inspection object:	**Zeichnungs-Nr.:** 4000930970 Drawing-no.:
Bestell-Nr.: 4500499295 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200556 Serial-no.:	**Datum der Prüfung:** 19.08.2022 Date of inspection:

Betrieb mit Motor 1
Operate with motor 1

Drehzahl: Rotary:	Soll / shall : 1465 U / min Ist / is : 1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall : 2,0 bar (ü) Ist / is : 2,2/2,0 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall : 100 l / min Ist / is : 108 l / min

Betrieb mit Motor 2
Operate with motor 2

Drehzahl: Rotary:	Soll / shall : 1465 U / min Ist / is : 1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall : 2,0 bar (ü) Ist / is : 2,2/2,1 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall : 100 l / min Ist / is : 114 l / min

Test-Medium: Medium:	Mobil SHC 626
Temperatur: Temperature:	Öl: 28°C / Umgebungstemperatur: 20°C
Beide Überströmventile eingestellt auf: Both overflow-valve adjusted at:	3,7 bar (ü)

Im Betriebszustand müssen beide Überströmventile erneut justiert werden.
On operating state must both overflow-valve newly adjusted.

Dauer der Prüfung je Pumpe: 1,0 Std.
Runtime of testing per hour:

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen: ----
Comments:

Datum: 19.08.2022 Date: **Prüfer:** S.Kuhrmeyer Inspector:	**Datum:** 19.08.2022 Date: **Prüfaufsicht:** M.Stewig Supervisor:	**Datum:** Date: **Abnahmegesellschaft:** Inspection authority:

EA SK

Änderung 0 / 04. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Probelaufprotokoll** **Ölversorgungsanlage für Getriebe** Test load record oelequipment for Gear	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101709 FA2200560 Manufacturer´s job-no.:
Prüfobjekt: Ölversorgungsanlage Getriebe 100L / min Inspection object:	**Zeichnungs-Nr.:** 4000930970 Drawing-no.:
Bestell-Nr.: 4500499295 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200560 Serial-no.:	**Datum der Prüfung:** 19.08.2022 Date of inspection:

Betrieb mit Motor 1
Operate with motor 1

Drehzahl: Rotary:	Soll / shall :	1465 U / min
	Ist / is :	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall :	2,0 bar (ü)
	Ist / is :	2,0/1,9 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall :	100 l / min
	Ist / is :	105 l / min

Betrieb mit Motor 2
Operate with motor 2

Drehzahl: Rotary:	Soll / shall :	1465 U / min
	Ist / is :	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall :	2,0 bar (ü)
	Ist / is :	2,0/1,8 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall :	100 l / min
	Ist / is :	105 l / min

Test-Medium: Medium:	Mobil SHC 626
Temperatur: Temperature:	Öl: 28°C / Umgebungstemperatur: 20°C
Beide Überströmventile eingestellt auf: Both overflow-valve adjusted at:	3,7 bar (ü)

Im Betriebszustand müssen beide Überströmventile erneut justiert werden.
On operating state must both overflow-valve newly adjusted.

Dauer der Prüfung je Pumpe: 1,0 Std.
Runtime of testing per hour:

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen: ----
Comments:

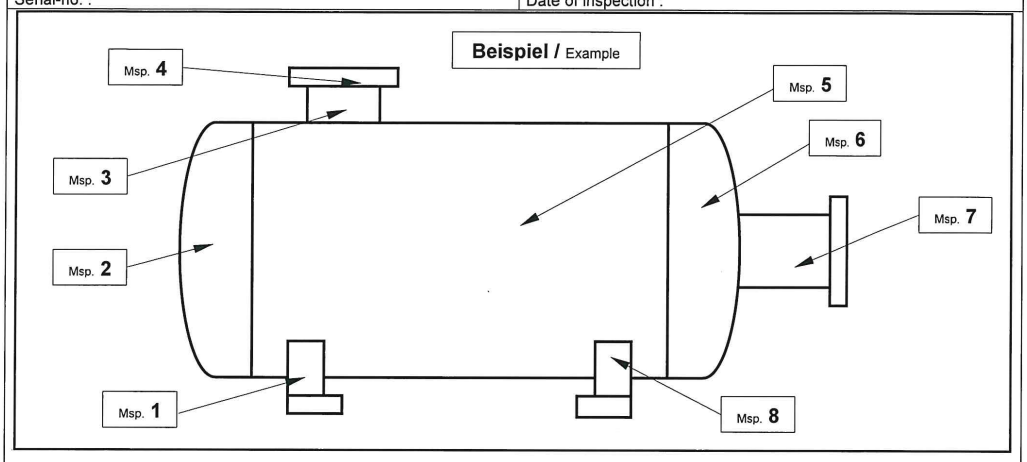
Datum: 19.08.2022 Date:	**Datum:** 19.08.2022 Date:	**Datum:** Date:
Prüfer: S.Kuhrmeyer Inspector:	**Prüfaufsicht:** M.Stewig Supervisor:	**Abnahmegesellschaft:** Inspection authority:

EA SK

Änderung 0 / 04. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

Emmerthaler Apparatebau GmbH Langes Feld 4 31860 Emmerthal	**Prüfbericht** **Schichtstärkenmessung** Coating strength testing report	Abnahmeprüfzeugnis 3.1 Inspection certificate 3.1 DIN EN 10204

Kunde : Aerzener Maschinenfabrik Customer : 4500499295	**Hersteller Auftrags-Nr. :** EAV2101709 Manufacturer`s job no. : FA2200556
Prüfobjekt : Ölversorgungsanlage Getriebe Inspection object : 2000064862	**Zeichnungs-Nr. :** 4000923770 Drawing-no. :
Fabrik-Nr. : Serial-no. :	**Datum der Prüfung :** 22.08.22 Date of inspection :



Beschichtung / Coating system

Anforderungen : Requirements :		**Messinstrument :** Measuring instrument :
Schicht 1 : VESTOZINK Coat 1 :	**Schicht 2 :** VESTOPOX Coat 2 :	**Schicht 3 :** VESTOPUR RAL5001 Coat 3 :
Geforderte Stärke : 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :

	Schicht Coat 1	Schicht Coat 2	Schicht Coat 3		Schicht Coat 1	Schicht Coat 2	Schicht Coat 3
Messpunkt Msp. 1	82 µm	177 µm	257 µm	Messpunkt Msp. 11	µm	µm	µm
Messpunkt Msp. 2	85 µm	165 µm	284 µm	Messpunkt Msp. 12	µm	µm	µm
Messpunkt Msp. 3	80 µm	160 µm	300 µm	Messpunkt Msp. 13	µm	µm	µm
Messpunkt Msp. 4	80 µm	160 µm	300 µm	Messpunkt Msp. 14	µm	µm	µm
Messpunkt Msp. 5	88 µm	172 µm	284 µm	Messpunkt Msp. 15	µm	µm	µm
Messpunkt Msp. 6	82 µm	185 µm	275 µm	Messpunkt Msp. 16	µm	µm	µm
Messpunkt Msp. 7	90 µm	166 µm	270 µm	Messpunkt Msp. 17	µm	µm	µm
Messpunkt Msp. 8	84 µm	162 µm	244 µm	Messpunkt Msp. 18	µm	µm	µm
Messpunkt Msp. 9	84 µm	170 µm	256 µm	Messpunkt Msp. 19	µm	µm	µm
Messpunkt Msp. 10	80 µm	170 µm	268 µm	Messpunkt Msp. 20	µm	µm	µm

Besteht die Beschichtung aus nur einer Schicht, werden Typ und Schichtstärke unter **1** eingetragen.
If the coating consists of one layer only, type and thickness of layer are entered under **1**.

Die Zeichnung dient als Beispiel für die Anordnung der Messpunkte an sämtlichen Prüfobjekten, dabei ist die Anzahl und Position der Messpunkte so auszuwählen, dass die gesamte Oberfläche bewertungsfähig ist.
The drawing serves as example for the arrangement of the measuring points on all the test objects, and the number and position of the measuring points is to be selected so, that the entire surface can be evaluated.

Die Messpunkte sind für eine exakte Rückverfolgbarkeit, auf der Oberfläche gekennzeichnet : ☐
The measuring points are marked on the surface for an exact traceability.

Bemerkungen :
Comments :

Bewertung : Evaluation : **Erfüllt :** Conform : ☒ **Nicht erfüllt :** Not conform : ☐

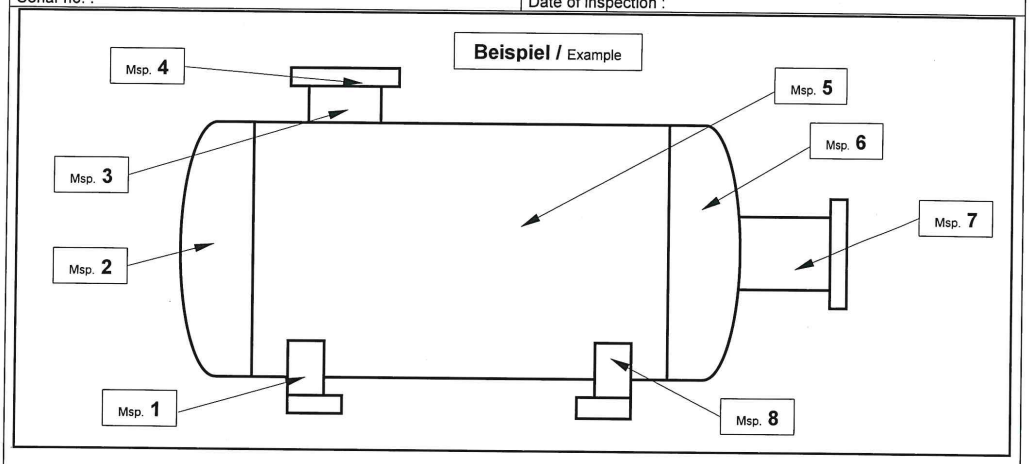
Datum : 22.08.22 / 22.08.2022
Date :
Prüfer :
Inspector :

Änderung1 / 11. Juli 2012 / M. Stewig

F 8.2.4-15 Prüfbericht Schichtstärkenmessung (Allgemein)

Emmerthaler Apparatebau GmbH Langes Feld 4 31860 Emmerthal	**Prüfbericht** **Schichtstärkenmessung** Coating strength testing report	Abnahmeprüfzeugnis 3.1 Inspection certificate 3.1 DIN EN 10204

Kunde : Aerzener Maschinenfabrik GmbH Customer : 4500499295	**Hersteller Auftrags-Nr. :** EAV2101709 Manufacturer`s job no. : FA2200560
Prüfobjekt : Ölversorgungsanlage Getriebe Inspection object : 2000064862	**Zeichnungs-Nr. :** 4000923770 Drawing-no. :
Fabrik-Nr. : Serial-no. :	**Datum der Prüfung :** 22.08.22 Date of inspection :



Beschichtung / Coating system

Anforderungen : Requirements :		**Messinstrument :** Measuring instrument :
Schicht 1 : VESTOZINK 2K-EP Coat 1 : 734907	**Schicht 2 :** VESTOPOX 2K-EP Coat 2 : 734908	**Schicht 3 :** VESTOPUR 2K-DT Coat 3 : 734967 RAL 5001
Geforderte Stärke : 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :

	Schicht Coat 1	Schicht Coat 2	Schicht Coat 3		Schicht Coat 1	Schicht Coat 2	Schicht Coat 3
Messpunkt Msp. 1	85 µm	172 µm	257 µm	Messpunkt Msp. 11	µm	µm	µm
Messpunkt Msp. 2	88 µm	168 µm	300 µm	Messpunkt Msp. 12	µm	µm	µm
Messpunkt Msp. 3	80 µm	166 µm	284 µm	Messpunkt Msp. 13	µm	µm	µm
Messpunkt Msp. 4	80 µm	170 µm	277 µm	Messpunkt Msp. 14	µm	µm	µm
Messpunkt Msp. 5	84 µm	165 µm	280 µm	Messpunkt Msp. 15	µm	µm	µm
Messpunkt Msp. 6	82 µm	160 µm	245 µm	Messpunkt Msp. 16	µm	µm	µm
Messpunkt Msp. 7	86 µm	160 µm	252 µm	Messpunkt Msp. 17	µm	µm	µm
Messpunkt Msp. 8	88 µm	172 µm	263 µm	Messpunkt Msp. 18	µm	µm	µm
Messpunkt Msp. 9	85 µm	175 µm	270 µm	Messpunkt Msp. 19	µm	µm	µm
Messpunkt Msp. 10	80 µm	168 µm	270 µm	Messpunkt Msp. 20	µm	µm	µm

Besteht die Beschichtung aus nur einer Schicht, werden Typ und Schichtstärke unter **1** eingetragen.
If the coating consists of one layer only, type and thickness of layer are entered under **1**.

Die Zeichnung dient als Beispiel für die Anordnung der Messpunkte an sämtlichen Prüfobjekten, dabei ist die Anzahl und Position der Messpunkte so auszuwählen, dass die gesamte Oberfläche bewertungsfähig ist.
The drawing serves as example for the arrangement of the measuring points on all the test objects, and the number and position of the measuring points is to be selected so, that the entire surface can be evaluated.

Die Messpunkte sind für eine exakte Rückverfolgbarkeit, auf der Oberfläche gekennzeichnet : ☐
The measuring points are marked on the surface for an exact traceability.

Bemerkungen :
Comments :

Bewertung : Evaluation : **Erfüllt :** Conform : ☒ **Nicht erfüllt :** Not conform : ☐

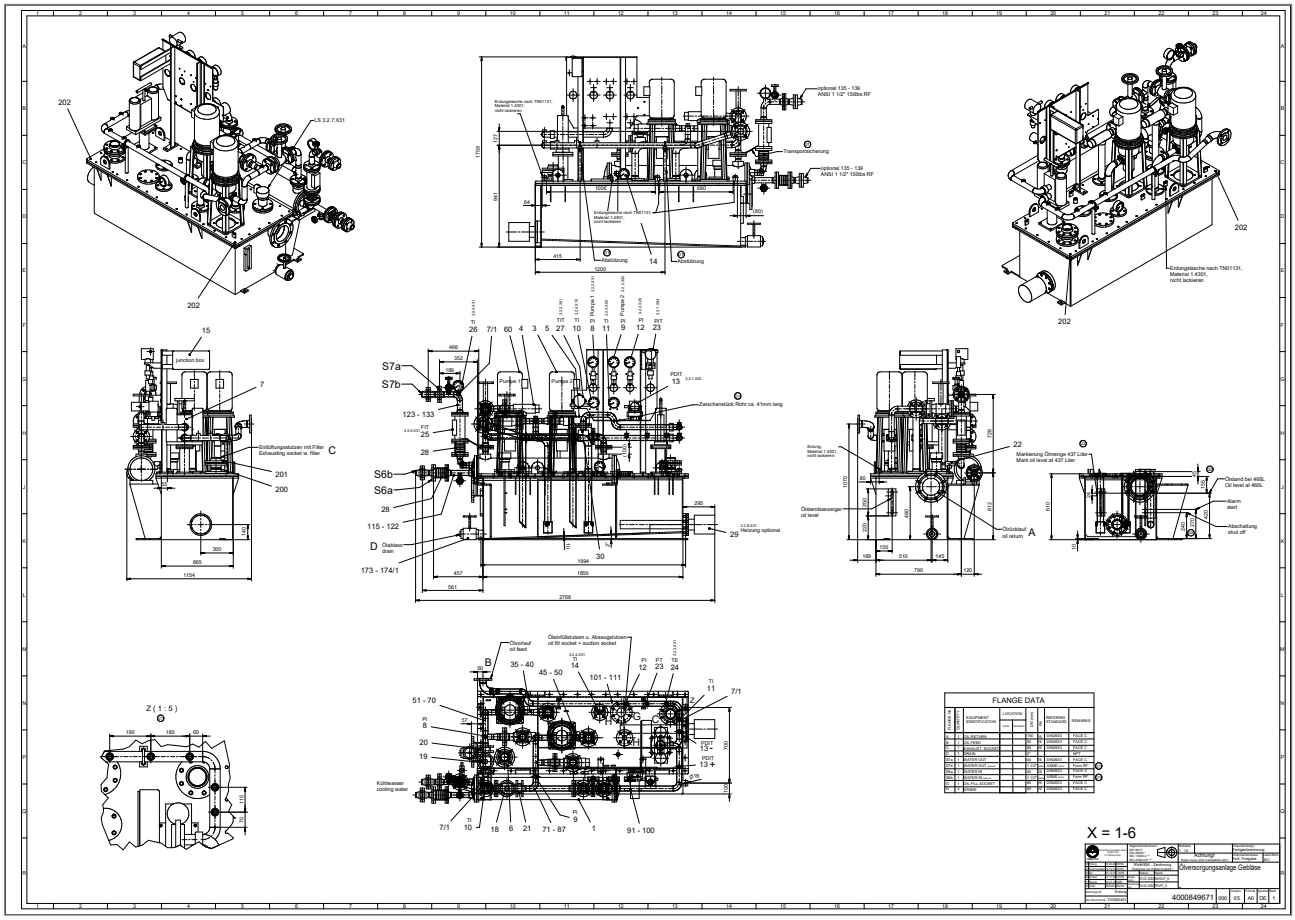
Datum : 22.08.22 / 22.08.2022
Date :
Prüfer :
Inspector :

Änderung1 / 11. Juli 2012 / M. Stewig

F 8.2.4-15 Prüfbericht Schichtstärkenmessung (Allgemein)

F.3 Blower stage

F.3.1 Drawing



F.3.2 Parts lists

Emmerthaler Apparatebau GmbH
Langes Feld 4
31860 Emmerthal

Teileliste
part list

Ölversorgungsanlage Gebläse
mit Gefälle

1 / 19

Artikel-Nr.: part list	4000849671	Revision: revision	REV_G	Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000849671 Vers.07	Gewicht (kg): weight (kg)	616,09	Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
1	F	1	L711676	DEU: Rohrbündelwärmetauscher Typ BCF 804-0_B13-4 weg ENU: tubular heat exchanger				ST.					
2	F	1	L712184	DEU: Druckfilter DU 251.25 G.30.E.P.BFS8 ENU: pressure filter				ST.					2,00
3	F	2	L716189	DEU: Zahnradpumpe KF 3/100 F20B POA 7DP1 m. E-Motor Loher Chemstar 400/690V, 4KW, 50Hz, 1500U/min, IP55 ENU: gear type pump									40,00
4	F	1	4000849997	DEU: Ölbehälter Gebläse mit 2 Grad Gefälle	4000849997 Vers.07			ST.					350,00
5	F	1	L712204	DEU: Ex- Niveauwächter DNRA00-12-F65 16B-H375-L405 ENU: level contactor									4,00
5.1	G	1	721332	DEU: Bimetall Thermometer -40... +160°C Typ R5502/4 / G 1/2 Zoll unten ENU: bimetal thermometer				VA					1,50
5.2	G	1	721328	DEU: Wiederstandsthermometer PT100 EEx-i Fa.E+H Type Wiederstandsthermometer TR 10, TE2.13.4 TR10-GAD9BHRYC2100 ENU: resistance thermometer				VA					0,20
5.3	G	1	721331	DEU: Ex-Flanschheizkörper DHF22BO3GG-3-T6 Fa.Elmess 3 kW, 400 V 3-Ph, 4,3 A, 1,3 W/cm2 ENU: radiator				1.4541					5,00
				Instrumentenaufbau IDW4001365403									

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Ölversorgungsanlage Gebläse
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Artikel-Nr.: 4000849671
part list

Revision: REV_G
revision

Zeichnungsnummer: 4000849671 Vers.07
drawingnumber

Gewicht (kg): 616,09
weight (kg)

Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
6	F	1	T004585	DEU: Instrumententafel Getriebe Gebläse ENU: console for instruments / tools	4000846299Vers05 /T004585			ST.					26,00
6.1	F	1	721321	DEU: Klemmenkasten JB1 Fabrikat : Stahl Beistellung ELOC				PVC					1,00
7	F	1	721322	DEU: Rohrfedermanometer 0...10 bar Typ 233.50.100, R1/2 Zoll AG unten ENU: tube pressure gauge				VA					0,10
8	F	1	721322	DEU: Rohrfedermanometer 0...10 bar Typ 233.50.100, R1/2 Zoll AG unten ENU: tube pressure gauge				VA					0,10
9	F	1	721283	DEU: Fernthermometer -40...+120°C Typ F73.100 mit Halter ENU: telethermometer with holder				VA					0,20
10	F	1	721283	DEU: Fernthermometer -40...+120°C Typ F73.100 mit Halter ENU: telethermometer with holder				VA					0,20
11	F	1	721282	DEU: Rohrfedermanometer 0...6 bar Typ 233.50.100, R1/2 Zoll AG unten ENU: tube pressure gauge				VA					0,10
12	F	1	721326	DEU: Differenzdruckmanometer Exi mit Ferngeber 4 - 20mA Fa. E+H Typ Deltabar S PMD75, PDIT2.13.13 PMD75-1BJ7HE1DHBA ENU: differential gauge				VA					1,00
12.1	F	4	710037	DEU: Sechskantschraube M 10 x 25 ENU: screw				5.6 GAL. ZN		933	7		0,09
12.2	F	4	709765	DEU: Sechskantmutter M 10 ENU: screw nut				5-2 GAL. ZN		934			0,05

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Zeichnungsnummer: drawingnumber	4000849671 Vers.07	Gewicht (kg): weight (kg)	616,09	Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
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Pos.	Index	Stück	Artikel-Nr.	Benennung und Abmessung	Zeichnungs-Nr.	Länge	Breite	Werkstoff	DIN EN	Standard	AD-W	WAZ	Gewicht (kg)
pos.	index	piece	article-no.	designation and dimensions	drawing-no.	length	width	material	DIN EN	standard	AD-W	WAZ	Weight (kg)
12.3	F	8	707657	DEU: Scheibe A10,5 10,5x20x2 ENU: washer				GAL. ZN		125			0,03
13	F	1	721327	DEU: Drucktransmitter EEx-i G1/2", 0..10Bar, Fa. E+H Typ Cerebar S PMP71, PIT2.13.14 PMP71-1BA1PE1GAABU ENU: pressure transmitter				VA					0,20
14	F	1	721329	DEU: Temperaturtransmitter HART EEx-ia, 4-20mA, Fa E+H Typ iTEMP TMT142, Feldtransmitter HART, TIT2.13.4 TMT142-B22131BBA1 ENU: temperature transmitter				VA					0,10
15	F	3	721319	DEU: Absperrventil für Manometer G 1/2", 1x D12 M02EKL12swLG12 DN 4 PN 400 ENU: manometer gauge valve				1.4571		16270B			0,30
16	F	3	721320	DEU: Messgerätehalter Typ 910.16 GRT-HLT H100 Form H Auslad. 100mm ENU: measuring instrument holder				ALU		16281			0,15
17	F	4	714234	DEU: Winkeladapter CAL-12M Hy-Lok ENU: angle adapter				1.4401					0,04
17.1	F	3	712037	DEU: Dichtkantring G 1/2 Zoll Typ 9092099 / Innenzentriert ENU: sealing edge ring				1.4571					0,15
17.2	F	24	703428	DEU: Sechskantschraube M 6 x 25 ENU: screw				8.8 GAL. ZN		933			0,16
17.3	F	24	708692	DEU: Sechskantmutter M 6 ENU: screw nut				8.8 GAL. ZN		934			0,06
17.4	F	24	708871	DEU: Federring A 6 ENU: spring washer				GAL. ZN		127			0,02

Emmerthaler Apparatebau GmbH Langes Feld 4 31860 Emmerthal	Teileliste part list	Ölversorgungsanlage Gebläse mit Gefälle	4 / 19

Artikel-Nr.: part list	4000849671	Revision: revision	REV_G	Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000849671 Vers.07	Gewicht (kg): weight (kg)	616,09	Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
				Ansaugleitung - Ölpumpe 1 / IDW4001367362									
21	G	1	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	1,43
22	E	1	705027	DEU: Rohr (Länge anpassen) d = 60,3 x 2,9 ENU: pipe		185		1.0305	10216-2	10220	4	3.1	0,76
23		1	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,49
24		1	701146	DEU: Red.-Stück K 60,3 x 2,9/ 48,3 x 2,6 ENU: pipe reducer				1.0305	10216-2	2616-1/10253-2 Typ A	4	3.1	0,28
25	E	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 ENU: pipe		130		1.0305	10216-2	10220	4	3.1	0,38
				Ansaugleitung - Ölpumpe 2 / IDW4001367494								3.1	
21		1	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	1,43
28	E	1	705027	DEU: Rohr (Länge anpassen) d = 60,3 x 2,9 ENU: pipe		185		1.0305	10216-2	10220	4	3.1	0,76
29		1	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,49
30		1	701146	DEU: Red.-Stück K 60,3 x 2,9/ 48,3 x 2,6 ENU: pipe reducer				1.0305	10216-2	2616-1/10253-2 Typ A	4	3.1	0,28

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Teileliste
part list

Ölversorgungsanlage Gebläse
mit Gefälle

Artikel-Nr.: 4000849671
part list

Revision: REV_G
revision

Zeichnungsnummer: 4000849671 Vers.07
drawingnumber

Gewicht (kg): 616,09
weight (kg)

Erstellt / developed	Datum / date	22.07.2022	Name / name: Pätzold
Bearbeitet / processed	Datum / date	29.07.2022	Name / name: Pätzold
Geprüft + genehmigt / checked + approved	Datum / date	29.07.2022	Name / name: Tuchel

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
				Ölpumpe1 - Ölkühler - Temperaturregler /4001367063								3.1	
33	E	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 ENU: pipe		92		1.0305	10216-2	10220	4	3.1	0,27
34		3	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,78
35	E	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 ENU: pipe		222		1.0305	10216-2	10220	4	3.1	0,65
37	E	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 ENU: pipe		116		1.0305	10216-2	10220	4	3.1	0,34
38		1	701046	DEU: T-Stück 48,3 x 2,6 ENU: T-piece				1.0305	10216-2	2615-1/10253-2 Typ A	4	3.1	0,59
39		1	701146	DEU: Red.-Stück K 60,3 x 2,9/ 48,3 x 2,6 ENU: pipe reducer				1.0305	10216-2	2616-1/10253-2 Typ A	4	3.1	0,28
40		1	711861	DEU: Rohrdoppelnippel Nr.23 2 Zoll x 200 ENU: pipe double nipple				1.0305		2982	4	3.1	0,98
41		1	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	1,43
42	E	1	705027	DEU: Rohr (Länge anpassen) d = 60,3 x 2,9 ENU: pipe		500		1.0305	10216-2	10220	4	3.1	2,06
43		2	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,28

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Artikel-Nr.: part list	4000849671	Revision: revision	REV_G	Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000849671 Vers.07	Gewicht (kg): weight (kg)	616,09	Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
43.1	F	2	714542	DEU: Einschraubverschraubung SS-12M0-1-8RS 12 mm Rohrverschrb. - 1/2 Zoll ISO-Außengew. zyl. ENU: Tube Fitting, Male Connector				SS 316					0,20
44	G	6	715321	DEU: V-Flansch Typ11 / B1 DN40 x 2,6 / PN40 ENU: Welding neck flange				1.0460	10222-2	1092-1	9	3.1	12,90
46	E	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 ENU: pipe		720		1.0305	10216-2	10220	4	3.1	2,11
48		2	701046	DEU: T-Stück 48,3 x 2,6 ENU: T-piece				1.0305	10216-2	2615-1/10253-2 Typ A	4	3.1	1,18
51	D	2	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,20
52	D	5	713201	DEU: Flachdichtung Innenbördel DN40 PN40 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,50
53		1	L711683	DEU: Absperrventil econosto Fig.241 DN 40 PN 16 ENU: shut-off valve				GRAUGUß					0,10
54		1	L711681	DEU: Rückschlagventil GESTRA TypRK 86 DN 40 PN 16 DRVZ42A001R307 ENU: non return valve				1.4571/1.4317					1,78
55	G	1	721280	DEU: Schutzrohr Typ TW 45-F 5 G1/2 Zoll U1=63 ENU: screwing in protection tube				1.4571					1,00
56		1	711861	DEU: Rohrdoppelnippel Nr.23 2 Zoll x 200 ENU: pipe double nipple				1.0345		2982	4	3.1	0,98

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Teileliste
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Ölversorgungsanlage Gebläse
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part list

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Gewicht (kg): 616,09
weight (kg)

Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
58	G	8	707663	DEU: Sechskantschraube M 16 x 60 ENU: screw				5.6 GAL. ZN		931	7		0,98
58.1	G	4	706746	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		933	7		0,49
59	G	4	705941	DEU: Sechskantschraube M 16 x 100 ENU: screw				5.6 GAL. ZN		933	7		0,68
60	G	16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
60.1	G	32	707659	DEU: Scheibe A17 ENU: washer				GAL. ZN		125			0,36
61		1	733929	DEU: Red.-Stück Sechskant Nr.33 3 Zoll x 2 Zoll 3 Zoll Außengewinde, 2 Zoll Innengewinde ENU: hexagon reducer				ST.		2990			0,90
62		1	L711707	DEU: Druckbegrenzungsventil RSNE2 Art.-Nr. 340056-1 ENU: pressure limitation valve				STAHLGUSS GS-C25					7,00
				Ölpumpe2 - Ölkühler / 4001367055									
63		1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 ENU: pipe		100		1.0305	10216-2	10220	4	3.1	0,29
64		3	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,78
65	E	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 ENU: pipe		105		1.0305	10216-2	10220	4	3.1	0,31
67	F	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 ENU: pipe		115		1.0305	10216-2	10220	4	3.1	0,34

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Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
68		1	701046	DEU: T-Stück 48,3 x 2,6 ENU: T-piece				1.0305	10216-2	2615-1/10253-2 Typ A	4	3.1	0,59
69		1	701146	DEU: Red.-Stück K 60,3 x 2,9/ 48,3 x 2,6 ENU: pipe reducer				1.0305	10216-2	2616-1/10253-2 Typ A	4	3.1	0,28
70		1	711861	DEU: Rohrdoppelnippel Nr.23 2 Zoll x 200 ENU: pipe double nipple				1.0305		2982	4	3.1	0,98
71	G	3	715208	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.0460	10222-2	1092-1	9	3.1	4,29
72	F	1	705027	DEU: Rohr (Länge anpassen) d = 60,3 x 2,9 ENU: pipe		400		1.0305	10216-2	10220	4	3.1	1,64
73		1	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,14
73.1		1	714542	DEU: Einschraubverschraubung SS-12M0-1-8RS 12 mm Rohrverschrb. - 1/2 Zoll ISO-Außengew. zyl. ENU: Tube Fitting, Male Connector				SS 316					0,10
74	F	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 ENU: pipe		115		1.0305	10216-2	10220	4	3.1	0,34
76	E	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 ENU: pipe		40		1.0305	10216-2	10220	4	3.1	0,12
77	G	1	715321	DEU: V-Flansch Typ11 / B1 DN40 x 2,6 / PN40 ENU: Welding neck flange				1.0460	10222-2	1092-1	9		2,15

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Teileliste
part list

Ölversorgungsanlage Gebläse
mit Gefälle

Artikel-Nr.: part list 4000849671

Revision: revision REV_G

Zeichnungsnummer: drawingnumber 4000849671 Vers.07

Gewicht (kg): weight (kg) 616,09

Erstellt developed	Datum date	22.07.2022	Name name Pätzold
Bearbeitet processed	Datum date	29.07.2022	Name name Pätzold
Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
79	D	1	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,10
80	D	2	713201	DEU: Flachdichtung Innenbördel DN40 PN40 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,20
81		1	L711683	DEU: Absperrventil econosto Fig.241 DN 40 PN 16 ENU: shut-off valve				GRAUGUß					0,10
82		1	L711681	DEU: Rückschlagventil GESTRA TypRK 86 DN 40 PN 16 DRVZ42A001R307 ENU: non return valve				1.4571/1.4317					1,78
83		1	L711707	DEU: Druckbegrenzungsventil ENU: pressure limitation valve									7,00
84	G	4	706746	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		933	7		0,49
85	G	4	705941	DEU: Sechskantschraube M 16 x 100 ENU: screw				5.6 GAL. ZN		933	7		0,68
86		8	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,27
86.1	G	16	707659	DEU: Scheibe A17 ENU: washer				GAL. ZN		125			0,18
				Entleerung Ölkühler									
87	G	2	707186	DEU: Rohr d = 10,0 x 1,5 nahtlos ENU: pipe		100		1.4541	10216-5	DIN EN ISO 1127	2		0,06
88		2	711852	DEU: Einschraubverschraubung GE10-LM-CF ENU: straight screwed coupling				ST. VERZ.					0,02
89	G	2	711858	DEU: Durchgangsventil DV 10-L ENU: globe valve				MESSING					2,00

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Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
90		2	711628	DEU: Verschlußkegel VKA 10 ENU: locking cone				ST. VERZ.					
				Ölkühler -Temperaturregler-Doppelfilter/4001367366									
91		1	715720	DEU: Red.-Stück Sechskant Nr.33 3" - 1 1/2" ENU: hexagon reducer				ST.		2990			0,70
91.1		1	711861	DEU: Rohrdoppelnippel Nr.23 2 Zoll x 200 ENU: pipe double nipple				1.0345		2982	4	3.1	0,98
92		4	715321	DEU: V-Flansch Typ11 / B1 DN40 x 2,6 / PN40 ENU: Welding neck flange				1.0460	10222-2	1092-1	9	3.1	8,60
93.1	F	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 nahtlos ENU: pipe		170		1.0345	10216-2	10220	4		0,50
93.2	F	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 nahtlos ENU: pipe		30		1.0345	10216-2	10220	4		0,09
93.3	F	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 nahtlos ENU: pipe		510		1.0345	10216-2	10220	4		1,49
93.4	F	1	701350	DEU: Rohr (Länge anpassen) d = 48,3 x 2,6 nahtlos ENU: pipe		280		1.0345	10216-2	10220	4		0,82
94	F	6	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	1,56
95		1	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,14

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Ölversorgungsanlage Gebläse
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Revision: revision: REV_G
Zeichnungsnummer: drawingnumber: 4000849671 Vers.07
Gewicht (kg): weight (kg): 616,09

Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
95.1		1	714542	DEU: Einschraubverschraubung SS-12M0-1-8RS 12 mm Rohrverschrb. - 1/2 Zoll ISO-Außengew. zyl. ENU: Tube Fitting, Male Connector				SS 316					0,10
96	D	3	713201	DEU: Flachdichtung Innenbördel DN40 PN40 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,30
97		1	L715753	DEU: Temperaturregler M40TD8A110-CC DN40 ENU: temperature controller				GG40.3					0,10
98	G	8	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		0,92
98.1	G	4	707663	DEU: Sechskantschraube M 16 x 60 ENU: screw				5.6 GAL. ZN		931	7		0,49
99	G	12	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,40
100	G	24	707659	DEU: Scheibe A17 ENU: washer				GAL. ZN		125			0,27
				Doppelfilter - Ölvorlauf / 4001367348									
101		4	704807	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.4541	10217-7	2605-1/10253-4 Typ A	2	3.1	1,04
102	E	1	706143	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		275		1.4541	10216-5	DIN EN ISO 1127	2	3.1	0,81
104		5	710711	DEU: Muffe G 1/2 Zoll ENU: socket				1.4571		2986	2	3.1	0,70
104.1		3	714542	DEU: Einschraubverschraubung SS-12M0-1-8RS 12 mm Rohrverschrb. - 1/2 Zoll ISO-Außengew. zyl. ENU: Tube Fitting, Male Connector				SS 316					0,30
106	E	1	706143	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		1.350		1.4541	10216-5	DIN EN ISO 1127	2	3.1	3,96

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Revision: revision REV_G

Zeichnungsnummer: drawingnumber 4000849671 Vers.07

Gewicht (kg): weight (kg) 616,09

Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
109	E	1	706143	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		215		1.4541	10216-5	DIN EN ISO 1127	2	3.1	0,63
110		1	705913	DEU: Red.-Stück K 60,3 x 2,9/ 48,3 x 2,6 ENU: pipe reducer				1.4541	10216-5	2616-1/10253-4 Typ A	2	3.1	0,28
111		1	704809	DEU: Rohrbogen 90°-3- 60,3 x 2,9 ENU: elbow				1.4541	10217-7	2605-1/10253-4 Typ A	2	3.1	0,49
112		1	714881	DEU: V-Flansch Typ11 / B1 DN50 x 2,9 / PN16 ENU: v-flange Typ 11 / B1				1.4541	10222-5	1092-1	2	3.1	2,82
113		1	721280	DEU: Schutzrohr Typ TW 45-F 5 G1/2 Zoll U1=63 ENU: screwing in protection tube				1.4571					1,00
				Kühlwasseranschluss Zulauf/4001367393									
114		1	711837	DEU: Red.-Stückm. Sechskant Nr.33 2 x 1 1/2 Zoll ENU: hexagon reducer				ST.		2990			0,41
115		1	721653	DEU: Rohrdoppelnippel Nr. 23 1 1/2 Zoll x 200 mit Gewinde DIN 259 ENU: pipe double nipple				ST.					0,35
116		1	L715976	DEU: Lateralkompensator DN40 PN16 ENU: lateral compensator				1.4571					1,50
118	G	1	715321	DEU: V-Flansch Typ11 / B1 DN40 x 2,6 / PN40 ENU: Welding neck flange				1.0460	10222-2	1092-1	9		2,15
119		1	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,14
120		1	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			

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Ölversorgungsanlage Gebläse
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Artikel-Nr.: 4000849671
part list

Revision: REV_G
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Zeichnungsnummer: 4000849671 Vers.07
drawingnumber

Gewicht (kg): 616,09
weight (kg)

Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
121		1	711870	DEU: Absperrventil 1/2 Zoll ENU: shut-off valve				RG5					
122		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
124	G	8	707663	DEU: Sechskantschraube M 16 x 60 ENU: screw				5.6 GAL. ZN		931	7		
126		8	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,27
127	G	16	702913	DEU: Scheibe A17 ENU: washer				A2		125			0,18
128	G	2	713201	DEU: Flachdichtung Innenbördel DN40 PN40 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,20
				optional ANSI 1 1/2" 150 lbs Anschluß									
129		2	705317	DEU: V-Flansch 1 1/2 Zoll 150 lbs Std s = 3,68 ENU: welding neck flange				SA 105/C21		ASME B16.5-2017 RF	9		3,60
129.1	G	1	715321	DEU: V-Flansch Typ11 / B1 DN40 x 2,6 / PN40 ENU: Welding neck flange				1.0460	10222-2	1092-1	9		2,15
130		1	713206	DEU: Flachdichtung Innenbördel 1 1/2 Zoll 150 lbs Form RF s=2 ENU: gasket				C 4400/1.4571		ASME B16.21			0,10
131		4	712561	DEU: Sechskantschraube M 14 x 60 ENU: screw				5.6 GAL. ZN		933	7		0,35
132		4	712562	DEU: Sechskantmutter M 14 ENU: screw nut				5-2 GAL. ZN		934	7		0,10
133		8	722915	DEU: Scheibe A14 15x28x2,5 ENU: washer				A4		ISO 7089			0,02
				Kühlwasserrücklauf IDW4001367472									

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Artikel-Nr.: part list	4000849671	Revision: revision	REV_G	Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000849671 Vers.07	Gewicht (kg): weight (kg)	616,09	Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
134		1	711837	DEU: Red.-Stückm. Sechskant Nr.33 2 x 1 1/2 Zoll ENU: hexagon reducer				ST.		2990			0,41
135		1	711997	DEU: Rohrdoppelnippel Nr.23 1 1/2 Zoll x 200 ENU: pipe double nipple				ST.		2982	4		0,35
136		2	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,52
137	G	4	715321	DEU: V-Flansch Typ11 / B1 DN40 x 2,6 / PN40 ENU: Welding neck flange				1.0460	10222-2	1092-1	9	3.1	8,60
138	E	1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		90		1.0305	10216-2	10220	4	3.1	0,26
138.1		1	701350	DEU: Rohr d = 48,3 x 2,6 nahtlos ENU: pipe		50		1.0345	10216-2	10220	4	3.1	0,15
139		3	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,42
140		1	711864	DEU: Winkel 90°- 1/2 Zoll - I/A ENU: angle									
141		1	711870	DEU: Absperrventil 1/2 Zoll ENU: shut-off valve				RG5					
142		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
143		2	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			
144	G	4	713201	DEU: Flachdichtung Innenbördel DN40 PN40 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,40

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Ölversorgungsanlage Gebläse
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Artikel-Nr.: 4000849671
part list

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weight (kg)

Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
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Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
145		1	L711680	DEU: Sicherheitsventil MU-ECK G 1/2 Zoll 06370.0400.0000 ENU: safety relief valve				ST.					3,00
146		1	732080	DEU: Schwebekörper-Durchflußmesser Typ H250/RR/M40/ESK-Ex 1,0-10 m3/h				VA					5,00
147		1	L715976	DEU: Lateralkompensator DN40 PN16 ENU: lateral compensator				1.4571					1,50
148		1	721279	DEU: Bimetall-Thermometer -40... +60°C Typ R5502/4 / G 1/2 Zoll unten ENU: bimetal thermometer				VA					0,20
149		1	721280	DEU: Schutzrohr Typ TW 45-F 5 G1/2 Zoll U1=63 ENU: screwing in protection tube				1.4571					1,00
150	G	8	707663	DEU: Sechskantschraube M 16 x 60 ENU: screw				5.6 GAL. ZN		931	7		0,98
151	G	32	702913	DEU: Scheibe A17 ENU: washer				A2		125			0,36
152	G	8	707665	DEU: Sechskantschraube M 16 x 70 ENU: screw				5.6 GAL. ZN		931	7		1,11
153		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
				optional ANSI 1 1/2" 150 lbs Anschluß									
155		1	715321	DEU: V-Flansch Typ11 / B1 DN40 x 2,6 / PN40 ENU: Welding neck flange				1.0460	10222-2	1092-1	9	3.1	2,15
156		2	705317	DEU: V-Flansch 1 1/2 Zoll 150 lbs ENU: welding neck flange				SA 105/C21		ASME B16.5-2009 RF	9	3.1	3,60

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Ölversorgungsanlage Gebläse
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revision

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drawingnumber

Gewicht (kg): 616,09
weight (kg)

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Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
157	G	1	713206	DEU: Flachdichtung Innenbördel 1 1/2 Zoll 150 lbs Form RF s=2 ENU: gasket				C 4400/1.4571		ASME B16.21			
158		4	712561	DEU: Sechskantschraube M 14 x 60 ENU: screw				5.6 GAL. ZN		933	7		0,35
159		4	712562	DEU: Sechskantmutter M 14 ENU: screw nut				5-2 GAL. ZN		934	7		0,10
160		8	722915	DEU: Scheibe A14 15x28x2,5 ENU: washer				A4		ISO 7089			0,02
				Zubehör Gesamtbaugruppe									
162	G	2	707768	DEU: Flachstahl 40 x 6 ENU: flat profile		80	40	1.0037		1017			0,30
163	G	1	707768	DEU: Flachstahl 40 x 6 ENU: flat profile		250	40	1.0037		1017			0,47
166		6	711645	DEU: Schelle HRL 1 A 12 ENU: clip				PP					
171.1	F	1	707187	DEU: Rohr (PIT) d = 12,0 x 1,5 nahtlos ENU: pipe		1.100		1.4541	10216-5	EN 10305-1	2		0,43
171.2	F	1	707187	DEU: Rohr (PI) d = 12,0 x 1,5 nahtlos ENU: pipe		1.050		1.4541	10216-5	EN 10305-1	2		0,41
171.3	F	1	707187	DEU: Rohr (PI) d = 12,0 x 1,5 nahtlos ENU: pipe		1.350		1.4541	10216-5	EN 10305-1	2		0,53
171.4	F	1	707187	DEU: Rohr (PDIT-) d = 12,0 x 1,5 nahtlos ENU: pipe		1.550		1.4541	10216-5	EN 10305-1	2		0,60
171.5	F	1	707187	DEU: Rohr (PDIT+) d = 12,0 x 1,5 nahtlos ENU: pipe		1.300		1.4541	10216-5	EN 10305-1	2		0,51

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Teileliste
part list

Ölversorgungsanlage Gebläse
mit Gefälle

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Artikel-Nr.: part list	4000849671	Revision: revision	REV_G	Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Zeichnungsnummer: drawingnumber	4000849671 Vers.07	Gewicht (kg): weight (kg)	616,09	Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
				Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos.	Index	Stück	Artikel-Nr.	Benennung und Abmessung	Zeichnungs-Nr.	Länge	Breite	Werkstoff	DIN EN	Standard	AD-W	WAZ	Gewicht (kg)
pos.	index	piece	article-no.	designation and dimensions	drawing-no.	length	width	material	DIN EN	standard	AD-W	WAZ	Weight (kg)
171.6	F	1	707187	DEU: Rohr (PIT) d = 12,0 x 1,5 nahtlos ENU: pipe		1.100		1.4541	10216-5	EN 10305-1	2		0,43
				.									
				Abstützung Ölvorlauf									
173	G	2	710419	DEU: Rohr d = 26,9 x 3,2 ENU: pipe		320		1.0305	10216-2	10220	4		1,20
173.1	G	2	714158	DEU: Rundstahlbügelschelle HRRBS 5L 48,3 PP VA ENU: round steel clip						3570			0,20
173.2	G	1	721108	DEU: Halter 40 x 95 Pos201	4000611121VERS02/T003927			1.0038					0,18
				.									
174	G	1	4SG-5258	DEU: Filter für Ölanlage komplett ENU: filter for oil-unit compl.	4SG-5258			VA					13,00
175	G	3	714884	DEU: V-Flansch Typ11 / B1 DN80 x 3,2 / PN16 ENU: v-flange Typ 11 / B1				1.4541	10222-5	1092-1	2		14,25
				.									
				Entleerung Öltank									
176	G	1	711873	DEU: Absperrventil 2 Zoll ENU: shut-off valve				RG5					
177	G	1	714157	DEU: Doppelnippel Nr.34 ENU: double nipple				ST.		2990			0,50
				.									
				Schraubenverbind./ Befestigung/ Dichtungen									
178	G	8	720731	DEU: Zylinderschraube Innensechskant M 12 x 40 ENU: hexagon socket head cap screw				8.8 GAL. ZN		7984			0,36

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Teileliste
part list

Ölversorgungsanlage Gebläse
mit Gefälle

Artikel-Nr.: part list: 4000849671

Revision: revision: REV_G

Zeichnungsnummer: drawingnumber: 4000849671 Vers.07

Gewicht (kg): weight (kg): 616,09

Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
179	G	16	707658	DEU: Scheibe A13 ENU: washer				GAL. ZN		125			0,10
180	G	8	707564	DEU: Sechskantmutter M 12 ENU: screw nut				5-2 GAL. ZN		934			0,14
181	G	8	706851	DEU: Sechskantschraube M 16 x 50 ENU: screw				8.8 GAL. ZN		931			0,86
182	G	24	707659	DEU: Scheibe A17 ENU: washer				GAL. ZN		125			0,27
183	G	2	722160	DEU: Fächerscheibe A17 Form A ENU: serrated lock washer				5.6 GAL. ZN		6798			0,02
184	G	8	708150	DEU: Sechskantschraube M 16 x 40 ENU: screw				5.6 GAL. ZN		933	7		0,72
185	G	8	707663	DEU: Sechskantschraube M 16 x 60 ENU: screw				5.6 GAL. ZN		931	7		0,98
186	G	8	706746	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		933	7		0,98
187	G	24	702913	DEU: Scheibe A17 ENU: washer				A2		125			0,27
188	G	16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
189	G	4	703485	DEU: Sechskantschraube M 10 x 55 ENU: screw				8.8 GAL. ZN		933			0,15
190	G	8	707657	DEU: Scheibe A10,5 10,5x20x2 ENU: washer				GAL. ZN		125			0,03
191	G	4	709765	DEU: Sechskantmutter M 10 ENU: screw nut				5-2 GAL. ZN		934			0,05
192	G	4	710037	DEU: Sechskantschraube M 10 x 25 ENU: screw				5.6 GAL. ZN		933	7		0,09
192.1	G	4	723334	DEU: Scheibe 10,5 x 30 x 2,5 ENU: washer				GAL. ZN					0,04

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Ölversorgungsanlage Gebläse
mit Gefälle

Artikel-Nr.: 4000849671
part list

Revision: REV_G
revision

Zeichnungsnummer: 4000849671 Vers.07
drawingnumber

Gewicht (kg): 616,09
weight (kg)

Erstellt developed	Datum date	22.07.2022	Name name	Pätzold
Bearbeitet processed	Datum date	29.07.2022	Name name	Pätzold
Geprüft + genehmigt checked + approved	Datum date	29.07.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
193	G	4	709788	DEU: Sechskantschraube M 12 x 35 ENU: screw				5.6 GAL. ZN		933	7		0,17
194	G	4	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		0,46
				...									
				*Dichtungen									
195	G	2	713201	DEU: Flachdichtung Innenbördel DN40 PN40 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,20
196	G	4	714942	DEU: Flachdichtung Innenbördel DN50 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,40
197	G	3	714943	DEU: Flachdichtung Innenbördel DN80 PN16 Form IBC s=2 ENU: gasket inboard-flange				C 4400/1.4571	1514-1				0,30

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Teileliste
part list

Ölversorgungsanlage Getriebe

Artikel-Nr.: part list — T003162_1

Revision: revision — REV_B

Zeichnungsnummer: drawingnumber — 4000848552Vers02

Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
1		1	L711676	DEU: Rohrbündelwärmetauscher ENU: tubular heat exchanger									51,00
2		1	L712718	DEU: Druckfilter ENU: pressure filter									23,00
3		1	L716190	DEU: Zahnradpumpe SF 3/32 RD-LFM m. E-Motor Loher Chemstar + Dach 400/690V, 3KW, 50Hz, 1500U/min IP55 ENU: gear type pump									20,00
4		1	L716190	DEU: Zahnradpumpe SF 3/32 RD-LFM m. E-Motor Loher Chemstar + Dach 400/690V, 3KW, 50Hz, 1500U/min IP55 ENU: gear type pump									20,00
6		1	721321	DEU: Klemmenkasten JB1 Fabrikat : Stahl Beistellung ELOC				PVC					1,00
7		1	721279	DEU: Bimetall-Thermometer 100D G 1/2" U Fa.WIKA R5502/4, -40... +60°C ENU: bimetal thermometer				VA					0,20
7/1		3	721280	DEU: Einschraubschutzrohr TW45-F Form 5 Fa.WIKA G 1/2"; EBL 63mm (U1) ENU: screwing in protection tube				1.4571					
8		1	721282	DEU: Rohrfedermanometer 100D R1/2"U; 0...6 Bar Fa.WIKA Typ 233.50.100, Anschluß R1/2" AG unten ENU: tube pressure gauge				VA					0,10

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Ölversorgungsanlage Getriebe

Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
				Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
9		1	721282	DEU: Rohrfedermanometer 100D R1/2"U; 0...6 Bar Fa.WIKA Typ 233.50.100, Anschluß R1/2" AG unten ENU: tube pressure gauge				VA					0,10
10		1	721283	DEU: Fernthrmometer mit Halter F73.100; Fa.WIKA -40...+120°C, Typ F73.100 ENU: telethermometer with holder				VA					0,20
11		1	721283	DEU: Fernthrmometer mit Halter F73.100; Fa.WIKA -40...+120°C, Typ F73.100 ENU: telethermometer with holder				VA					0,20
12		1	721285	DEU: Rohrfedermanometer 100D R1/2"U, 0..2,5 bar Fa.WIKA Typ 233.50.100 ENU: tube pressure gauge				VA					0,20
13		1	721294	DEU: Differenzdruckmanometer Exi mit Ferngeber 4 - 20mA Fa. E+H Typ Deltabar S PMD75, PDIT2.13.63 PMD75-1BJ7HB1DHBA ENU: differential manometer				VA					1,00
14		1	L712200	DEU: Absperrventil DN 50 PN 16 ENU: shut-off valve				GG 25					13,20
15		1	L712200	DEU: Absperrventil DN 50 PN 16 ENU: shut-off valve				GG 25					13,20
16		1	L711683	DEU: Absperrventil econosto Fig.241 DN 40 PN 16 ENU: shut-off valve				GRAUGUß					10,20
17		1	L711683	DEU: Absperrventil econosto Fig.241 DN 40 PN 16 ENU: shut-off valve				GRAUGUß					10,20

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Ölversorgungsanlage Getriebe

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Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
				Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos.	Index	Stück	Artikel-Nr.	Benennung und Abmessung	Zeichnungs-Nr.	Länge	Breite	Werkstoff	DIN EN	Standard	AD-W	WAZ	Gewicht (kg)
pos.	index	piece	article-no.	designation and dimensions	drawing-no.	length	width	material	DIN EN	standard	AD-W	WAZ	Weight (kg)
18		1	L711681	DEU: Rückschlagventil RK 86 ENU: non return valve									1,00
19		1	L711681	DEU: Rückschlagventil RK 86 ENU: non return valve									1,00
20		1	L711680	DEU: Sicherheitsventil MU-ECK ENU: safety relief valve									1,80
22		2	L715976	DEU: Lateralkompensator DN40 PN16 ENU: lateral compensator				1.4571					3,00
23		1	721295	DEU: Drucktransmitter EEx-i G1/2", 0..10Bar, Fa. E+H Typ Cerebar S PMP71, PIT2.13.64 PMP71-1BA1PB1GAABU ENU: pressure transmitter				VA					0,20
24		1	721296	DEU: Wiederstandsthermometer PT100 EEx-i Fa.E+H Type Wiederstandsthermometer TR 10, TE2.13.54 TR10-GAD9BHRYC2100 ENU: resistance thermometer				VA					0,20
25		1	732080	DEU: Schwebekörper-Durchflußmesser Typ H250/RR/M40/ESK-Ex 1,0-10 m3/h				VA					5,00
26		1	L715740	DEU: Temperaturregler M40TD110-A38 DN40 reduziert ENU: temperature controller				GG40.3					
27		1	721297	DEU: Temperaturtransmitter HART EEx-ia, 4-20mA, Fa E+H Typ iTEMP TMT142, Feldtransmitter HART, TIT2.1354 TMT142-B22131BBA1 ENU: temperature transmitter				VA					0,10

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Teileliste
part list

Ölversorgungsanlage Getriebe

Artikel-Nr.: part list — T003162_1
Revision: revision — REV_B
Zeichnungsnummer: drawingnumber — 4000848552Vers02
Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name: Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name: Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name: Ahlers

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
28		3	721319	DEU: Manometerabsperrventil Fa.Swagelok G 1/2", 1x D12 ENU: manometer gauge valve				1.4571		16270B			0,30
29		3	721320	DEU: Messgerätehalter Fa. WIKA Form H Auslad. 100mm ENU: measuring instrument holder				ALU		16281			0,15
29/2		4	714234	DEU: Winkeladapter CAL-12M Hy-Lok ENU: angle adapter				1.4401					0,04
				Ansaugltg - Pumpe									
30		5	700154	DEU: V-Flansch C 50 x 60,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	12,65
31		1	701037	DEU: T-Stück 60,3 x 2,9 ENU: T-piece				1.0305	10216-2	2615-1/10253-2 Typ A	4	3.1	0,90
32		1	705027	DEU: Rohr d = 60,3 x 2,9 ENU: pipe		400		1.0305	10216-2	10220	4	3.1	1,64
33		4	700948	DEU: Rohrbogen 90°-3- 60,3 x 2,9 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	1,96
34		2	701146	DEU: Red.-Stück K 60,3 x 2,9/ 48,3 x 2,6 ENU: pipe reducer				1.0305	10216-2	2616-1/10253-2 Typ A	4	3.1	0,56
35		4	707863	DEU: Dichtung 2 x 61 / 107 DN50 ENU: gasket				C 4400	1514-1	2690			0,20
36		14	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		1,61
37		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
38		2	706746	DEU: Sechskantschraube M 16 x 65 ENU: screw				5.6 GAL. ZN		933	7		0,25
				Pumpe - Ölkühler-Temperaturregler									

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Teileliste
part list

Ölversorgungsanlage Getriebe

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Artikel-Nr.: part list — T003162_1

Revision: revision — REV_B

Zeichnungsnummer: drawingnumber — 4000848552Vers02

Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name: Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name: Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name: Ahlers

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
40		6	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	1,56
41		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		550		1.0305	10216-2	10220	4	3.1	1,61
42		4	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9		7,44
43		4	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	1,04
44		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		800		1.0305	10216-2	10220	4	3.1	2,34
45		2	701046	DEU: T-Stück 48,3 x 2,6 ENU: T-piece				1.0305	10216-2	2615-1/10253-2 Typ A	4	3.1	1,18
46		3	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,42
46		3	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	5,58
47		1	715720	DEU: Red.-Stück Sechskant Nr.33 3" - 1 1/2" ENU: hexagon reducer						2990			
48		8	707427	DEU: Dichtung 2 x 49 / 92 ENU: gasket				C 4400		2690			
49		12	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		1,38
50		8	705301	DEU: Sechskantschraube M 16 x 90 ENU: screw				5.6 GAL. ZN		933	7		1,26
51		20	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,67
52		12	708875	DEU: Sechskantschraube M 16 x 50 ENU: screw				5.6 GAL. ZN		933	7		1,24

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Teileliste
part list

Ölversorgungsanlage Getriebe

Artikel-Nr.: T003162_1
part list

Revision: REV_B
revision

Zeichnungsnummer: 4000848552Vers02
drawingnumber

Gewicht (kg): 299,85
weight (kg)

Erstellt / developed	Datum / date	19.02.2021	Name / name: Tuchel
Bearbeitet / processed	Datum / date	19.02.2021	Name / name: Tuchel
Geprüft + genehmigt / checked + approved	Datum / date	19.02.2021	Name / name: Ahlers

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
				Entleerung Ölkühler									
55		2	712754	DEU: Winkeleinschraubverschraubung WE 10-PLM ENU: elbow screw fitting				ST. VERZ.					
56		2	711858	DEU: Durchgangsventil DV 10-L ENU: globe valve				ST. VERZ.					
57		2	711628	DEU: Verschlußkegel VKA 10 ENU: locking cone				ST. VERZ.					
		1	707186	DEU: Rohr d = 10,0 x 1,5 ENU: pipe		650		1.4541	10216-5	DIN EN ISO 1127	2		0,20
				Ölkühler -Temperaturregler- Filter									
58		1	715720	DEU: Red.-Stück Sechskant Nr.33 3" - 1 1/2" ENU: hexagon reducer				ST.		2990			0,70
59		4	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	7,44
60		3	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,78
61		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		200		1.0305	10216-2	10220	4	3.1	0,59
62		1	701155	DEU: Red.-Stück K 48,3 x 2,6/ 42,4 x 2,6 ENU: pipe reducer				1.0305	10216-2	2616-1/10253-2 Typ A	4	3.1	0,17
63		1	705039	DEU: Rohr d = 42,4 x 2,6 ENU: pipe		300		1.0305	10216-2	10220	4	3.1	0,77
64		3	700959	DEU: Rohrbogen 90°-3- 42,4 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,57
65		1	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,14

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Teileliste
part list

Ölversorgungsanlage Getriebe

Artikel-Nr.: part list — T003162_1

Revision: revision — REV_B

Zeichnungsnummer: drawingnumber — 4000848552Vers02

Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
66		3	707427	DEU: Dichtung 2 x 49 / 92 DN40 PN16-40 ENU: gasket				C 4400		2690			
67		4	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		0,46
68		4	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,13
69		1	721653	DEU: Rohrdoppelnippel Nr. 23 1 1/2 Zoll x 200 mit Gewinde DIN 259 ENU: pipe double nipple				ST.					0,35
				Filter - Ölvorlauf									
70		3	704805	DEU: Rohrbogen 90°-3- 42,4 x 2,6 ENU: elbow				1.4541	10216-5	2605-1/10253-4 Typ A	2	3.1	0,57
71		1	712571	DEU: Rohr d = 42,4 x 2,6 ENU: pipe		500		1.4541	10216-5	DIN EN ISO 1127	2	3.1	1,72
72		1	704613	DEU: V-Flansch C 32 x 42,4 ENU: welding neck flange				1.4541	10222-5	2633	2	3.1	1,69
73		5	710711	DEU: Muffe G 1/2 Zoll ENU: socket				1.4571		2986	2	3.1	0,70
				Kühlwasseranschluss Zulauf								3.1	
75		1	711837	DEU: Red.-Stückm. Sechskant Nr.33 2 x 1 1/2 Zoll ENU: hexagon reducer				ST.		2990			0,41
76		1	721653	DEU: Rohrdoppelnippel Nr. 23 1 1/2 Zoll x 200 mit Gewinde DIN 259 ENU: pipe double nipple				ST.					0,35
77		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		160		1.0305	10216-2	10220	4	3.1	0,47
78		1	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	1,86

Emmerthaler Apparatebau GmbH
Langes Feld 4
31860 Emmerthal

Teileliste
part list

Ölversorgungsanlage Getriebe

Artikel-Nr.: part list — T003162_1
Revision: revision — REV_B
Zeichnungsnummer: drawingnumber — 4000848552Vers02
Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
79		1	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,14
80		1	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			
81		1	711870	DEU: Absperrventil 1/2 Zoll ENU: shut-off valve				RG5					
82		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
83		8	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		0,92
84		20	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,67
				Rücklauf									
85		1	711837	DEU: Red.-Stückm. Sechskant Nr.33 2 x 1 1/2 Zoll ENU: hexagon reducer				ST.		2990			0,41
86		1	721653	DEU: Rohrdoppelnippel Nr. 23 1 1/2 Zoll x 200 mit Gewinde DIN 259 ENU: pipe double nipple				ST.					0,35
87		2	700954	DEU: Rohrbogen 90°-3- 48,3 x 2,6 ENU: elbow				1.0305	10216-2	2605-1/10253-2 Typ A	4	3.1	0,52
88		3	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	5,58
89		1	701350	DEU: Rohr d = 48,3 x 2,6 ENU: pipe		160		1.0305	10216-2	10220	4	3.1	0,47
90		3	705769	DEU: Muffe G 1/2 Zoll ENU: socket				1.0305	17175	2986	4	3.1	0,42
91		1	711864	DEU: Winkel 90°- 1/2 Zoll - I/A ENU: angle									

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Teileliste
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Ölversorgungsanlage Getriebe

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Artikel-Nr.: T003162_1
part list

Revision: REV_B
revision

Zeichnungsnummer: 4000848552Vers02
drawingnumber

Gewicht (kg): 299,85
weight (kg)

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
92		1	711870	DEU: Absperrventil 1/2 Zoll ENU: shut-off valve				RG5					
93		1	711841	DEU: Schwarzer Stopfen Nr.20 1/2 Zoll ENU: plug						2991			0,05
94		2	714141	DEU: Doppelnippel Nr.34 1/2 Zoll ENU: double nipple				ST.		2990			
95		5	707427	DEU: Dichtung 2 x 49 / 92 DN40 PN16-40 ENU: gasket				C 4400		2690			
96		16	707662	DEU: Sechskantschraube M 16 x 55 ENU: screw				5.6 GAL. ZN		931	7		1,84
97		16	707565	DEU: Sechskantmutter M 16 ENU: screw nut				5-2 GAL. ZN		934	7		0,53
98		24	702913	DEU: Scheibe A 17,0 ENU: washer				A2		125			0,27
				optional ANSI 1 1/2" 150 lbs Anschluß									
135		2	700160	DEU: V-Flansch C 40 x 48,3 ENU: welding neck flange				1.0460	10222-2	2633	9	3.1	3,72
136		4	705317	DEU: V-Flansch 1 1/2 Zoll 150 lbs ENU: welding neck flange				SA 105/C21		ASME B16.5-2009 RF	9	3.1	7,20
137		2	711703	DEU: Flachdichtung 1 1/2 Zoll 150 lbs (83 x 48) ENU: gasket				C 4400		ASME B16.21			
138		8	712561	DEU: Sechskantschraube M 14 x 60 ENU: screw				5.6 GAL. ZN		933	7		0,70
139		8	712562	DEU: Sechskantmutter M 14 ENU: screw nut				5-2 GAL. ZN		934	7		0,20
				Schilder Insrumente									

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Teileliste
part list

Ölversorgungsanlage Getriebe

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Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
				Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
		1	721713	DEU: Schilder Instrumente Getriebe ca. 75 x 18 mm ENU: signs instruments gearbox	4000590723VERS01/T006327			PVC					
		1	721751	DEU: Schild nach Vorlage (Fabriknummer) ca. 75 x 18 mm ENU: Label from pattern				PVC					
				***									
		2	706300	DEU: Schelle HRL 1 A 8 ENU: clip				PP					
		2	707373	DEU: Schelle HRL 1 A 10 ENU: clip				PP					
		6	711645	DEU: Schelle HRL 1 A 12 ENU: clip				PP					
		4	714545	DEU: Winkelverschraubung SS-12MO-9 ENU: angular pipe fitting				AISI 316					
		14	712037	DEU: Dichtkantring G 1/2 Zoll ENU: sealing edge ring				1.4571					
		6	714542	DEU: Einschraubverschraubung SS-12MO-1-8RS G 1/2 ENU: Tube Fitting, Male Connector				AISI 316					
		1	707187	DEU: Rohr d = 12,0 x 1,5 ENU: pipe		6.500		1.4541	10216-5	EN 10305-1	2		2,54
		1	717919	DEU: Rundstahlbügelschelle HRRBS 4 L 42,4 PP VA ENU: round steel clip				VA					
		4	707654	DEU: Verschlussschraube G 1/2 Zoll ENU: locking screw				GAL. ZN		910			0,27
		1	707863	DEU: Dichtung 2 x 61 / 107 DN 50 PN6-40 ENU: gasket				C 4400	1514-1	2690			0,05

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Teileliste
part list

Ölversorgungsanlage Getriebe

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Artikel-Nr.: part list — T003162_1

Revision: revision — REV_B

Zeichnungsnummer: drawingnumber — 4000848552Vers02

Gewicht (kg): weight (kg) — 299,85

Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
		1	707768	DEU: Flachstahl 40 x 6 ENU: flat profile		250	40	1.0037		1017			0,47
		20	707658	DEU: Scheibe A 13,0 ENU: washer				GAL. ZN		125			0,13
		16	716011	DEU: Scheibe B 10,5 ENU: washer				ST. GAL. ZN		ISO 7090			0,10
		1	713200	DEU: Flachdichtung DN 32 PN 40 s = 2,0 ENU: gasket				C 4400/1.4571		1514-1			
		4	708830	DEU: Sechskantschraube M 12 x 25 ENU: screw				5.6 GAL. ZN		933	7		0,14
		8	709789	DEU: Sechskantschraube M 12 x 30 ENU: screw				5.6 GAL. ZN		933	7		0,30
		4	709563	DEU: Sechskantschraube M 10 x 30 ENU: screw				5.6 GAL. ZN		933	7		0,10
		4	711047	DEU: Sechskantschraube M 10 x 45 ENU: screw				5.6 GAL. ZN		933	7		0,13
		4	703502	DEU: Sechskantschraube M 12 x 40 ENU: screw				5.6 GAL. ZN		933	7		0,18
		4	709564	DEU: Sechskantschraube M 10 x 35 ENU: screw				5.6 GAL. ZN		933	7		0,11
		4	707564	DEU: Sechskantmutter M 12 ENU: screw nut				5-2 GAL. ZN		934			0,07
		4	709765	DEU: Sechskantmutter M 10 ENU: screw nut				5-2 GAL. ZN		934			0,05
		1	T002881	DEU: Grundrahmen Ölversorgungsanlage Getriebe ENU: base frame for oil supply system	4000848036/T002881 "a"			ST.					
		1	T004585	DEU: Instrumententafel Getriebe Gebläse ENU: console for instruments / tools	4000846299/T004585			ST.					26,00

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Teileliste
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Ölversorgungsanlage Getriebe

Artikel-Nr.: part list	T003162_1	Revision: revision	REV_B	Erstellt developed	Datum date	19.02.2021	Name name	Tuchel
Zeichnungsnummer: drawingnumber	4000848552Vers02	Gewicht (kg): weight (kg)	299,85	Bearbeitet processed	Datum date	19.02.2021	Name name	Tuchel
				Geprüft + genehmigt checked + approved	Datum date	19.02.2021	Name name	Ahlers

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
		1	710419	DEU: Rohr d = 26,9 x 3,2 ENU: pipe		400		1.0305	10216-2	10220	4		0,75
		1	706428	DEU: Blech s = 5,0 ENU: sheet plate		150	300	1.0425	10028-2	10029-A	1	3.1	1,77

F.3.3 Test documentation

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Prüfbericht für Ölversorgungsanlagen Gebläse** Inspection for oil equipments	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101639 FA2200505 Manufacturer´s job-no.:
Prüfobjekt: Ölversorgungsanlage Gebläse mit 2 Grad Gefälle im Ölbehälter Inspection object:	**Zeichnungs-Nr.:** 4000849671 Drawing-no.:
Bestell-Nr.: 4500499297 2000064848 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200505-1 Serial-no.:	**Datum der Prüfung:** 21.07.2022 Date of inspection:

Bei den o.g. Anlagen wurden vor der Auslieferung folgende Prüfungen durchgeführt:
At a.c. systems were following inspections implemented:

	Ja / Yes	Nein / No
1. Bei den Drehstrommotoren wurde das Typenschild überprüft: At the three-phase-motors were the rating plate verifies: 400 / Y690V, 50Hz	☒	☐
2. Probelauf mit Mengen- und Druckmessung wurde durchgeführt. Probelaufprotokoll siehe Beiblatt. The run with rate of flow and pressure messure.See test load record.	☒	☐
3. Die werkseitig eingestellten Schaltpunkte des Niveawächters und die Schutzart wurden nach den Aufgaben aus der beiliegenden Skizze überprüft. The switching points from level swich and the protection were check.	☒	☐
4. Die Ölversorgungsanlage wurde komplett entleert (Ölbehälter, Ölkühler, Doppelfilter, Rohrleitung) The oil equipment was completely deflated (container, oilcooler, doublefilter, pipe)	☒	☐
5. Die Rohrleitung wurde mittels Wasserdruckpumpe (15 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The pipe line for oil was verified by hydrostatic test (15 bar) There were no objections according to hydrostatic test.	☒	☐
6. Die komplette Ölversorgungsanlage wurde mittels Luftdruckprobe (0,4 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The complete aggregate was verified by nekal test (0,4 bar (Ü) There were no objections according to necal test.	☒	☐
7. Die Konservierung der Rohrleitung wurden gemäß der Auftragsspezifikation durchgeführt. The preservation of pipe was executed according to specification of commission.	☒	☐

Pos. 1 Pos. 3 Pos. 5 Pos. 7

Pos. 2 Pos. 4 Pos. 6

Probelaufprotokoll siehe Anhang

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen : -----
Comments :

Datum : 21.07.2022 Date : EA SK **Prüfer :** Stephan Kuhrmeyer Inspector :	**Datum :** 21.07.2022 Date : **Prüfaufsicht :** Michael Stewig Supervisor :	**Datum :** Date : **Abnahmegesellschaft :** Inspection authority :

Änderung 0 / 13. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

EMMERTHAL **Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Prüfbericht für Ölversorgungsanlagen Gebläse** Inspection for oil equipments	**Blatt** 1 Page **von** 1 of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101639 FA2200504 Manufacturer´s job-no.:
Prüfobjekt: Ölversorgungsanlage Gebläse mit 2 Grad Gefälle im Ölbehälter Inspection object:	**Zeichnungs-Nr.:** 4000849671 Drawing-no.:
Bestell-Nr.: 4500499297 2000064848 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200504-1 Serial-no.:	**Datum der Prüfung:** 21.07.2022 Date of inspection:

Bei den o.g. Anlagen wurden vor der Auslieferung folgende Prüfungen durchgeführt:
At a.c. systems were following inspections implemented:

	Ja Yes	Nein No
1. Bei den Drehstrommotoren wurde das Typenschild überprüft: At the three-phase-motors were the rating plate verifies: 400 / Y690V, 50Hz	☒	☐
2. Probelauf mit Mengen- und Druckmessung wurde durchgeführt. Probelaufprotokoll siehe Beiblatt. The run with rate of flow and pressure messure.See test load record.	☒	☐
3. Die werkseitig eingestellten Schaltpunkte des Niveawächters und die Schutzart wurden nach den Aufgaben aus der beiliegenden Skizze überprüft. The switching points from level swich and the protection were check.	☒	☐
4. Die Ölversorgungsanlage wurde komplett entleert (Ölbehälter, Ölkühler, Doppelfilter, Rohrleitung) The oil equipment was completely deflated (container, oilcooler, doublefilter, pipe)	☒	☐
5. Die Rohrleitung wurde mittels Wasserdruckpumpe (15 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The pipe line for oil was verified by hydrostatic test (15 bar) There were no objections according to hydrostatic test.	☒	☐
6. Die komplette Ölversorgungsanlage wurde mittels Luftdruckprobe (0,4 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The complete aggregate was verified by nekal test (0,4 bar (Ü) There were no objections according to necal test.	☒	☐
7. Die Konservierung der Rohrleitung wurden gemäß der Auftragsspezifikation durchgeführt. The preservation of pipe was executed according to specification of commission.	☒	☐

Pos. 1 Pos. 3 Pos. 5 Pos. 7

Pos. 2 Pos. 4 Pos. 6

Probelaufprotokoll siehe Anhang

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen : -----
Comments :

Datum : 21.07.2022 Date : EA SK	**Datum :** 21.07.2022 Date :	**Datum :** Date :
Prüfer : Stephan Kuhrmeyer Inspector :	**Prüfaufsicht :** Michael Stewig Supervisor :	**Abnahmegesellschaft :** Inspection authority :

Änderung 0 / 13. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Probelaufprotokoll** **Ölversorgungsanlage für Gebläse** Test load record oelequipment for blower	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101639 Manufacturer´s job-no.: FA2200505
Prüfobjekt: Ölversorgungsanlage Gebläse mit 2 Grad Gefälle im Ölbehälter Inspection object:	**Zeichnungs-Nr.:** 4000849671 Drawing-no.:
Bestell-Nr.: 4500499297 2000064848 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200505-1 Serial-no.:	**Datum der Prüfung:** 21.07.2022 Date of inspection:

Betrieb mit Motor 1
Operate with motor 1

Drehzahl: Rotary:	Soll / shall:	1465 U / min
	Ist / is:	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall:	5,0 bar (ü)
	Ist / is:	3,9 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall:	140 l / min
	Ist / is:	145 l / min

Betrieb mit Motor 2
Operate with motor 2

Drehzahl: Rotary:	Soll / shall:	1465 U / min
	Ist / is:	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall:	5,0 bar (ü)
	Ist / is:	4,0 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall:	140 l / min
	Ist / is:	140 l / min

Test-Medium: Medium:	Mobil SHC 626
Temperatur: Temperature:	ÖL: 40°C / Umgebungstemperatur : 23°C
Beide Überströmventile eingestellt auf: Both overflow-valve adjusted at:	6,5 bar (ü)

Im Betriebszustand müssen beide Überströmventile erneut justiert werden.
On operating state must both overflow-valve newly adjusted.

Dauer der Prüfung je Pumpe: 1,0 Std.
Runtime of testing per hour:

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen : ----
Comments :

Datum: 21.07.2022 Date: EA SK **Prüfer:** Stephan Kuhrmeyer Inspector:	**Datum:** 21.07.2022 Date: **Prüfaufsicht:** Michael Stewig Supervisor :	**Datum:** Date: **Abnahmegesellschaft:** Inspection authority :

Änderung 0 / 04. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

Emmerthaler Apparatebau GmbH Langes Feld 4 31857 Emmerthal	**Probelaufprotokoll** **Ölversorgungsanlage für Gebläse** Test load record oelequipment for blower	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101639 Manufacturer´s job-no.: FA2200504
Prüfobjekt: Ölversorgungsanlage Gebläse mit 2 Grad Gefälle im Ölbehälter Inspection object:	**Zeichnungs-Nr.:** 4000849671 Drawing-no.:
Bestell-Nr.: 4500499297 2000064848 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200504-1 Serial-no.:	**Datum der Prüfung:** 21.07.2022 Date of inspection:

Betrieb mit Motor 1
Operate with motor 1

Drehzahl: Rotary:	Soll / shall:	1465 U / min
	Ist / is:	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall:	5,0 bar (ü)
	Ist / is:	3,5 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall:	140 l / min
	Ist / is:	140 l / min

Betrieb mit Motor 2
Operate with motor 2

Drehzahl: Rotary:	Soll / shall:	1465 U / min
	Ist / is:	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall:	5,0 bar (ü)
	Ist / is:	3,6 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall:	140 l / min
	Ist / is:	140 l / min

Test-Medium: Medium:	Mobil SHC 626
Temperatur: Temperature:	ÖL: 30°C / Umgebungstemperatur : 28°C
Beide Überströmventile eingestellt auf: Both overflow-valve adjusted at:	6,5 bar (ü)

Im Betriebszustand müssen beide Überströmventile erneut justiert werden.
On operating state must both overflow-valve newly adjusted.

Dauer der Prüfung je Pumpe: 1,0 Std.
Runtime of testing per hour:

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

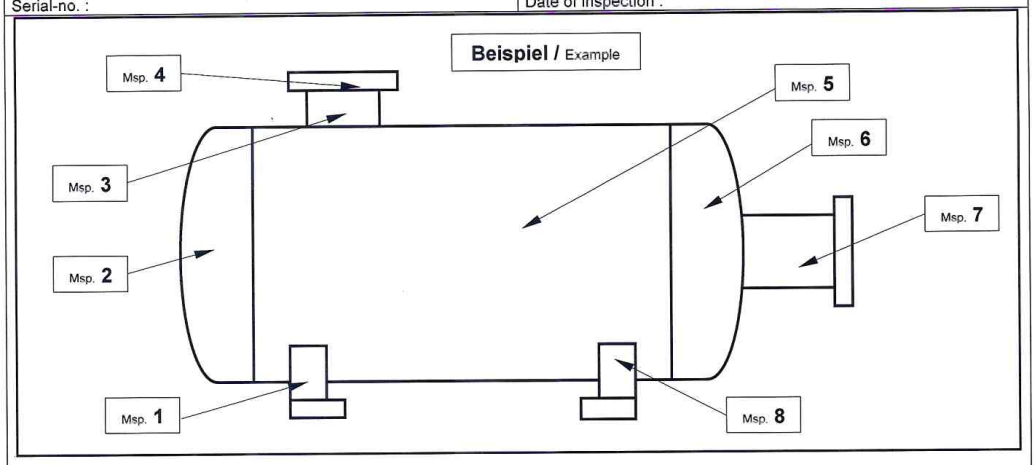
Bemerkungen : ----
Comments :

Datum: 21.07.2022 Date: EA SK **Prüfer:** Stephan Kuhrmeyer Inspector:	**Datum:** 21.07.2022 Date: **Prüfaufsicht:** Michael Stewig Supervisor :	**Datum:** Date: **Abnahmegesellschaft:** Inspection authority :

Änderung 0 / 04. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

Emmerthaler Apparatebau GmbH Langes Feld 4 31860 Emmerthal	**Prüfbericht** **Schichtstärkenmessung** Coating strength testing report	Abnahmeprüfzeugnis 3.1 Inspection certificate 3.1 DIN EN 10204

Kunde : Aerzener Maschinenfabrik GmbH Customer : 4500499297	**Hersteller Auftrags-Nr. :** EAV2101639 Manufacturer`s job no. : FA2200505
Prüfobjekt : Ölversorgungsanlage Gebläse Inspection object : 2000064848	**Zeichnungs-Nr. :** 4000849671 Drawing-no. :
Fabrik-Nr. : Serial-no. :	**Datum der Prüfung :** 01.08.2022 Date of inspection :



Beschichtung / Coating system

Anforderungen : Requirements :		**Messinstrument :** Measuring instrument :
Schicht 1 : VESTOZINK 2K-EP 734907 Coat 1 :	**Schicht 2 :** VESTOPOX 2K-EP 734908 Coat 2 :	**Schicht 3 :** VESTOPUR 2K-DT 734967 RAL 5001 Coat 3 :
Geforderte Stärke : 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :

	Schicht Coat 1	Schicht Coat 2	Schicht Coat 3		Schicht Coat 1	Schicht Coat 2	Schicht Coat 3
Messpunkt Msp. 1	86 µm	232 µm	480 µm	Messpunkt Msp. 11	117 µm	276 µm	392 µm
Messpunkt Msp. 2	94 µm	204 µm	446 µm	Messpunkt Msp. 12	128 µm	264 µm	382 µm
Messpunkt Msp. 3	87 µm	241 µm	383 µm	Messpunkt Msp. 13	104 µm	217 µm	332 µm
Messpunkt Msp. 4	104 µm	234 µm	368 µm	Messpunkt Msp. 14	98 µm	228 µm	346 µm
Messpunkt Msp. 5	98 µm	228 µm	407 µm	Messpunkt Msp. 15	101 µm	288 µm	407 µm
Messpunkt Msp. 6	86 µm	196 µm	434 µm	Messpunkt Msp. 16	88 µm	234 µm	388 µm
Messpunkt Msp. 7	102 µm	198 µm	442 µm	Messpunkt Msp. 17	83 µm	256 µm	344 µm
Messpunkt Msp. 8	94 µm	204 µm	346 µm	Messpunkt Msp. 18	114 µm	248 µm	358 µm
Messpunkt Msp. 9	88 µm	248 µm	382 µm	Messpunkt Msp. 19	123 µm	304 µm	407 µm
Messpunkt Msp. 10	104 µm	256 µm	344 µm	Messpunkt Msp. 20	103 µm	294 µm	392 µm

Besteht die Beschichtung aus nur einer Schicht, werden Typ und Schichtstärke unter **1** eingetragen.
If the coating consists of one layer only, type and thickness of layer are entered under **1**.

Die Zeichnung dient als Beispiel für die Anordnung der Messpunkte an sämtlichen Prüfobjekten, dabei ist die Anzahl und Position der Messpunkte so auszuwählen, dass die gesamte Oberfläche bewertungsfähig ist.
The drawing serves as example for the arrangement of the measuring points on all the test objects, and the number and position of the measuring points is to be selected so, that the entire surface can be evaluated.

Die Messpunkte sind für eine exakte Rückverfolgbarkeit, auf der Oberfläche gekennzeichnet : ☐
The measuring points are marked on the surface for an exact traceability.

Bemerkungen :
Comments :

Bewertung : Evaluation : **Erfüllt :** Conform : ☒ **Nicht erfüllt :** Not conform : ☐

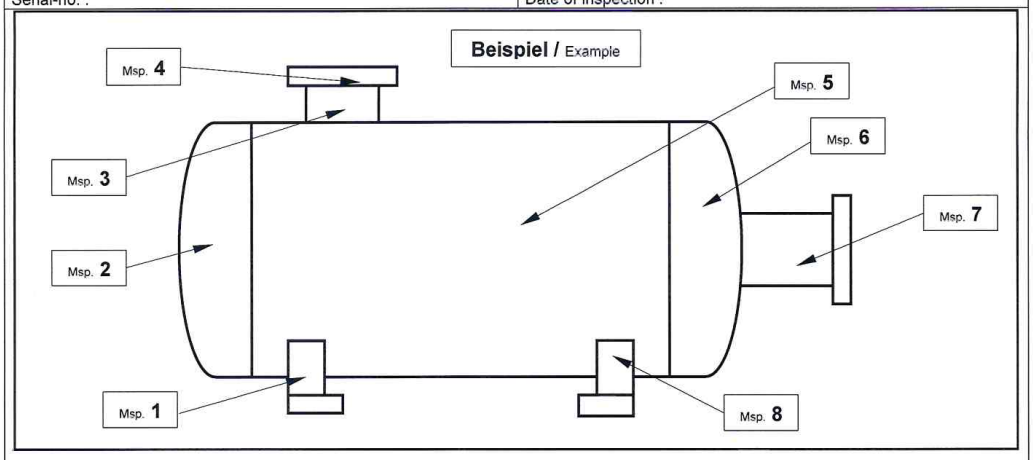
Datum : 01.08.2022 / 01.08.2022
Date :
Prüfer :
Inspector :

Änderung1 / 11. Juli 2012 / M. Stewig

F 8.2.4-15 Prüfbericht Schichtstärkenmessung (Allgemein)

Emmerthaler Apparatebau GmbH Langes Feld 4 31860 Emmerthal	**Prüfbericht** **Schichtstärkenmessung** Coating strength testing report	Abnahmeprüfzeugnis 3.1 Inspection certificate 3.1 DIN EN 10204

Kunde : Aerzener Maschinenfabrik GmbH Customer : 4500499297	**Hersteller Auftrags-Nr. :** EAV2101639 Manufacturer`s job no. : FA2200504
Prüfobjekt : Ölversorgungsanlage Gebläse Inspection object : 2000064848	**Zeichnungs-Nr. :** 4000849671 Drawing-no. :
Fabrik-Nr. : Serial-no. :	**Datum der Prüfung :** 01.08.2022 Date of inspection :



Beschichtung / Coating system

Anforderungen : Requirements :		**Messinstrument :** Measuring instrument :
Schicht 1 : VESTOZINK 2K-EP Coat 1 : 734907	**Schicht 2 :** VESTOPOX 2K-EP Coat 2 : 734908	**Schicht 3 :** VESTOPUR 2K-DT Coat 3 : 734967 RAL 5001
Geforderte Stärke : 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :

	Schicht Coat 1	Schicht Coat 2	Schicht Coat 3		Schicht Coat 1	Schicht Coat 2	Schicht Coat 3
Messpunkt Msp. 1	94 µm	232 µm	430 µm	Messpunkt Msp. 11	114 µm	252 µm	346 µm
Messpunkt Msp. 2	89 µm	236 µm	378 µm	Messpunkt Msp. 12	129 µm	286 µm	407 µm
Messpunkt Msp. 3	86 µm	207 µm	346 µm	Messpunkt Msp. 13	88 µm	292 µm	411 µm
Messpunkt Msp. 4	98 µm	204 µm	313 µm	Messpunkt Msp. 14	93 µm	211 µm	307 µm
Messpunkt Msp. 5	107 µm	213 µm	343 µm	Messpunkt Msp. 15	96 µm	209 µm	311 µm
Messpunkt Msp. 6	102 µm	246 µm	402 µm	Messpunkt Msp. 16	104 µm	196 µm	376 µm
Messpunkt Msp. 7	96 µm	248 µm	382 µm	Messpunkt Msp. 17	112 µm	232 µm	333 µm
Messpunkt Msp. 8	89 µm	196 µm	343 µm	Messpunkt Msp. 18	91 µm	196 µm	312 µm
Messpunkt Msp. 9	94 µm	189 µm	327 µm	Messpunkt Msp. 19	87 µm	183 µm	307 µm
Messpunkt Msp. 10	109 µm	234 µm	332 µm	Messpunkt Msp. 20	94 µm	242 µm	374 µm

Besteht die Beschichtung aus nur einer Schicht, werden Typ und Schichtstärke unter **1** eingetragen.
If the coating consists of one layer only, type and thickness of layer are entered under **1**.

Die Zeichnung dient als Beispiel für die Anordnung der Messpunkte an sämtlichen Prüfobjekten, dabei ist die Anzahl und Position der Messpunkte so auszuwählen, dass die gesamte Oberfläche bewertungsfähig ist.
The drawing serves as example for the arrangement of the measuring points on all the test objects, and the number and position of the measuring points is to be selected so, that the entire surface can be evaluated.

Die Messpunkte sind für eine exakte Rückverfolgbarkeit, auf der Oberfläche gekennzeichnet : ☐
The measuring points are marked on the surface for an exact traceability.

Bemerkungen :
Comments :

Bewertung : Evaluation :	**Erfüllt :** ☒ Conform :	**Nicht erfüllt :** ☐ Not conform :	
Datum : 01.08.20227 Date :	01.08.2022		
Prüfer : Inspector :			

Änderung1 / 11. Juli 2012 / M. Stewig

F 8.2.4-15 Prüfbericht Schichtstärkenmessung (Allgemein)

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Prüfbericht für Ölversorgungsanlagen Gebläse** Inspection for oil equipments	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101639 Manufacturer´s job-no.: FA2200506
Prüfobjekt: Ölversorgungsanlage Gebläse mit 2 Grad Gefälle im Ölbehälter Inspection object:	**Zeichnungs-Nr.:** 4000849671 Drawing-no.:
Bestell-Nr.: 4500499297 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200506 Serial-no.:	**Datum der Prüfung:** 17.08.2022 Date of inspection:

Bei den o.g. Anlagen wurden vor der Auslieferung folgende Prüfungen durchgeführt:
At a.c. systems were following inspections implemented:

	Ja / Yes	Nein / No
1. Bei den Drehstrommotoren wurde das Typenschild überprüft: At the three-phase-motors were the rating plate verifies: 400 / Y690V, 50Hz	☒	☐
2. Probelauf mit Mengen- und Druckmessung wurde durchgeführt. Probelaufprotokoll siehe Beiblatt. The run with rate of flow and pressure messure.See test load record.	☒	☐
3. Die werkseitig eingestellten Schaltpunkte des Niveawächters und die Schutzart wurden nach den Aufgaben aus der beiliegenden Skizze überprüft. The switching points from level swich and the protection were check.	☒	☐
4. Die Ölversorgungsanlage wurde komplett entleert (Ölbehälter, Ölkühler, Doppelfilter, Rohrleitung) The oil equipment was completely deflated (container, oilcooler, doublefilter, pipe)	☒	☐
5. Die Rohrleitung wurde mittels Wasserdruckpumpe (15 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The pipe line for oil was verified by hydrostatic test (15 bar) There were no objections according to hydrostatic test.	☒	☐
6. Die komplette Ölversorgungsanlage wurde mittels Luftdruckprobe (0,4 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The complete aggregate was verified by nekal test (0,4 bar (Ü) There were no objections according to necal test.	☒	☐
7. Die Konservierung der Rohrleitung wurden gemäß der Auftragsspezifikation durchgeführt. The preservation of pipe was executed according to specification of commission.	☒	☐

Pos. 1 Pos. 3 Pos. 5 Pos. 7

Pos. 2 Pos. 4 Pos. 6

Probelaufprotokoll siehe Anhang

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen : -----
Comments :

Datum : 17.08.2022 Date :	**Datum :** 17.08.2022 Date :	**Datum :** Date :
Prüfer : Stephan Kuhrmeyer Inspector :	**Prüfaufsicht :** Michael Stewig Supervisor :	**Abnahmegesellschaft :** Inspection authority :

Änderung 0 / 13. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Prüfbericht für Ölversorgungsanlagen Gebläse** Inspection for oil equipments	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101639 FA2200507 Manufacturer´s job-no.:
Prüfobjekt: Ölversorgungsanlage Gebläse mit 2 Grad Gefälle im Ölbehälter Inspection object:	**Zeichnungs-Nr.:** 4000849671 Drawing-no.:
Bestell-Nr.: 4500499297 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200507 Serial-no.:	**Datum der Prüfung:** 17.08.2022 Date of inspection:

Bei den o.g. Anlagen wurden vor der Auslieferung folgende Prüfungen durchgeführt:
At a.c. systems were following inspections implemented:

	Ja / Yes	Nein / No
1. Bei den Drehstrommotoren wurde das Typenschild überprüft: At the three-phase-motors were the rating plate verifies: 400 / Y690V, 50Hz	☒	☐
2. Probelauf mit Mengen- und Druckmessung wurde durchgeführt. Probelaufprotokoll siehe Beiblatt. The run with rate of flow and pressure messure.See test load record.	☒	☐
3. Die werkseitig eingestellten Schaltpunkte des Niveawächters und die Schutzart wurden nach den Aufgaben aus der beiliegenden Skizze überprüft. The switching points from level swich and the protection were check.	☒	☐
4. Die Ölversorgungsanlage wurde komplett entleert (Ölbehälter, Ölkühler, Doppelfilter, Rohrleitung) The oil equipment was completely deflated (container, oilcooler, doublefilter, pipe)	☒	☐
5. Die Rohrleitung wurde mittels Wasserdruckpumpe (15 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The pipe line for oil was verified by hydrostatic test (15 bar) There were no objections according to hydrostatic test.	☒	☐
6. Die komplette Ölversorgungsanlage wurde mittels Luftdruckprobe (0,4 bar(ü)) auf Dichtheit überprüft. Es wurden keine Undichtigkeiten festgestellt. The complete aggregate was verified by nekal test (0,4 bar (Ü) There were no objections according to necal test.	☒	☐
7. Die Konservierung der Rohrleitung wurden gemäß der Auftragsspezifikation durchgeführt. The preservation of pipe was executed according to specification of commission.	☒	☐

Pos. 1 Pos. 3 Pos. 5 Pos. 7

Pos. 2 Pos. 4 Pos. 6

Probelaufprotokoll siehe Anhang

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen : -----
Comments :

Datum : 17.08.2022 Date :	**Datum :** 17.08.2022 Date :	**Datum :** Date :
Prüfer : Stephan Kuhrmeyer Inspector :	**Prüfaufsicht :** Michael Stewig Supervisor :	**Abnahmegesellschaft :** Inspection authority :

EA SK

Änderung 0 / 13. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Probelaufprotokoll** **Ölversorgungsanlage für Gebläse** Test load record oelequipment for blower	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101639 FA2200506 Manufacturer´s job-no.:
Prüfobjekt: Ölversorgungsanlage Gebläse mit 2 Grad Gefälle im Ölbehälter Inspection object:	**Zeichnungs-Nr.:** 4000849671 Drawing-no.:
Bestell-Nr.: 4500499297 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200506 Serial-no.:	**Datum der Prüfung:** 17.08.2022 Date of inspection:

Betrieb mit Motor 1
Operate with motor 1

Drehzahl: Rotary:	Soll / shall:	1465 U / min
	Ist / is:	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall:	5,0 bar (ü)
	Ist / is:	3,7 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall:	140 l / min
	Ist / is:	140 l / min

Betrieb mit Motor 2
Operate with motor 2

Drehzahl: Rotary:	Soll / shall:	1465 U / min
	Ist / is:	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall:	5,0 bar (ü)
	Ist / is:	4,1 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall:	150 l / min
	Ist / is:	150 l / min

Test-Medium: Medium:	Mobil SHC 626
Temperatur: Temperature:	ÖL: 30°C / Umgebungstemperatur : 28°C
Beide Überströmventile eingestellt auf: Both overflow-valve adjusted at:	6,5 bar (ü)

Im Betriebszustand müssen beide Überströmventile erneut justiert werden.
On operating state must both overflow-valve newly adjusted.

Dauer der Prüfung je Pumpe: 1,0 Std.
Runtime of testing per hour:

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

Bemerkungen : ----
Comments :

Datum: 17.08.2022 Date:	**Datum:** 17.08.2022 Date:	**Datum:** Date:
Prüfer: Stephan Kuhrmeyer Inspector:	**Prüfaufsicht:** Michael Stewig Supervisor :	**Abnahmegesellschaft:** Inspection authority :

EA SK

Änderung 0 / 04. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

EMMERTHAL	**Emmerthaler Apparatebau GmbH** Langes Feld 4 31857 Emmerthal	**Probelaufprotokoll** **Ölversorgungsanlage für Gebläse** Test load record oelequipment for blower	**Blatt** 1 **von** 1 Page of

Kunde: Aerzener Maschinenfabrik GmbH Customer:	**Hersteller Auftrags-Nr.:** EAV2101639 Manufacturer´s job-no.: FA2200507
Prüfobjekt: Ölversorgungsanlage Gebläse mit 2 Grad Gefälle im Ölbehälter Inspection object:	**Zeichnungs-Nr.:** 4000849671 Drawing-no.:
Bestell-Nr.: 4500499297 Order-no.:	**Ort der Prüfung:** Emmerthal Place of inspection:
Fabrik-Nr.: FA2200507 Serial-no.:	**Datum der Prüfung:** 17.08.2022 Date of inspection:

Betrieb mit Motor 1
Operate with motor 1

Drehzahl: Rotary:	Soll / shall:	1465 U / min
	Ist / is:	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall:	5,0 bar (ü)
	Ist / is:	3,7 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall:	140 l / min
	Ist / is:	141 l / min

Betrieb mit Motor 2
Operate with motor 2

Drehzahl: Rotary:	Soll / shall:	1465 U / min
	Ist / is:	1465 r / min
Betriebsdruck: Operating pressure:	Soll / shall:	5,0 bar (ü)
	Ist / is:	3,7 bar (ü)
Durchflussmenge: Rate of flow:	Soll / shall:	140 l / min
	Ist / is:	138 l / min

Test-Medium: Medium:	Mobil SHC 626
Temperatur: Temperature:	ÖL: 30°C / Umgebungstemperatur : 28°C
Beide Überströmventile eingestellt auf: Both overflow-valve adjusted at:	6,5 bar (ü)

Im Betriebszustand müssen beide Überströmventile erneut justiert werden.
On operating state must both overflow-valve newly adjusted.

Dauer der Prüfung je Pumpe: 1,0 Std.
Runtime of testing per hour:

Während des Probelaufs wurden keine Mängel festgestellt.
There were no defects found during test run.

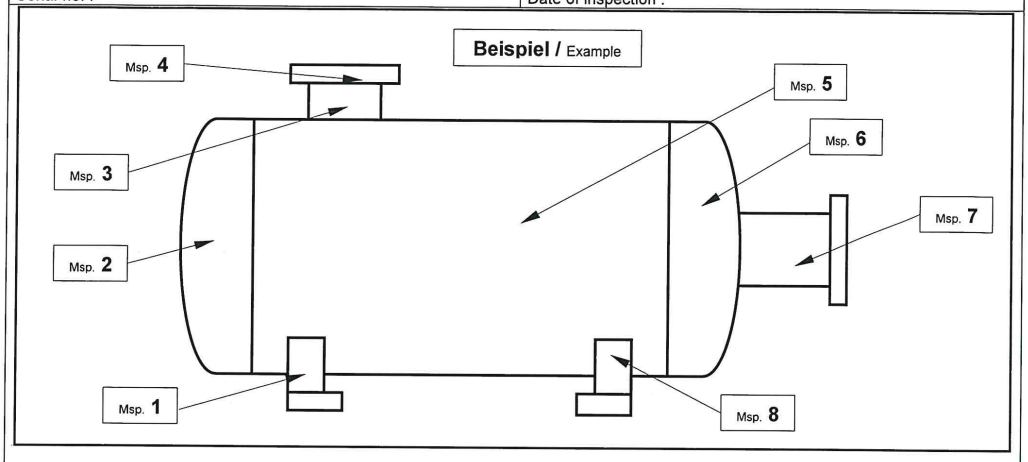
Bemerkungen : ----
Comments :

Datum: 17.08.2022 Date:	**Datum:** 17.08.2022 Date:	**Datum:** Date:
Prüfer: Stephan Kuhrmeyer Inspector:	**Prüfaufsicht:** Michael Stewig Supervisor :	**Abnahmegesellschaft:** Inspection authority :

Änderung 0 / 04. November 2020 / M. Stewig F Probelaufprotokoll Ölversorgungsanlage für Gebläse / Test load record oelequipment for blower

EMMERTHAL **Emmerthaler Apparatebau GmbH** Langes Feld 4 31860 Emmerthal	**Prüfbericht** **Schichtstärkenmessung** Coating strength testing report	Abnahmeprüfzeugnis 3.1 Inspection certificate 3.1 DIN EN 10204

Kunde : Aerzener Maschinenfabrik GmbH Customer : 4500499297	**Hersteller Auftrags-Nr. :** EAV2101639 Manufacturer`s job no. : FA2200506
Prüfobjekt : Ölversorgungsanlage Gebläse Inspection object : 2000064848	**Zeichnungs-Nr. :** 4000849671 Drawing-no. :
Fabrik-Nr. : Serial-no. :	**Datum der Prüfung :** 22.08.22 Date of inspection :



Beschichtung / Coating system

Anforderungen : Requirements :		**Messinstrument :** Measuring instrument :
Schicht 1 : VESTOZINK 2K-EP Coat 1 : 734907	**Schicht 2 :** VESTOPOX 2K-EP Coat 2 : 734908	**Schicht 3 :** VESTOPUR 2K-DT Coat 3 : 734967 RAL 5001
Geforderte Stärke : 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :

	Schicht Coat 1	Schicht Coat 2	Schicht Coat 3		Schicht Coat 1	Schicht Coat 2	Schicht Coat 3
Messpunkt Msp. 1	85 µm	175 µm	305 µm	Messpunkt Msp. 11	µm	µm	µm
Messpunkt Msp. 2	90 µm	168 µm	300 µm	Messpunkt Msp. 12	µm	µm	µm
Messpunkt Msp. 3	90 µm	182 µm	284 µm	Messpunkt Msp. 13	µm	µm	µm
Messpunkt Msp. 4	88 µm	175 µm	288 µm	Messpunkt Msp. 14	µm	µm	µm
Messpunkt Msp. 5	82 µm	168 µm	305 µm	Messpunkt Msp. 15	µm	µm	µm
Messpunkt Msp. 6	96 µm	177 µm	316 µm	Messpunkt Msp. 16	µm	µm	µm
Messpunkt Msp. 7	100 µm	175 µm	300 µm	Messpunkt Msp. 17	µm	µm	µm
Messpunkt Msp. 8	98 µm	168 µm	328 µm	Messpunkt Msp. 18	µm	µm	µm
Messpunkt Msp. 9	95 µm	182 µm	335 µm	Messpunkt Msp. 19	µm	µm	µm
Messpunkt Msp. 10	99 µm	180 µm	300 µm	Messpunkt Msp. 20	µm	µm	µm

Besteht die Beschichtung aus nur einer Schicht, werden Typ und Schichtstärke unter **1** eingetragen.
If the coating consists of one layer only, type and thickness of layer are entered under **1**.

Die Zeichnung dient als Beispiel für die Anordnung der Messpunkte an sämtlichen Prüfobjekten, dabei ist die Anzahl und Position der Messpunkte so auszuwählen, dass die gesamte Oberfläche bewertungsfähig ist.
The drawing serves as example for the arrangement of the measuring points on all the test objects, and the number and position of the measuring points is to be selected so, that the entire surface can be evaluated.

Die Messpunkte sind für eine exakte Rückverfolgbarkeit, auf der Oberfläche gekennzeichnet : ☐
The measuring points are marked on the surface for an exact traceability.

Bemerkungen :
Comments :

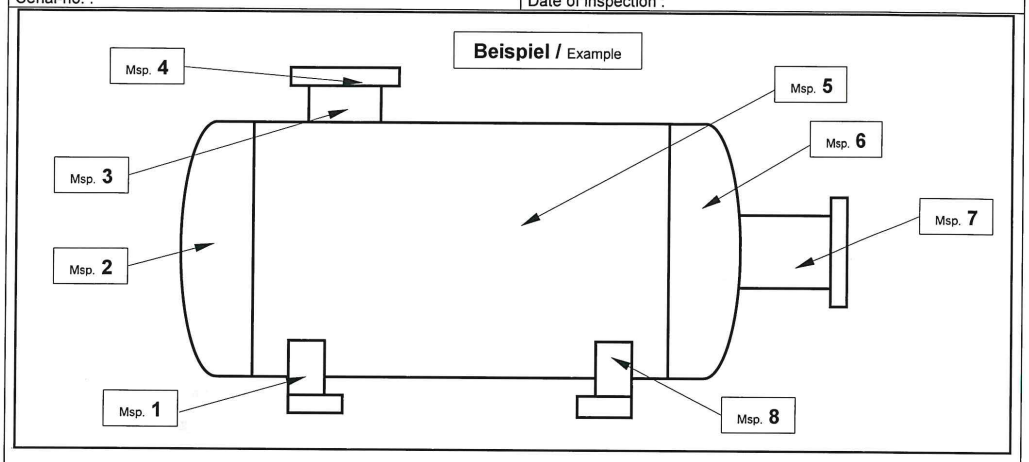
Bewertung : Evaluation :	**Erfüllt :** Conform : ☒	**Nicht erfüllt :** Not conform : ☐
Datum : 22.08.22 Date :	22.08.2022	
Prüfer : Inspector :		

Änderung1 / 11. Juli 2012 / M. Stewig

F 8.2.4-15 Prüfbericht Schichtstärkenmessung (Allgemein)

Emmerthaler Apparatebau GmbH Langes Feld 4 31860 Emmerthal	**Prüfbericht** **Schichtstärkenmessung** Coating strength testing report	Abnahmeprüfzeugnis 3.1 Inspection certificate 3.1 DIN EN 10204

Kunde : Aerzener Maschinenfabrik GmbH Customer : 4500499297	**Hersteller Auftrags-Nr. :** EAV2101639 Manufacturer`s job no. : FA2200507
Prüfobjekt : Ölversorgungsanlage Gebläse Inspection object : 2000064848	**Zeichnungs-Nr. :** 4000849671 Drawing-no. :
Fabrik-Nr. : Serial-no. :	**Datum der Prüfung :** 22.08.22 Date of inspection :



Beschichtung / Coating system

Anforderungen : Requirements :		**Messinstrument :** Measuring instrument :
Schicht 1 : VESTOZINK 2K-EP Coat 1 : 734907	**Schicht 2 :** VESTOPOX 2K-EP Coat 2 : 734908	**Schicht 3 :** VESTOPUR 2K-DT Coat 3 : 734967 RAL 5001
Geforderte Stärke : 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :	**Geforderte Stärke :** 80 µm Required thickness :

	Schicht Coat 1	Schicht Coat 2	Schicht Coat 3		Schicht Coat 1	Schicht Coat 2	Schicht Coat 3
Messpunkt Msp. 1	82 µm	175 µm	286 µm	Messpunkt Msp. 11	µm	µm	µm
Messpunkt Msp. 2	95 µm	184 µm	305 µm	Messpunkt Msp. 12	µm	µm	µm
Messpunkt Msp. 3	80 µm	200 µm	300 µm	Messpunkt Msp. 13	µm	µm	µm
Messpunkt Msp. 4	90 µm	188 µm	321 µm	Messpunkt Msp. 14	µm	µm	µm
Messpunkt Msp. 5	84 µm	175 µm	285 µm	Messpunkt Msp. 15	µm	µm	µm
Messpunkt Msp. 6	88 µm	177 µm	276 µm	Messpunkt Msp. 16	µm	µm	µm
Messpunkt Msp. 7	105 µm	185 µm	295 µm	Messpunkt Msp. 17	µm	µm	µm
Messpunkt Msp. 8	89 µm	166 µm	295 µm	Messpunkt Msp. 18	µm	µm	µm
Messpunkt Msp. 9	85 µm	177 µm	298 µm	Messpunkt Msp. 19	µm	µm	µm
Messpunkt Msp. 10	92 µm	184 µm	284 µm	Messpunkt Msp. 20	µm	µm	µm

Besteht die Beschichtung aus nur einer Schicht, werden Typ und Schichtstärke unter **1** eingetragen.
If the coating consists of one layer only, type and thickness of layer are entered under **1**.

Die Zeichnung dient als Beispiel für die Anordnung der Messpunkte an sämtlichen Prüfobjekten, dabei ist die Anzahl und Position der Messpunkte so auszuwählen, dass die gesamte Oberfläche bewertungsfähig ist.
The drawing serves as example for the arrangement of the measuring points on all the test objects, and the number and position of the measuring points is to be selected so, that the entire surface can be evaluated.

Die Messpunkte sind für eine exakte Rückverfolgbarkeit, auf der Oberfläche gekennzeichnet : ☐
The measuring points are marked on the surface for an exact traceability.

Bemerkungen :
Comments :

Bewertung : Evaluation : **Erfüllt :** Conform : ☒ **Nicht erfüllt :** Not conform : ☐

Datum : 22.08.22 / 22.08.2022
Date :
Prüfer :
Inspector :

Änderung1 / 11. Juli 2012 / M. Stewig

F 8.2.4-15 Prüfbericht Schichtstärkenmessung (Allgemein)

G Piping

Name	Data
Designation	
Type	
Number	
Type of manual	*Technical documentation*
Manufacturer	Emmerthaler Apparatebau GmbH

G.1 Exhaust silencer

Name	Data
Designation	Exhaust silencer All stages
Type	
Number	
Type of manual	*Technical documentation*
Manufacturer	Emmerthaler Apparatebau GmbH

G.2 All stages

G.2.1 Technical documentation

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1 General Information for Certification Body/Inspectorat	1.01 **Insp.No.**	**3094/50003/22 Rev. A**	
1.02 Applicant:	Emmerthaler Apparatebau GmbH, Langes Feld 4, D-31860 Emmerthal		
1.03 Manufacturer, address:	Emmerthaler Apparatebau GmbH, Langes Feld 4, D-31860 Emmerthal		
1.04 Order no./ Com.no:	EAV2101539		
1.05 Equipment designation:	Reflexionsschalldämpfer 2nd stage / … Cooling Gas - DN1200 PN10		
1.06 Drawing no.:	2000064641	1.07 Revision:	01

2 Design code:	2014/68/EU, AD2000	2.01 Module	B
2.02 Type of equipment:	pressure vessel		
2.03 Remarks:			

3 Operational limits:	3.01 chamber 1	3.02 chamber 2	3.03 chamber 3	3.04 chamber 4
3.05 Designation of pressure chamber	**Silencer**	**----**	**----**	**----**
3.06 PS [bar]	**0 / +3,5**	**----**	**----**	**----**
3.07 TS [°C]	**-15 / +100**	**----**	**----**	**----**
3.08 PT [bar]	**5,4**	**----**	**----**	**----**
3.09 Test fluid	**water**	**----**	**----**	**----**
3.10 Corrosion allowance [mm]	**1**	**----**	**----**	**----**
3.11 Number of allowable load cycles	**1.000***	**----**	**----**	**----**
3.12 Allowable load cycle range [bar]	**0 / +3,5* 10%**	**----**	**----**	**----**
3.13 Volume [L] / DN	**27890 / 27520**	**----**	**----**	**----**
3.14 Fluid group	**1**	**----**	**----**	**----**
3.15 Category acc. to annex II	**IV**	**----**	**----**	**----**

4 Add. loads:	----	4.01 Position first pressure test	**horizontal**
4.02 Seismic	see drawing	4.03 Wind	see drawing
4.04 Nozzles	see drawing	4.05 Others	*) AD2000 S1 Pkt. 1.4

5 Completeness and adequacy of technical documents	5.01 Examination of documents
5.02 Exclusive statement of manufacturer	(A) submitted, acceptable
5.03 Equipment description / functional description	(D) not submitted
5.04 Description of type range (for type approvals only)	(D) not submitted
5.05 Drawing(s)	(A) submitted, acceptable
5.06 Part list(s): Instructions to applied standards and design codes	(A) submitted, acceptable
5.07 Part list(s): Instructions to manufact.& delivery terms, measure tolerances	(A) submitted, acceptable
5.08 Design calculation(s): traditional design by formula	(D) not submitted
5.09 Design calculation(s): design by analysis (FEA, FDA, BEA)	(D) not submitted
5.10 Test results of experimental design	(D) not submitted
5.11 Approvals for procedures for permanent joining	(E) part of final examination
5.12 Approvals for personnel for permanent joining	(E) part of final examination
5.13 Approvals for NDE-personnel	(E) part of final examination
5.14 Risk analysis	(D) not submitted, form. acceptable
5.15 Operating instructions	(E) part of final examination
5.16 The submitted documents are **sufficient** for the design evaluation.	

2250003_PEDE_en.doc Insp.No. **3094/50003/22 Rev. A** | page **1** of **3** | R7

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6 Examination of documents concerning materials [Annex I 4]	6.01 Examination of documents
6.02 Materials according to harmonized standards	(B) submitted, sect.11 shall be noted
6.03 European approval of materials (EAM)	(D) not submitted
6.04 Particular material appraisal (PMA)	(D) not submitted
6.05 Formal appraisal of materials by technical standard	(D) not submitted
6.06 Pls. note: Certification 3.1(B) of pressure-bearing materials only based on Annex I para. 4.3 !	
7 Examination of documents concerning design [Annex I 2]	7.01 Examination of documents
7.02 Strength (internal pressure / add. loads)	(B) considered, sect.11 shall be noted
7.03 Strength (external pressure / support)	(A) considered, acceptable
7.04 Strength (fatigue, cyclic loading(s))	(D) not applicable
7.05 Strength (time depending behaviour, creep)	(D) not applicable
7.06 Experimental design method (test programme)	(D) not applicable
7.07 Inspection, vent and drain openings	(A) considered, acceptable
7.08 Corrosion, chemical attack	(C) resistance by user specification
7.09 Wear (also other measures)	(D) not applicable
7.10 External fire	(D) not applicable
7.11 Additional requirements for piping	(D) not applicable
7.12 Additional requirements for equipment with risk of overheating	(D) not applicable
7.12 Deep cold service with the risk of brittle fraction	(D) not applicable
8 Examination of documents concerning manufacturing [Annex I 3]	8.01 Examination of documents
8.02 Forming operations	(A) considered, acceptable
8.03 Heat treatment (caused by forming: normalization / sol. annealing)	(D) not applicable
8.04 Permanent joining	(B) considered, sect.11 shall be noted
8.05 Nondestructive examinations: scope and location	(B) considered, sect.11 shall be noted
8.06 Heat treatment (before/after welding)	(D) not applicable
9 Examination of documents concerning safety equipment [AI 3]	9.01 Examination of documents
9.02 Examination of safety accessories	(D) not applicable
10 Examination of documents concerning final examination [AI 3]	10.01 Examination of documents
10.02 Test pressure [Annex I, para. 3.2.2, 7.4]	(A) considered, acceptable
10.03 Marking [Annex I, para. 3.3]	(A) considered, acceptable

11 Remarks:

(1) (5.14) The Top risk analysis regards to the documented result on the submitted drawing. / Der Prüfpunkt Risikoanalyse bezieht sich auf das dokumentierte Ergebnis in Form der vorliegenden Zeichnung.

(2) (6.02) All pressure loaded bolts have to be applied with minimum material attest level 2.2. / Alle drucktragenden Schrauben sind mindestens mit Materialattest Stufe 2.2 zu verwenden.

(3) (7.03) Regarding anchor bolts the requirements according AD2000 S3/0 have to be considered. / Zur Auswahl der Ankerschrauben sind die Vorgaben nach AD2000 S3/0 zu berücksichtigen.

(4) (8.04) All pressure loaded seams are to be executed as full penetrated weldings with complete root development. Only Vd-TÜV-examined filler materials need to be applied. / Alle drucktragenden Schweißnähte sind als durchgeschweißte Vollanbindungen mit umlaufend durchgehender Wurzelausbildung auszuführen. Es sind ausschließlich Vd-TÜV-eignungsgeprüfte Schweißzusätze zu verwenden.

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(5) (8.05) The suggested NDE-scope is in accordance with AD2000 HP0 TG1 at v=0,85. / Der vorgeschlagene ZfP-Umfang entspricht den Vorgaben nach AD2000 HP0, Tafel 1 PG1 für v=0,85.

(6) (10.02) The pressure test shall be conducted with a manometer with valid calibration certificate at the highest point of the pressure vessel. / Die Druckprüfung ist mit einem Manometer mit gültigem Kalibrierzeugis an der höchsten Stelle des Druckbehälters durchzuführen.

(7) (10.03) The pressure equipment need to be marked according to 2014/68/EU Appendix I 3.3 and AD2000 A401. / Das Druckgerät ist nach 2014/68/EU Anh. I Pkt. 3.3 sowie AD2000 A401 zu kennzeichnen.

12 Result of examination: The design is considered as finally approved.

13 The Inspector	13.1 Date:	2022-01-17	13.2 Place:	Jena	
Notified Body 0090 **TÜV Thüringen e.V.** **Melchendorfer Str. 64** **D-99096 Erfurt** **info@tuev-thueringen.de**	13.3 Name:	R. Biegler phone +49-151-2033-1675			Technischer Überwachungs-Verein TÜV 528 Thüringen e. V.
	13.4 signature				13.5 stamp

13.6 Validity note for modules G and H1: Two years, for Modules B Ten years (monitored) from the day of issue.

14 Attached documents:
Drawing/Zeichnung 2000064641_2nd-stage Rev. 01 with approval/mit Prüfvermerk
Part list/Stücklist 2000064641_2nd-stage Rev A with approval/mit Prüfvermerk
Drawing/Zeichnung 2000064641_cooling-gas Rev. 01 with approval/mit Prüfvermerk
Part list/Stücklist 2000064641_cooling-gas Rev A with approval/mit Prüfvermerk

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1 General Information for Certification Body/Inspectorat		1.01 **Insp.No.**	**3094/49863/22 Rev. A**
1.02 Applicant:	Emmerthaler Apparatebau GmbH, Langes Feld 4, D-31860 Emmerthal		
1.03 Manufacturer, address:	Emmerthaler Apparatebau GmbH, Langes Feld 4, D-31860 Emmerthal		
1.04 Order no./ Com.no:	EAV2101539		
1.05 Equipment designation:	Reflexionsschalldämpfer - 1st stage DN1200 PN10		
1.06 Drawing no.:	2000064641	1.07 Revision:	01

2 Design code:	2014/68/EU, AD2000	2.01 Module	B
2.02 Type of equipment:	pressure vessel		
2.03 Remarks:			

3 Operational limits:	3.01 chamber 1	3.02 chamber 2	3.03 chamber 3	3.04 chamber 4
3.05 Designation of pressure chamber	**Silencer**	**----**	**----**	**----**
3.06 PS [bar]	**0 / +3,5**	**----**	**----**	**----**
3.07 TS [°C]	**-15 / +100**	**----**	**----**	**----**
3.08 PT [bar]	**5,4**	**----**	**----**	**----**
3.09 Test fluid	**water**	**----**	**----**	**----**
3.10 Corrosion allowance [mm]	**1**	**----**	**----**	**----**
3.11 Number of allowable load cycles	**1.000***	**----**	**----**	**----**
3.12 Allowable load cycle range [bar]	**0 / +3,5* 10%**	**----**	**----**	**----**
3.13 Volume [L] / DN	**30840**	**----**	**----**	**----**
3.14 Fluid group	**1**	**----**	**----**	**----**
3.15 Category acc. to annex II	**IV**	**----**	**----**	**----**

4 Add. loads:	----	4.01 Position first pressure test	**horizontal**
4.02 Seismic	see drawing	4.03 Wind	see drawing
4.04 Nozzles	see drawing	4.05 Others	*) AD2000 S1 Pkt. 1.4

5 Completeness and adequacy of technical documents	5.01 Examination of documents
5.02 Exclusive statement of manufacturer	(A) submitted, acceptable
5.03 Equipment description / functional description	(D) not submitted
5.04 Description of type range (for type approvals only)	(D) not submitted
5.05 Drawing(s)	(A) submitted, acceptable
5.06 Part list(s): Instructions to applied standards and design codes	(A) submitted, acceptable
5.07 Part list(s): Instructions to manufact.& delivery terms, measure tolerances	(A) submitted, acceptable
5.08 Design calculation(s): traditional design by formula	(D) not submitted
5.09 Design calculation(s): design by analysis (FEA, FDA, BEA)	(D) not submitted
5.10 Test results of experimental design	(D) not submitted
5.11 Approvals for procedures for permanent joining	(E) part of final examination
5.12 Approvals for personnel for permanent joining	(E) part of final examination
5.13 Approvals for NDE-personnel	(E) part of final examination
5.14 Risk analysis	(D) not submitted, form. acceptable
5.15 Operating instructions	(E) part of final examination
5.16 The submitted documents are **sufficient** for the design evaluation.	

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6 Examination of documents concerning materials [Annex I 4]	6.01 Examination of documents
6.02 Materials according to harmonized standards	(B) submitted, sect.11 shall be noted
6.03 European approval of materials (EAM)	(D) not submitted
6.04 Particular material appraisal (PMA)	(D) not submitted
6.05 Formal appraisal of materials by technical standard	(D) not submitted
6.06 Pls. note: Certification 3.1(B) of pressure-bearing materials only based on Annex I para. 4.3 !	
7 Examination of documents concerning design [Annex I 2]	7.01 Examination of documents
7.02 Strength (internal pressure / add. loads)	(A) considered, acceptable
7.03 Strength (external pressure / support)	(A) considered, acceptable
7.04 Strength (fatigue, cyclic loading(s))	(D) not applicable
7.05 Strength (time depending behaviour, creep)	(D) not applicable
7.06 Experimental design method (test programme)	(D) not applicable
7.07 Inspection, vent and drain openings	(A) considered, acceptable
7.08 Corrosion, chemical attack	(C) resistance by user specification
7.09 Wear (also other measures)	(D) not applicable
7.10 External fire	(D) not applicable
7.11 Additional requirements for piping	(D) not applicable
7.12 Additional requirements for equipment with risk of overheating	(D) not applicable
7.12 Deep cold service with the risk of brittle fraction	(D) not applicable
8 Examination of documents concerning manufacturing [Annex I 3]	8.01 Examination of documents
8.02 Forming operations	(A) considered, acceptable
8.03 Heat treatment (caused by forming: normalization / sol. annealing)	(D) not applicable
8.04 Permanent joining	(B) considered, sect.11 shall be noted
8.05 Nondestructive examinations: scope and location	(B) considered, sect.11 shall be noted
8.06 Heat treatment (before/after welding)	(D) not applicable
9 Examination of documents concerning safety equipment [AI 3]	9.01 Examination of documents
9.02 Examination of safety accessories	(D) not applicable
10 Examination of documents concerning final examination [AI 3]	10.01 Examination of documents
10.02 Test pressure [Annex I, para. 3.2.2, 7.4]	(A) considered, acceptable
10.03 Marking [Annex I, para. 3.3]	(A) considered, acceptable

11 Remarks:

(1) (5.14) The Top risk analysis regards to the documented result on the submitted drawing. / Der Prüfpunkt Risikoanalyse bezieht sich auf das dokumentierte Ergebnis in Form der vorliegenden Zeichnung.

(2) (6.02) All pressure loaded bolts have to be applied with minimum material attest level 2.2. / Alle drucktragenden Schrauben sind mindestens mit Materialattest Stufe 2.2 zu verwenden.

(3) (7.03) Regarding anchor bolts the requirements according AD2000 S3/0 have to be considered. / Zur Auswahl der Ankerschrauben sind die Vorgaben nach AD2000 S3/0 zu berücksichtigen.

(4) (8.04) All pressure loaded seams are to be executed as full penetrated weldings with complete root development. Only Vd-TÜV-examined filler materials need to be applied. / Alle drucktragenden Schweißnähte sind als durchgeschweißte Vollanbindungen mit umlaufend durchgehender Wurzelausbildung auszuführen. Es sind ausschließlich Vd-TÜV-eignungsgeprüfte Schweißzusätze zu verwenden.

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(5) (8.05) The suggested NDE-scope is in accordance with AD2000 HP0 TG1 at v=0,85. / Der vorgeschlagene ZfP-Umfang entspricht den Vorgaben nach AD2000 HP0, Tafel 1 PG1 für v=0,85.

(6) (10.02) The pressure test shall be conducted with a manometer with valid calibration certificate at the highest point of the pressure vessel. / Die Druckprüfung ist mit einem Manometer mit gültigem Kalibrierzeugis an der höchsten Stelle des Druckbehälters durchzuführen.

(7) (10.03) The pressure equipment need to be marked according to 2014/68/EU Appendix I 3.3 and AD2000 A401. / Das Druckgerät ist nach 2014/68/EU Anh. I Pkt. 3.3 sowie AD2000 A401 zu kennzeichnen.

12 Result of examination: The design is considered as finally approved.

13 The Inspector	13.1 Date:	2022-01-17	13.2 Place:	Jena	
Notified Body 0090 **TÜV Thüringen e.V.** **Melchendorfer Str. 64** **D-99096 Erfurt** **info@tuev-thueringen.de**	13.3 Name:	R. Biegler phone +49-151-2033-1675			Technischer Überwachungs-Verein TÜV 528 Thüringen e.V.
	13.4 signature				13.5 stamp

13.6 Validity note for modules G and H1: Two years, for Modules B Ten years (monitored) from the day of issue.

14 Attached documents:
Drawings/Zeichnungen 2000064641 Rev. 01 with approval/mit Prüfvermerk
Part lists/Stücklisten 2000064641 Rev - with approval/mit Prüfvermerk

blueTÜV by TÜV Thüringen	**Design Examination Report for Pressure Equipment according to 2014/68/EU Modules B / G / H1** page 1 of 3	TÜV THÜRINGEN

1 General Information for Certification Body/Inspectorat		1.01 **Insp.No.**	**3094/50003/22 Rev. A**
1.02 Applicant:	Emmerthaler Apparatebau GmbH, Langes Feld 4, D-31860 Emmerthal		
1.03 Manufacturer, address:	Emmerthaler Apparatebau GmbH, Langes Feld 4, D-31860 Emmerthal		
1.04 Order no./ Com.no:	EAV2101539		
1.05 Equipment designation:	Reflexionsschalldämpfer 2nd stage / … Cooling Gas - DN1200 PN10		
1.06 Drawing no.:	2000064641	1.07 Revision:	01

2 Design code:	2014/68/EU, AD2000	2.01 Module	B
2.02 Type of equipment:	pressure vessel		
2.03 Remarks:			

3 Operational limits:	3.01 chamber 1	3.02 chamber 2	3.03 chamber 3	3.04 chamber 4
3.05 Designation of pressure chamber	**Silencer**	**----**	**----**	**----**
3.06 PS [bar]	**0 / +3,5**	**----**	**----**	**----**
3.07 TS [°C]	**-15 / +100**	**----**	**----**	**----**
3.08 PT [bar]	**5,4**	**----**	**----**	**----**
3.09 Test fluid	**water**	**----**	**----**	**----**
3.10 Corrosion allowance [mm]	**1**	**----**	**----**	**----**
3.11 Number of allowable load cycles	**1.000***	**----**	**----**	**----**
3.12 Allowable load cycle range [bar]	**0 / +3,5* 10%**	**----**	**----**	**----**
3.13 Volume [L] / DN	**27890 / 27520**	**----**	**----**	**----**
3.14 Fluid group	**1**	**----**	**----**	**----**
3.15 Category acc. to annex II	**IV**	**----**	**----**	**----**

4 Add. loads:	----	4.01 Position first pressure test	**horizontal**
4.02 Seismic	see drawing	4.03 Wind	see drawing
4.04 Nozzles	see drawing	4.05 Others	*) AD2000 S1 Pkt. 1.4

5 Completeness and adequacy of technical documents	5.01 Examination of documents
5.02 Exclusive statement of manufacturer	(A) submitted, acceptable
5.03 Equipment description / functional description	(D) not submitted
5.04 Description of type range (for type approvals only)	(D) not submitted
5.05 Drawing(s)	(A) submitted, acceptable
5.06 Part list(s): Instructions to applied standards and design codes	(A) submitted, acceptable
5.07 Part list(s): Instructions to manufact.& delivery terms, measure tolerances	(A) submitted, acceptable
5.08 Design calculation(s): traditional design by formula	(D) not submitted
5.09 Design calculation(s): design by analysis (FEA, FDA, BEA)	(D) not submitted
5.10 Test results of experimental design	(D) not submitted
5.11 Approvals for procedures for permanent joining	(E) part of final examination
5.12 Approvals for personnel for permanent joining	(E) part of final examination
5.13 Approvals for NDE-personnel	(E) part of final examination
5.14 Risk analysis	(D) not submitted, form. acceptable
5.15 Operating instructions	(E) part of final examination
5.16 The submitted documents are **sufficient** for the design evaluation.	

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6 Examination of documents concerning materials [Annex I 4]	6.01 Examination of documents
6.02 Materials according to harmonized standards	(B) submitted, sect.11 shall be noted
6.03 European approval of materials (EAM)	(D) not submitted
6.04 Particular material appraisal (PMA)	(D) not submitted
6.05 Formal appraisal of materials by technical standard	(D) not submitted
6.06 Pls. note: Certification 3.1(B) of pressure-bearing materials only based on Annex I para. 4.3 !	
7 Examination of documents concerning design [Annex I 2]	7.01 Examination of documents
7.02 Strength (internal pressure / add. loads)	(B) considered, sect.11 shall be noted
7.03 Strength (external pressure / support)	(A) considered, acceptable
7.04 Strength (fatigue, cyclic loading(s))	(D) not applicable
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7.08 Corrosion, chemical attack	(C) resistance by user specification
7.09 Wear (also other measures)	(D) not applicable
7.10 External fire	(D) not applicable
7.11 Additional requirements for piping	(D) not applicable
7.12 Additional requirements for equipment with risk of overheating	(D) not applicable
7.12 Deep cold service with the risk of brittle fraction	(D) not applicable
8 Examination of documents concerning manufacturing [Annex I 3]	8.01 Examination of documents
8.02 Forming operations	(A) considered, acceptable
8.03 Heat treatment (caused by forming: normalization / sol. annealing)	(D) not applicable
8.04 Permanent joining	(B) considered, sect.11 shall be noted
8.05 Nondestructive examinations: scope and location	(B) considered, sect.11 shall be noted
8.06 Heat treatment (before/after welding)	(D) not applicable
9 Examination of documents concerning safety equipment [AI 3]	9.01 Examination of documents
9.02 Examination of safety accessories	(D) not applicable
10 Examination of documents concerning final examination [AI 3]	10.01 Examination of documents
10.02 Test pressure [Annex I, para. 3.2.2, 7.4]	(A) considered, acceptable
10.03 Marking [Annex I, para. 3.3]	(A) considered, acceptable

11 Remarks:

(1) (5.14) The Top risk analysis regards to the documented result on the submitted drawing. / Der Prüfpunkt Risikoanalyse bezieht sich auf das dokumentierte Ergebnis in Form der vorliegenden Zeichnung.

(2) (6.02) All pressure loaded bolts have to be applied with minimum material attest level 2.2. / Alle drucktragenden Schrauben sind mindestens mit Materialattest Stufe 2.2 zu verwenden.

(3) (7.03) Regarding anchor bolts the requirements according AD2000 S3/0 have to be considered. / Zur Auswahl der Ankerschrauben sind die Vorgaben nach AD2000 S3/0 zu berücksichtigen.

(4) (8.04) All pressure loaded seams are to be executed as full penetrated weldings with complete root development. Only Vd-TÜV-examined filler materials need to be applied. / Alle drucktragenden Schweißnähte sind als durchgeschweißte Vollanbindungen mit umlaufend durchgehender Wurzelausbildung auszuführen. Es sind ausschließlich Vd-TÜV-eignungsgeprüfte Schweißzusätze zu verwenden.

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(5) (8.05) The suggested NDE-scope is in accordance with AD2000 HP0 TG1 at v=0,85. / Der vorgeschlagene ZfP-Umfang entspricht den Vorgaben nach AD2000 HP0, Tafel 1 PG1 für v=0,85.

(6) (10.02) The pressure test shall be conducted with a manometer with valid calibration certificate at the highest point of the pressure vessel. / Die Druckprüfung ist mit einem Manometer mit gültigem Kalibrierzeugis an der höchsten Stelle des Druckbehälters durchzuführen.

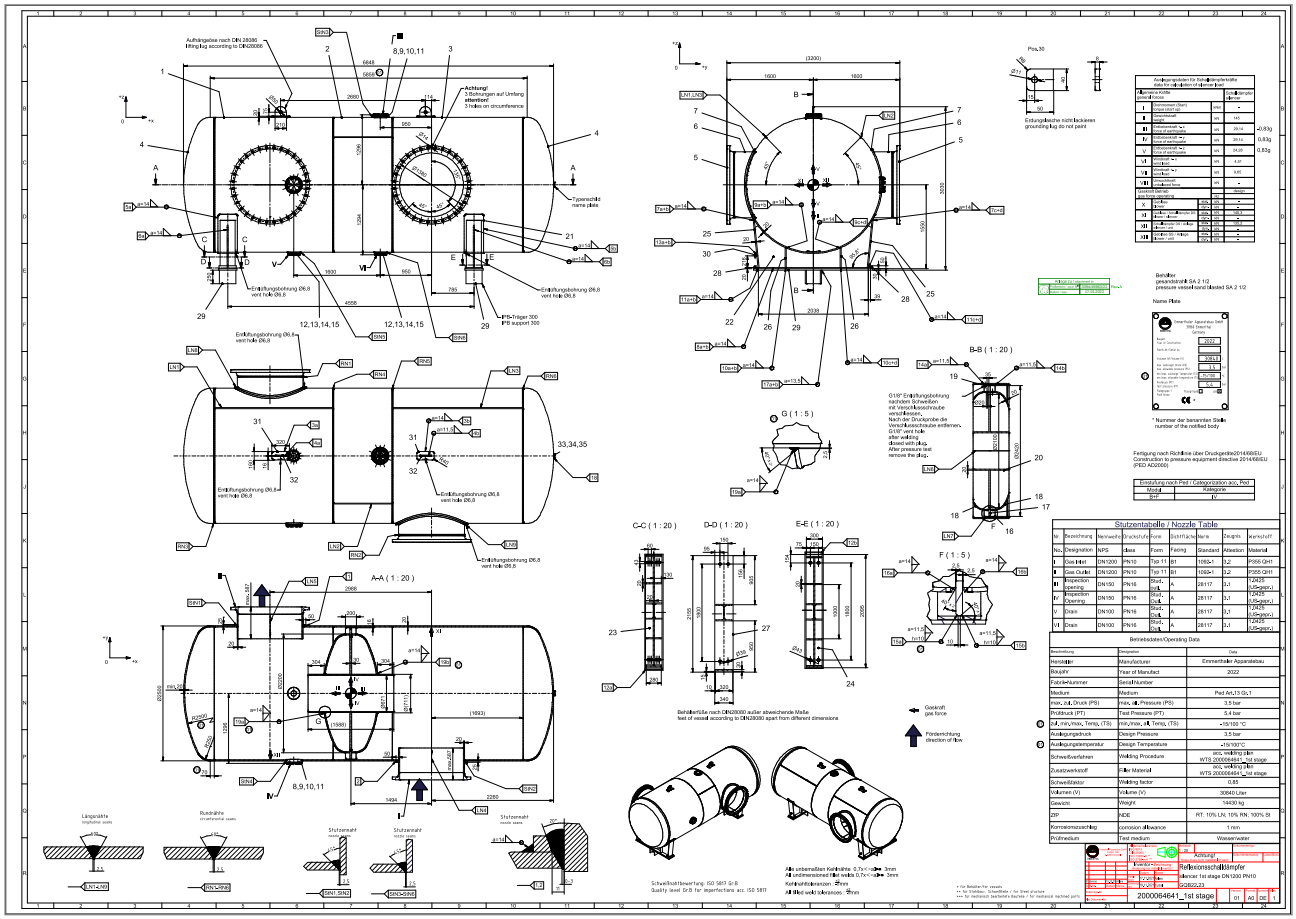
(7) (10.03) The pressure equipment need to be marked according to 2014/68/EU Appendix I 3.3 and AD2000 A401. / Das Druckgerät ist nach 2014/68/EU Anh. I Pkt. 3.3 sowie AD2000 A401 zu kennzeichnen.

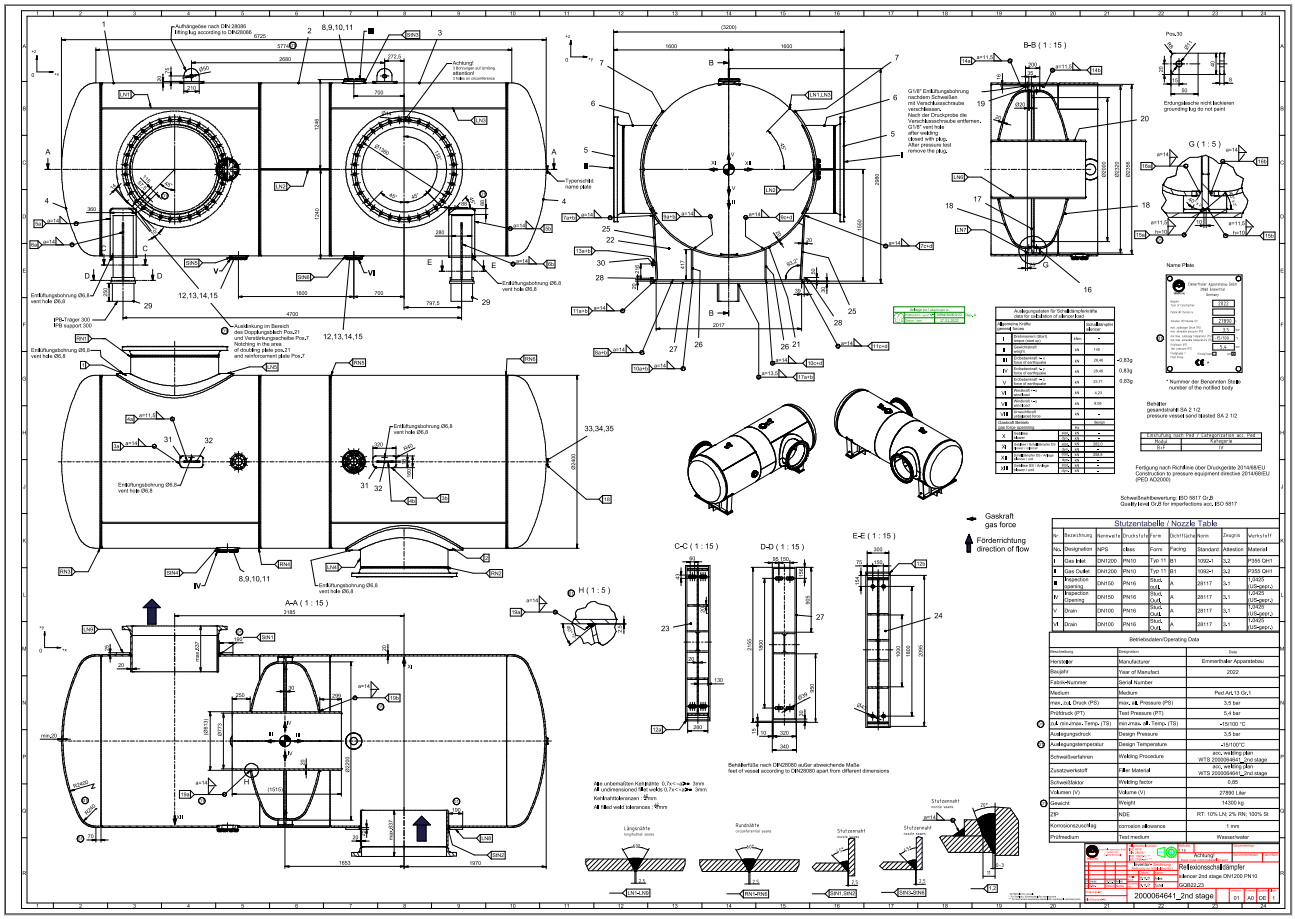
12 Result of examination: The design is considered as finally approved.

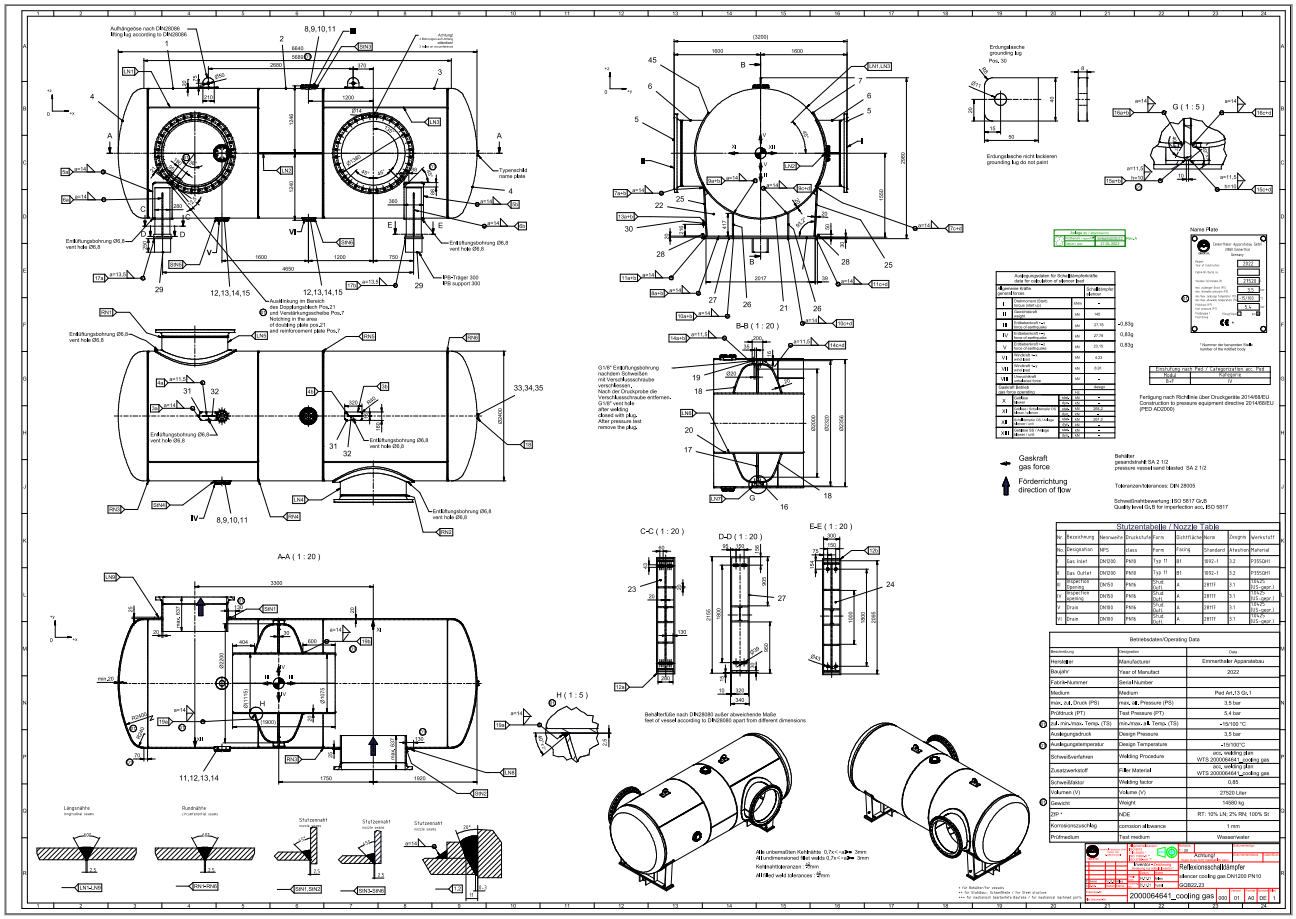
13 The Inspector	13.1 Date:	2022-01-17	13.2 Place:	Jena	
Notified Body 0090 **TÜV Thüringen e.V.** **Melchendorfer Str. 64** **D-99096 Erfurt** **info@tuev-thueringen.de**	13.3 Name:	R. Biegler phone +49-151-2033-1675			Technischer Überwachungs-Verein TÜV 528 Thüringen e. V.
	13.4 signature				13.5 stamp

13.6 Validity note for modules G and H1: Two years, for Modules B Ten years (monitored) from the day of issue.

14 Attached documents:
Drawing/Zeichnung 2000064641_2nd-stage Rev. 01 with approval/mit Prüfvermerk
Part list/Stücklist 2000064641_2nd-stage Rev A with approval/mit Prüfvermerk
Drawing/Zeichnung 2000064641_cooling-gas Rev. 01 with approval/mit Prüfvermerk
Part list/Stücklist 2000064641_cooling-gas Rev A with approval/mit Prüfvermerk


A-A (1 : 20)
B-B (1 : 20)
C-C (1 : 20)
D-D (1 : 20)
E-E (1 : 20)
F (1 : 5)
G (1 : 5)
Stutzentabelle / Nozzle Table
Betriebsdaten/Operating Data
2000054641_1st stage


A-A (1 : 15)
B-B (1 : 15)
C-C (1 : 15)
D-D (1 : 15)
E-E (1 : 15)
G (1 : 5)
H (1 : 5)
Gaskraft
gas force
Förderrichtung
direction of flow
Stutzentabelle / Nozzle Table
Betriebsdaten/Operating Data
2000084641_2nd stage


A–A (1 : 20)
B–B (1 : 20)
C–C (1 : 20)
D–D (1 : 20)
E–E (1 : 20)
G (1 : 5)
H (1 : 5)
Gaskraft
gas force
Förderrichtung
direction of flow
Stutzentabelle / Nozzle Table
Betriebsdaten/Operating Data
Reflexionsschalldämpfer
silencer cooling gas DN1200 PN10
2000064641_cooling gas

Emmerthaler Apparatebau GmbH
Langes Feld 4
31860 Emmerthal

Teileliste
part list

Reflexionsschalldämpfer
1st stage DN1200 GQB22.23

Artikel-Nr.: part list — 2000064641_1ST STAGE

Zeichnungsnummer: drawingnumber — 2000064641_1st stage

Revision: revision — Rev. A

Anlage zu / attachment to
Prüfbericht / report N° 3094/49863/22
Datum / date: 17.01.2022

Gewicht (kg): weight (kg) — 14454,20

Erstellt developed	Datum date	18.11.2021	Name name	Ahlers
Bearbeitet processed	Datum date	23.11.2021	Name name	Ahlers
Geprüft + genehmigt checked + approved	Datum date	23.11.2021	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
1		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		2.200	7.791	1.0425	10028-2	10029-A	1	3.1	2.691,01
2		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		1.095	7.791	1.0425	10028-2	10029-A	1	3.1	1.339,39
3		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		2.416	7.791	1.0425	10028-2	10029-A	1	3.1	2.955,22
4		2	732435	DEU: Klöpperboden 2500 x 20,0 Zylindrischer Bord auf 20mm beigedreht ENU: dished boiler end				1.0425	10028-2	28011	1	3.1	2.304,00
5		2	724932	DEU: V-Flansch Typ11 / B1 DN1200 x 20,0 / PN10 ENU: v-flange Typ 11 / B1				P355QH1	10222-4	1092-1	9/10	3.2	557,80
6		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		453	3.766	1.0425	10028-2	10029-A	1	3.1	535,68
7		2	705995	DEU: Blech s = 25,0 ENU: sheet plate		140	1.329	1.0425	10028-2	10029-A	1	3.1	84,40
8		2	732168	DEU: Blockflansch AA150 PN16 h = 50 ENU: block flange				1.0425 (US GEPRÜFT)	10028-2	28117	9	3.1	35,00
9		2	713442	DEU: Flachdichtung Innenbördel DN150 PN16 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,20
10		2	715224	DEU: B-Flansch Typ05 / A DN150 / PN16 ENU: blind flange				1.0425 (US GEPRÜFT)	10028-2	1092-1	9	3.1	21,00
11		16	730757	DEU: Sechskantschraube M 20 x 50 ENU: screw				1.7218	10269	933	7		2,22
12		2	731226	DEU: Blockflansch AA100-PN 16 h=40 ENU: block flange				1.0425 (US GEPRÜFT)		28117	9	3.1	17,60
13		2	713204	DEU: Flachdichtung Innenbördel DN100 PN16 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,20

Emmerthaler Apparatebau GmbH
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Teileliste
part list

Reflexionsschalldämpfer
1st stage DN1200 GQB22.23

Artikel-Nr.: 2000064641_1ST STAGE
part list

Revision:
revision

Zeichnungsnummer: 2000064641_1st stage
drawingnumber

Gewicht (kg): 14454,20
weight (kg)

Erstellt developed	Datum date	18.11.2021	Name name	Ahlers
Bearbeitet processed	Datum date	23.11.2021	Name name	Ahlers
Geprüft + genehmigt checked + approved	Datum date	23.11.2021	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
14		2	715132	DEU: B-Flansch Typ05 / A DN100 / PN16 ENU: flange				1.0425 (US GEPRÜFT)	10028-2	1092-1	9	3.1	11,30
15		16	733943	DEU: Sechskantschraube M 16 x 35 ENU: screw				1.7218	10269	ISO 4017	7		1,34
16		1	710319	DEU: Blech s = 16,0 ENU: sheet plate		200	7.665	1.0425	10028-2	10029-A	1	3.1	192,54
17		1	701589	DEU: Blech (Ø=2420/2100) s = 30,0 ENU: sheet plate		2.420	2.420	1.0425	10028-2	10029-1	1		262,50
18		2	735510	DEU: Klöpperboden 2200 x 20 ENU: dished boiler end				1.0425	10028-2	28011	1		1.460,00
19		1	706383	DEU: Verschlussschraube G 1/8 Zoll ENU: locking screw				GAL. ZN		910			0,06
20		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		1.588	2.170	1.0425	10028-2	10029-A	1		541,02
21		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		360	2.828	1.0425	10028-2	10029-A	1	3.1	319,68
22		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		774	2.148	1.0425	10028-2	10029-A	1		273,80
23		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		300	2.095	1.0425	10028-2	10029-A	1		98,67
24		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		300	2.095	1.0425	10028-2	10029-A	1		98,67
25		4	707106	DEU: Blech s = 20,0 ENU: sheet plate		878	280	1.0425	10028-2	10029-A	1		154,39
26		8	707106	DEU: Blech s = 20,0 ENU: sheet plate		363	130	1.0425	10028-2	10029-A	1		59,27
27		2	701589	DEU: Blech s = 30,0 ENU: sheet plate		2.155	340	1.0425	10028-2	10029-1	1		345,10
28		2	701589	DEU: Blech s = 30,0 ENU: sheet plate		320	50	1.0425	10028-2	10029-1	1		7,54

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Teileliste
part list

Reflexionsschalldämpfer
1st stage DN1200 GQB22.23

Artikel-Nr.: 2000064641_1ST STAGE
part list

Revision:
revision

Zeichnungsnummer: 2000064641_1st stage
drawingnumber

Gewicht (kg): 14454,20
weight (kg)

Erstellt developed	Datum date	18.11.2021	Name name	Ahlers
Bearbeitet processed	Datum date	23.11.2021	Name name	Ahlers
Geprüft + genehmigt checked + approved	Datum date	23.11.2021	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
29		2	709370	DEU: I-Träger HEB 300 IPB ENU: beam		250		1.0037		1025			58,60
30		2	706093	DEU: Blech s = 8,0 ENU: sheet plate		50	40	1.4301	10028-7	10029-A	2		0,25
31		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		320	160	1.0425	10028-2	10029-A	1	3.1	16,08
32		2	710319	DEU: Blech s = 16,0 ENU: sheet plate		210	180	1.0425	10028-2	10029-A	1		9,50
33		1	BZ000477	DEU: Typenschildbrücke s=1,5 / 115 x 97mm, gekantet für Typenschild gelasert ENU: rating plate holder	4000610202VERS01/T007258_1			1.4301	10028-7	10029-A	2		0,06
34		1	716722	DEU: Typenschild mit Firmenlogo Emmerthal 70 x 90 x 1,5 mm ENU: type plate	4000611644Vers02/T007402 REV_A			ALU					0,07
35		4	710231	DEU: Blindniet d = 4,0 x 8,0 Best.-Nr. 427131943 ENU: pop rivet				A2					0,04

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Teileliste
part list

Reflexionsschalldämpfer
2nd stage DN1200 GQB22.23

Artikel-Nr.: 2000064641_2ND STAGE
part list

Zeichnungsnummer: 2000064641_2nd stage VERS01
drawingnumber

Revision: REV_A
revision

Rev. A

Anlage zu / attachment to
Prüfbericht / report N° 3094/50003/22
Datum / date: 17.01.2022

Gewicht (kg): 14297,02
weight (kg)

Erstellt developed	Datum date	07.01.2022	Name name	Ahlers
Bearbeitet processed	Datum date	07.01.2022	Name name	Ahlers
Geprüft + genehmigt checked + approved	Datum date	07.01.2022	Name name	Tuchel

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
1		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		2.206	7.477	1.0425	10028-2	10029-A	1	3.1	2.589,60
2		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		974	7.477	1.0425	10028-2	10029-A	1	3.1	1.143,37
3		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		2.454	7.477	1.0425	10028-2	10029-A	1	3.1	2.880,72
4		2	732146	DEU: Klöpperboden 2400 x 20,0 Zylindrischer Bord auf 20mm beigedreht ENU: dished boiler end				1.0425	10028-2	28011		3.1	2.130,00
5		2	724932	DEU: V-Flansch Typ11 / B1 DN1200 x 20,0 / PN10 ENU: v-flange Typ 11 / B1				P355QH1	10222-4	1092-1	9/10	3.2	557,80
6		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		505	3.766	1.0425	10028-2	10029-A	1	3.1	597,17
7	A	2	705995	DEU: Blech s = 25,0 ENU: sheet plate		1.625	1.800	1.0425	10028-2	10029-A	1	3.1	368,40
8		2	732168	DEU: Blockflansch AA150 PN16 h = 50 ENU: block flange				1.0425 (US GEPRÜFT)	10028-2	28117	9	3.1	35,00
9		2	713442	DEU: Flachdichtung Innenbördel DN150 PN16 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,20
10		2	715224	DEU: B-Flansch Typ05 / A DN150 / PN16 ENU: blind flange				1.0425 (US GEPRÜFT)	10028-2	1092-1	9	3.1	21,00
11		16	730757	DEU: Sechskantschraube M 20 x 50 ENU: screw				1.7218	10269	933	7		2,22
12		2	731226	DEU: Blockflansch AA100-PN 16 h=40 ENU: block flange				1.0425 (US GEPRÜFT)		28117	9	3.1	17,60

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Teileliste
part list

Reflexionsschalldämpfer
2nd stage DN1200 GQB22.23

Artikel-Nr.: part list	2000064641_2ND STAGE	Revision: revision	REV_A	Erstellt developed	Datum date	07.01.2022	Name name	Ahlers
Zeichnungsnummer: drawingnumber	2000064641_2nd stage VERS01			Bearbeitet processed	Datum date	07.01.2022	Name name	Ahlers
		Gewicht (kg): weight (kg)	14297,02	Geprüft + genehmigt checked + approved	Datum date	07.01.2022	Name name	Tuchel

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
13		2	713204	DEU: Flachdichtung Innenbördel DN100 PN16 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,20
14		2	715132	DEU: B-Flansch Typ05 / A DN100 / PN16 ENU: flange				1.0425 (US GEPRÜFT)	10028-2	1092-1	9	3.1	11,30
15		16	733943	DEU: Sechskantschraube M 16 x 35 ENU: screw				1.7218	10269	ISO 4017	7		1,34
16		1	710319	DEU: Blech s = 16,0 ENU: sheet plate		200	7.351	1.0425	10028-2	10029-A	1	3.1	184,66
17		1	701589	DEU: Blech (Ø=2320/2000) s = 30,0 ENU: sheet plate		2.320	2.320	1.0425	10028-2	10029-1	1		246,30
18		2	735510	DEU: Klöpperboden 2200 x 20 Zylindrischer Bord auf 20mm beigedreht ENU: dished boiler end				1.0425	10028-2	28011	1		1.460,00
19		1	706383	DEU: Verschlussschraube G 1/8 Zoll ENU: locking screw				GAL. ZN		910			0,06
20		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		1.515	2.491	1.0425	10028-2	10029-A	1		592,50
21		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		360	2.670	1.0425	10028-2	10029-A	1	3.1	301,82
22		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		790	2.062	1.0425	10028-2	10029-A	1		296,60
23		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		300	2.095	1.0425	10028-2	10029-A	1		98,67
24		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		300	2.095	1.0425	10028-2	10029-A	1		98,67
25		4	707106	DEU: Blech s = 20,0 ENU: sheet plate		890	280	1.0425	10028-2	10029-A	1		156,50
26		8	707106	DEU: Blech s = 20,0 ENU: sheet plate		417	130	1.0425	10028-2	10029-A	1		68,09

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Teileliste
part list

Reflexionsschalldämpfer
2nd stage DN1200 GQB22.23

Artikel-Nr.: part list	2000064641_2ND STAGE	Revision: revision	REV_A	Erstellt developed	Datum date	07.01.2022	Name name	Ahlers
Zeichnungsnummer: drawingnumber	2000064641_2nd stage VERS01			Bearbeitet processed	Datum date	07.01.2022	Name name	Ahlers
		Gewicht (kg): weight (kg)	14297,02	Geprüft + genehmigt checked + approved	Datum date	07.01.2022	Name name	Tuchel

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
27		2	701589	DEU: Blech s = 30,0 ENU: sheet plate		2.155	340	1.0425	10028-2	10029-1	1		345,10
28		2	701589	DEU: Blech s = 30,0 ENU: sheet plate		320	50	1.0425	10028-2	10029-1	1		7,54
29		2	709370	DEU: I-Träger HEB 300 IPB ENU: beam		250		1.0037		1025			58,60
30		2	706093	DEU: Blech s = 8,0 ENU: sheet plate		50	40	1.4301	10028-7	10029-A	2		0,25
31		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		320	160	1.0425	10028-2	10029-A	1	3.1	16,08
32		2	710319	DEU: Blech s = 16,0 ENU: sheet plate		210	180	1.0425	10028-2	10029-A	1		9,50
33		1	BZ000477	DEU: Typenschildbrücke s=1,5 / 115 x 97mm, gekantet für Typenschild gelasert ENU: rating plate holder	4000610202VERS01/T007258_1			1.4301	10028-7	10029-A	2		0,06
34		1	716722	DEU: Typenschild mit Firmenlogo Emmerthal 70 x 90 x 1,5 mm ENU: type plate	4000611644Vers02/T007402 REV_A			ALU					0,07
35		4	710231	DEU: Blindniet d = 4,0 x 8,0 Best.-Nr. 427131943 ENU: pop rivet				A2					0,04

Emmerthaler Apparatebau GmbH
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Teileliste
part list

Reflexionsschalldämpfer
cooling gas DN1200 GQB22.23

1 / 3

Artikel-Nr.: 2000064641_COOLING G
part list

Zeichnungsnummer: 2000064641_cooling gas VERS01
drawingnumber

Revision: REV_A Rev. A
revision

Anlage zu / attachment to
Prüfbericht / report N° 3094/50003/22
Datum / date: 17.01.2022

Gewicht (kg): 14578,46
weight (kg)

Erstellt developed	Datum date	07.01.2022	Name name	Ahlers	
Bearbeitet processed	Datum date	07.01.2022	Name name	Ahlers	
Geprüft + genehmigt checked + approved	Datum date	07.01.2022	Name name	Tuchel	

Pos. pos.	Index index	Stück piece	Artikel-Nr. article-no.	Benennung und Abmessung designation and dimensions	Zeichnungs-Nr. drawing-no.	Länge length	Breite width	Werkstoff material	DIN EN DIN EN	Standard standard	AD-W AD-W	WAZ WAZ	Gewicht (kg) Weight (kg)
1		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		2.045	7.477	1.0425	10028-2	10029-A	1	3.1	2.400,60
2		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		1.200	7.477	1.0425	10028-2	10029-A	1	3.1	1.408,67
3		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		2.304	7.477	1.0425	10028-2	10029-A	1	3.1	2.704,64
4		2	732146	DEU: Klöpperboden 2400 x 20,0 Zylindrischer Bord auf 20mm beigedreht ENU: dished boiler end				1.0425	10028-2	28011		3.1	2.130,00
5		2	724932	DEU: V-Flansch Typ11 / B1 DN1200 x 20,0 / PN10 ENU: v-flange Typ 11 / B1				P355QH1	10222-4	1092-1	9/10	3.2	557,80
6		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		505	3.766	1.0425	10028-2	10029-A	1	3.1	597,17
7	A	2	705995	DEU: Blech s = 25,0 ENU: sheet plate		1.505	1.640	1.0425	10028-2	10029-A	1	3.1	237,40
8		2	732168	DEU: Blockflansch AA150 PN16 h = 50 ENU: block flange				1.0425 (US GEPRÜFT)	10028-2	28117	9	3.1	35,00
9		2	713442	DEU: Flachdichtung Innenbördel DN150 PN16 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,20
10		2	715224	DEU: B-Flansch Typ05 / A DN150 / PN16 ENU: blind flange				1.0425 (US GEPRÜFT)	10028-2	1092-1	9	3.1	21,00
11		16	730757	DEU: Sechskantschraube M 20 x 50 ENU: screw				1.7218	10269	933	7		2,22
12		2	731226	DEU: Blockflansch AA100-PN 16 h=40 ENU: block flange				1.0425 (US GEPRÜFT)		28117	9	3.1	17,60

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Teileliste
part list

Reflexionsschalldämpfer
cooling gas DN1200 GQB22.23

Artikel-Nr.: part list	2000064641_COOLING G	Revision: revision	REV_A	Erstellt developed	Datum date	07.01.2022	Name name	Ahlers
Zeichnungsnummer: drawingnumber	2000064641_cooling gas VERS01			Bearbeitet processed	Datum date	07.01.2022	Name name	Ahlers
		Gewicht (kg): weight (kg)	14578,46	Geprüft + genehmigt checked + approved	Datum date	07.01.2022	Name name	Tuchel

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
13		2	713204	DEU: Flachdichtung Innenbördel DN100 PN16 Form IBC s=2 ENU: gasket				C 4400/1.4571	1514-1				0,20
14		2	715132	DEU: B-Flansch Typ05 / A DN100 / PN16 ENU: flange				1.0425 (US GEPRÜFT)	10028-2	1092-1	9	3.1	11,30
15		16	733943	DEU: Sechskantschraube M 16 x 35 ENU: screw				1.7218	10269	ISO 4017	7		1,34
16		1	710319	DEU: Blech s = 16,0 ENU: sheet plate		200	7.351	1.0425	10028-2	10029-A	1	3.1	184,66
17		1	701589	DEU: Blech (Ø=2320/2000) s = 30,0 ENU: sheet plate		2.320	2.320	1.0425	10028-2	10029-1	1		246,30
18		2	735510	DEU: Klöpperboden 2200 x 20 Zylindrischer Bord auf 20mm beigedreht ENU: dished boiler end				1.0425	10028-2	28011	1		1.460,00
19		1	706383	DEU: Verschlussschraube G 1/8 Zoll ENU: locking screw				GAL. ZN		910			0,06
20		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		1.900	3.440	1.0425	10028-2	10029-A	1		1.026,15
21		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		360	2.670	1.0425	10028-2	10029-A	1	3.1	301,82
22		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		790	2.062	1.0425	10028-2	10029-A	1		296,60
23		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		300	2.095	1.0425	10028-2	10029-A	1		98,67
24		1	707106	DEU: Blech s = 20,0 ENU: sheet plate		300	2.095	1.0425	10028-2	10029-A	1		98,67
25		4	707106	DEU: Blech s = 20,0 ENU: sheet plate		890	280	1.0425	10028-2	10029-A	1		156,50
26		8	707106	DEU: Blech s = 20,0 ENU: sheet plate		417	280	1.0425	10028-2	10029-A	1		146,65

Emmerthaler Apparatebau GmbH
Langes Feld 4
31860 Emmerthal

Teileliste
part list

Reflexionsschalldämpfer
cooling gas DN1200 GQB22.23

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Artikel-Nr.: part list	2000064641_COOLING G	Revision: revision	REV_A	Erstellt developed	Datum date	07.01.2022	Name name	Ahlers
Zeichnungsnummer: drawingnumber	2000064641_cooling gas VERS01			Bearbeitet processed	Datum date	07.01.2022	Name name	Ahlers
		Gewicht (kg): weight (kg)	14578,46	Geprüft + genehmigt checked + approved	Datum date	07.01.2022	Name name	Tuchel

Pos. / pos.	Index / index	Stück / piece	Artikel-Nr. / article-no.	Benennung und Abmessung / designation and dimensions	Zeichnungs-Nr. / drawing-no.	Länge / length	Breite / width	Werkstoff / material	DIN EN / DIN EN	Standard / standard	AD-W / AD-W	WAZ / WAZ	Gewicht (kg) / Weight (kg)
27		2	701589	DEU: Blech s = 30,0 ENU: sheet plate		2.155	340	1.0425	10028-2	10029-1	1		345,10
28		2	701589	DEU: Blech s = 30,0 ENU: sheet plate		320	50	1.0425	10028-2	10029-1	1		7,54
29		2	709370	DEU: I-Träger HEB 300 IPB ENU: beam		250		1.0037		1025			58,60
30		2	706093	DEU: Blech s = 8,0 ENU: sheet plate		50	40	1.4301	10028-7	10029-A	2		0,25
31		2	707106	DEU: Blech s = 20,0 ENU: sheet plate		320	160	1.0425	10028-2	10029-A	1	3.1	16,08
32		2	710319	DEU: Blech s = 16,0 ENU: sheet plate		210	180	1.0425	10028-2	10029-A	1		9,50
33		1	BZ000477	DEU: Typenschildbrücke s=1,5 / 115 x 97mm, gekantet für Typenschild gelasert ENU: rating plate holder	4000610202VERS01/T007258_1			1.4301	10028-7	10029-A	2		0,06
34		1	716722	DEU: Typenschild mit Firmenlogo Emmerthal 70 x 90 x 1,5 mm ENU: type plate	4000611644Vers02/T007402 REV_A			ALU					0,07
35		4	710231	DEU: Blindniet d = 4,0 x 8,0 Best.-Nr. 427131943 ENU: pop rivet				A2					0,04

EMMERTHAL

TITLE	***:***	***Weldingbook***
MANUFACTURER	:	n.a.
CLIENT	:	Aerzener Maschinenfabrik GmbH
PURCHASE ORDER	:	4500495448
PROJECT	:	---
DESTINATION	:	---
MANUFACTURER JOB	:	EAV2101539
Item	:	Tag. No.
MANUFACTURER DRAWING N°	:	2000064641, 1 Stage, 2 Stage, Cooling gas
MANUFACTURER DOCUMENT N°	:	WTS_ 2000064641 WPS 1. Stage, 2. Stage, Cooling gas
MANUFACTURER SERIAL N°	:	---
Revision	:	

DOC. CLASS:

REV	DATE	DESCRIPTION	BY	CHECKED	APPROVED
00	03.01.2022	Prepare	A.Hahn	J. Namislo	

SCALE : LOCATION RUWAIS PROJECT No.

PROJECT:

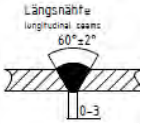
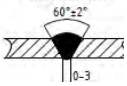
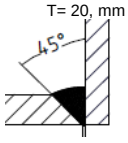
Weldbook
Reflexionsschalldämpfer Silencer
1. Stage, 2. Stage, Cooling Gas

DRG No.:			of
DRG No.:			of
SHT SIZE A4	DRAWING No.	SHT No.	REV.

Welding Procedure Sheet (WTS)

Emmerthaler Apparatebau GmbH

Kunde: **Customer:**	Aerzener Maschinenfabrik GmbH	Bauteil: Object:	Reflexionsschalldämpfer 1 Stage Fabrik-Nr.:
Auftrags-Nr.: **Order no:**	4500495448	**Zeichnungs-Nr.:** **Drawing no.:**	2000064641 Rev. 01
Tag No.:			
WTS- No.:	WTS 2000064641 Rev. 0	EAV-Nr.:	2101539

Weld Nr: Seam no – |	Naht folge Weld sequence	Nahtform form of weld	Art der Naht-vorbereitung weld preparation 1 mechanisch 2 thermisch 3 ohne			Drawing No. / Material	Verfahren / welding process und / and Zusatzwerkstoff / filler metal	weld pos. Welder Stamp
			1	2	3	2000064641		
LN1 LN2 LN3 LN4 LN5 LN6	1 - 5	V - Naht / type Längsnaht longitudinal seam (gegengeschweißt) (Backing) T= 15 - 25 mm 	x			P265 GH – P250 GH	**WPAR-Nr.: n.n.** WPS-Nr.:2000064641 LN1- LN5 135 / 121 SGMAGM / SAW GMAW SG3 G4Si1 EN ISO 440 DIN EN 758 Schutzgas/shielding gas M21 ISO EN 14175 SAW Wire L61 DIN EN 756 SAW Flux LW 860 DIN EN 760 (Lincoln)	F, H
			1	2	3			
RN1 - RN6	6 - 11	V - Naht / type Rundnaht circumferential seam (gegengeschweißt) (Backing) T= 15 - 25 mm 	x			P265 GH – P250 GH	**WPAR-Nr.: n.n.** WPS-Nr.: 2000064641 RN1-RN6 135 / 121 SGMAGM / SAW GMAW SG3 G4Si1 EN ISO 440 DIN EN 758 Schutzgas/shielding gas M21 ISO EN 14175 SAW Wire L61 DIN EN 756 SAW Flux LW 860 DIN EN 760 (Lincoln)	F, H
			1	2	3			
15a 15b 16a 16b 19a 19b	12 - 17	HV - Naht / type Rundnaht circumferential seam T= 20, mm 	X			P265GH – P265GH	**WPAR-Nr.: n.n.** WPS-Nr.: 2000064641 N15_N16_N19 135 / 121 SGMAGM / SAW GMAW SG3 G4Si1 EN ISO 440 DIN EN 758 Schutzgas/shielding gas M21 ISO EN 14175 SAW Wire L61 DIN EN 756 SAW Flux LW 860 DIN EN 760 (Lincoln)	F, H

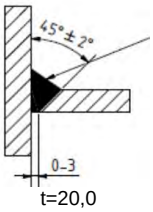
Datum: 15.12.2021
date

Seite **1** von **2**

Erstellt Hahn — Geprüft Namislo

Welding Procedure Sheet (WTS)
Emmerthaler Apparatebau GmbH

Kunde: **Customer:**	Aerzener Maschinenfabrik GmbH	Bauteil: Object:	Reflexionsschalldämpfer 1 Stage Fabrik-Nr.:
Auftrags-Nr.: **Order no:**	4500495448	**Zeichnungs-Nr.:** **Drawing no.:**	2000064641 Rev. 01
Tag No.:			
WTS- No.:	WTS 2000064641 Rev. 0	EAV-Nr.:	2101539

			1	2	3		**WPAR-Nr.: n.n**	
STN1 - STN6	18 - 23	Fillet weld Nozzle seam  t=20,0		X		P235 GH – P235 GH	WPS-Nr.: 2000064641 STN1- STN6 135 SGMAGM GMAW SG3 G4Si1 EN ISO 440 Schutzgas/shielding gas M21 ISO EN 14175	
1 - 17	24 - 40	Kehlnaht Fillet weld 	1 x	2	3	P265 GH – P235 GH	**WPAR-Nr.: n.n.** WPS-Nr.: 2000064641 Fillet welds 135 GMAW SG3 G4Si1 EN ISO 440 Schutzgas/shielding gas M21 ISO EN 14175	F, H

Kehlnaht a Maße = Siehe Angaben auf der Zeichnung 2000064641
NDE Examination:
Siehe Zeichnung/on drawing 2000064641

EMMERTHALER APPARATEBAU GMBH 31860 EMMERTHAL 1 Tel. 05155/622-0

Datum: 15.12.2021
date

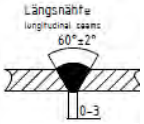
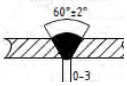
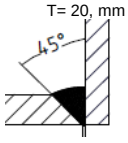
Seite **2** von **2**

Erstellt Hahn | Geprüft Namislo

Welding Procedure Sheet (WTS)

Emmerthaler Apparatebau GmbH

Kunde: **Customer:** **клиент:**	Aerzener Maschinenfabrik GmbH	Bauteil: Object:	Reflexionsschalldämpfer 2 Stage Fabrik-Nr.:
Auftrags-Nr.: **Order no:**	4500495448	**Zeichnungs-Nr.:** **Drawing no.:**	2000064641 Rev. 01
Tag No.:			
WTS- No.:	WTS 2000064641 Rev. 0	EAV-Nr.:	2101539

Weld Nr: Seam no – |	Naht folge Weld sequence	Nahtform form of weld	Art der Naht-vorbereitung weld preparation 1 mechanisch 2 thermisch 3 ohne			Drawing No. / Material	Verfahren / welding process und / and Zusatzwerkstoff / filler metal	weld pos. Welder Stamp
			1	2	3	2000064641	**WPAR-Nr.: n.n.**	
LN1 LN2 LN3 LN4 LN5 LN6	1 - 5	V - Naht / type Längsnaht longitudinal seam (gegengeschweißt) (Backing) T= 15 - 25 mm 	x			P265 GH – P250 GH	WPS-Nr.:2000064641 LN1- LN5 135 / 121 SGMAGM / SAW GMAW SG3 G4Si1 EN ISO 440 DIN EN 758 Schutzgas/shielding gas M21 ISO EN 14175 SAW Wire L61 DIN EN 756 SAW Flux LW 860 DIN EN 760 (Lincoln)	F, H
			1	2	3		**WPAR-Nr.: n.n.**	
RN1 - RN6	6 - 11	V - Naht / type Rundnaht circumferential seam (gegengeschweißt) (Backing) T= 15 - 25 mm 	x			P265 GH – P250 GH	WPS-Nr.: 2000064641 RN1-RN6 135 / 121 SGMAGM / SAW GMAW SG3 G4Si1 EN ISO 440 DIN EN 758 Schutzgas/shielding gas M21 ISO EN 14175 SAW Wire L61 DIN EN 756 SAW Flux LW 860 DIN EN 760 (Lincoln)	F, H
			1	2	3		**WPAR-Nr.: n.n.**	
15a 15b 16a 16b 19a 19b	12 - 17	HV - Naht / type Rundnaht circumferential seam T= 20, mm 	X			P265GH – P265GH	WPS-Nr.: 2000064641 N15_N16_N19 135 / 121 SGMAGM / SAW GMAW SG3 G4Si1 EN ISO 440 DIN EN 758 Schutzgas/shielding gas M21 ISO EN 14175 SAW Wire L61 DIN EN 756 SAW Flux LW 860 DIN EN 760 (Lincoln)	F, H

Datum: 15.12.2021
date

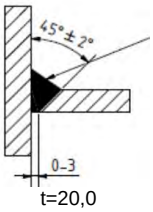
Seite **1** von **2**

Erstellt Hahn — Geprüft Namislo

Welding Procedure Sheet (WTS)

Emmerthaler Apparatebau GmbH

Kunde: **Customer:** **клиент:**	Aerzener Maschinenfabrik GmbH	Bauteil: Object:	Reflexionsschalldämpfer 2 Stage Fabrik-Nr.:
Auftrags-Nr.: **Order no:**	4500495448	**Zeichnungs-Nr.:** **Drawing no.:**	2000064641 Rev. 01
Tag No.:			
WTS- No.:	WTS 2000064641 Rev. 0	EAV-Nr.:	2101539

			1	2	3		**WPAR-Nr.: n.n**	
STN1 - STN6	18 - 23	Fillet weld Nozzle seam  t=20,0		X		P235 GH – P235 GH	WPS-Nr.: 2000064641 STN1- STN6 135 SGMAGM GMAW SG3 G4Si1 EN ISO 440 Schutzgas/shielding gas M21 ISO EN 14175	
1 - 17	24 - 40	Kehlnaht Fillet weld 	1 x	2	3	P265 GH – P235 GH	**WPAR-Nr.: n.n.** WPS-Nr.: 2000064641 Fillet welds 135 GMAW SG3 G4Si1 EN ISO 440 Schutzgas/shielding gas M21 ISO EN 14175	F, H

Kehlnaht a Maße = Siehe Angaben auf der Zeichnung 2000064641

NDE Examination:

Siehe Zeichnung/on drawing 2000064641

EMMERTHALER APPARATEBAU GMBH 31860 EMMERTHAL 1 Tel. 05155/622-0

Datum: 15.12.2021
date

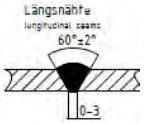
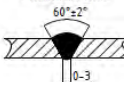
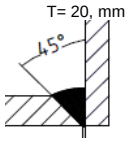
Seite **2** von **2**

Erstellt Hahn | Geprüft Namislo

Welding Procedure Sheet (WTS)

Emmerthaler Apparatebau GmbH

Kunde: **Customer:** **клиент:**	Aerzener Maschinenfabrik GmbH	Bauteil: Object:	Reflexionsschalldämpfer Cooling gas Fabrik-Nr.:
Auftrags-Nr.: **Order no:**	4500495448	**Zeichnungs-Nr.:** **Drawing no.:**	2000064641 Rev. 01
Tag No.:			
WTS- No.:	WTS 2000064641 Rev. 0	EAV-Nr.:	2101539

Weld Nr: Seam no – |	Naht folge Weld sequence	Nahtform form of weld	Art der Naht-vorbereitung weld preparation 1 mechanisch 2 thermisch 3 ohne			Drawing No. / Material	Verfahren / welding process und / and Zusatzwerkstoff / filler metal	weld pos. Welder Stamp
			1	2	3	2000064641		
LN1 LN2 LN3 LN4 LN5 LN6	1 - 5	V - Naht / type Längsnaht longitudinal seam (gegengeschweißt) (Backing) T= 15 - 25 mm 	x			P265 GH – P250 GH	**WPAR-Nr.: n.n.** WPS-Nr.:2000064641 LN1- LN5 135 / 121 SGMAGM / SAW GMAW SG3 G4Si1 EN ISO 440 DIN EN 758 Schutzgas/shielding gas M21 ISO EN 14175 SAW Wire L61 DIN EN 756 SAW Flux LW 860 DIN EN 760 (Lincoln)	F, H
			1	2	3			
RN1 - RN6	6 - 11	V - Naht / type Rundnaht circumferential seam (gegengeschweißt) (Backing) T= 15 - 25 mm 	x			P265 GH – P250 GH	**WPAR-Nr.: n.n.** WPS-Nr.: 2000064641 RN1-RN6 135 / 121 SGMAGM / SAW GMAW SG3 G4Si1 EN ISO 440 DIN EN 758 Schutzgas/shielding gas M21 ISO EN 14175 SAW Wire L61 DIN EN 756 SAW Flux LW 860 DIN EN 760 (Lincoln)	F, H
			1	2	3			
15a 15b 16a 16b 19a 19b	12 - 17	HV - Naht / type Rundnaht circumferential seam T= 20, mm 	X			P265GH – P265GH	**WPAR-Nr.: n.n.** WPS-Nr.: 2000064641 N15_N16_N19 135 / 121 SGMAGM / SAW GMAW SG3 G4Si1 EN ISO 440 DIN EN 758 Schutzgas/shielding gas M21 ISO EN 14175 SAW Wire L61 DIN EN 756 SAW Flux LW 860 DIN EN 760 (Lincoln)	F, H

Datum: 15.12.2021
date

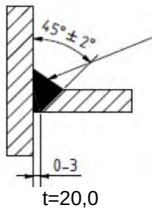
Seite **1** von **2**

Erstellt Hahn — Geprüft Namislo

Welding Procedure Sheet (WTS)

Emmerthaler Apparatebau GmbH

Kunde: **Customer:** **клиент:**	Aerzener Maschinenfabrik GmbH	Bauteil: Object:	Reflexionsschalldämpfer Cooling gas Fabrik-Nr.:
Auftrags-Nr.: **Order no:**	4500495448	**Zeichnungs-Nr.:** **Drawing no.:**	2000064641 Rev. 01
Tag No.:			
WTS- No.:	WTS 2000064641 Rev. 0	EAV-Nr.:	2101539

			1	2	3		**WPAR-Nr.: n.n**	
STN1 - STN6	18 - 23	Fillet weld Nozzle seam  t=20,0		X		P235 GH – P235 GH	WPS-Nr.: 2000064641 STN1- STN6 135 SGMAGM GMAW SG3 G4Si1 EN ISO 440 Schutzgas/shielding gas M21 ISO EN 14175	
1 - 17	24 - 40	Kehlnaht Fillet weld 	1 x	2	3	P265 GH – P235 GH	**WPAR-Nr.: n.n.** WPS-Nr.: 2000064641 Fillet welds 135 GMAW SG3 G4Si1 EN ISO 440 Schutzgas/shielding gas M21 ISO EN 14175	F, H

Kehlnaht a Maße = Siehe Angaben auf der Zeichnung 2000064641

NDE Examination:

Siehe Zeichnung/on drawing 2000064641

EMMERTHALER APPARATEBAU GMBH 31860 EMMERTHAL 1 Tel. 05155/622-0

Datum: 15.12.2021
date

Seite **2** von **2**

Erstellt Hahn | Geprüft Namislo

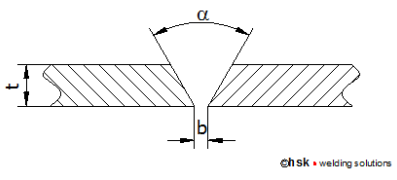
Emmerthaler Apparatebau GmbH 31860 Emmerthal Langes Feld 4	WPS silencer 1 st stage DN 1200 PN10	WPS-Nr. / *WPS no.* Rev. WPS 2000064641 LN1-LN5 Seite / *Page* 1 von / *of* 2

Ort *Location*:	n.a.	Prüfer oder Prüfstelle: *Examiner or test centre:*	
WPQR-Nr. *WPQR No.*:	n.a.	Art der Vorbereitung und Reinigung: *Method of preparation and cleaning:*	Plasma cutting
Schweißerqualifikation *Welder qualification*:	n.a.	Bearbeitung der Wurzellage: *Processing the root weld:*	Grinding
Schweißprozess *Welding process*:	135-(MAG), 121-(UP)	Spezifikation Grundwerkstoff(e): *Parent material specification:*	Gruppennr. ISO 15608: *Group no ISO 15608:*
Nahtart *Joint type*:	siehe Zeichnung / *see manufacturing drawing*	[1.0425], P265GH	1.1
Kunde *Customer*:	Aerzener Maschinenfabrik	[1.0425], P265GH	1.1
Auftrags-Nr. *Order no.*:	4500495448	Werkstoffdicke *Material thickness*:	20 mm
Zeichnungs-Nr. *Drawing no.*:	2000064641	Außendurchmesser *Outside diameter*:	125 - 1380 mm mm
Teile-Nr. *Part no.*:	longitudinal seam no.: N 1 - N5	Schweißposition *Welding position*:	PA

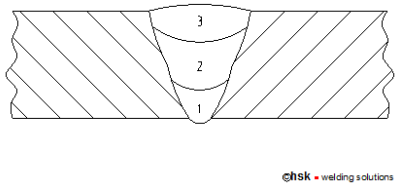
Maße: / *Dimensions:*

t1=20 mm
b= 3-4mm
ß= 40°
u=0,5 - 1,0 mm
t2=20mm

Gestaltung der Verbindung / *Joint design*



Schweißfolge / *Welding sequence*



Bemerkung / *Remark*:
Flux : Lincoln 860
Typ:SA AB 1 66 AC H 5 DIN EN 760
Dry : 2 Std. 350 °C

Einzelheiten für das Schweißen / *Welding details*

	Schweißlage *Welding pass*	Prozess *Process*	Ø Schweiß-zusatz *Ø weld filler*	Gas	Strom *Current*	Spannung *Voltage*	Stromart / Polung *Current / Polarity*	Draht-vorschub-geschw. *Wire feed rate*	Schweiß-geschwindig-keit *Travel speed*	Wärme-einbringung *Heat input*
A	Root pass 2	135	1 mm	Gas-1	160-180 A A	16-19 V	= / +	3,8-4,5 m/min	14-18 cm/min	0,683 - 1,173 kJ/mm
B	Filler pass 3	121	2,4-3,2 mm		380 A	28 V	= / -	automatisch	55 cm/min	1,161 kJ/mm
C	Cappass 3	121	2,4-3,2 mm		450 A	31 V	= / -	automatisch	60 cm/min	1,395 kJ/mm
D	Backingpass 1	121	2,4-3,2 mm		450 A	31 V	= / -	automatisch	60 cm/min	1,395 kJ/mm

Schweißzusatz / Schweißpulver / *Welding filler / welding flux*

Sondervorschriften für Trocknung / *Special regulations for drying*

Prozess / *Process*	Bezeichnung *Designation*	Ø Schweiß-zusatz *Ø weld filler*	Markenname *Brand name*	Hersteller *Manufacturer*	Zeit *Time*	Temperatur *Temperature*
135	DIN EN 440	1 mm	Carbofil 1a	Oerlikon		
121	EN 756	2,4-3,2 mm	L61 LW860	Lincoln		

Schutzgas / *Shielding gas*

	Typ *Type*	Markenname *Brand name*	Hersteller *Manufacturer*	Menge *Volume*	Vorströmzeit *Pre-purge time*	Nachströmzeit *Post-purge time*
Gas-1	Schutzgas / *Shielding*: M21-ArC-18			12 - 15 l/min	0,5 s	3 s

Erstellt mit schweissassistent® von hsk-welding solutions

Emmerthaler Apparatebau GmbH 31860 Emmerthal Langes Feld 4	WPS silencer 1 st stage DN 1200 PN10	WPS-Nr. / *WPS no.* Rev. WPS 2000064641 LN1-LN5 Seite / *Page* 2 von / *of* 2

Weitere Informationen / *Further information*

	Parameter	Wert / *Value*
A	Düsen- / Gaskappengröße *Nozzle /gas cup size*	16
A	Werkstoffübergang *Material transfer*	Kurzlichtbogen
A	Kontaktrohrabstand *Distance contact tube/work piece*	10 - 20 mm
B	Kontaktrohrabstand *Distance contact tube/work piece*	25-30 mm
C	Kontaktrohrabstand *Distance contact tube/work piece*	25-30 mm
D	Kontaktrohrabstand *Distance contact tube/work piece*	25-30 mm

Schweißraupenform / *Weld bead form*	Strichraupe / *stringer bead*
Vorwärmtemperatur *Preheat temperature*:	>25mm 100 °C
Zwischenlagentemperatur *Interpass temperature*:	≤ 250 °C

Datum, Erstellt / *Date, prepared*: 16.12.2021 Hahn	Datum, Geprüft / *Date, checked*: 16.12.2021 Namislo	Datum, Freigegeben / *Date, released*:
Unterschrift / *Signature*	Unterschrift / *Signature*	Unterschrift / *Signature*

Erstellt mit schweissassistent® von hsk-welding solutions

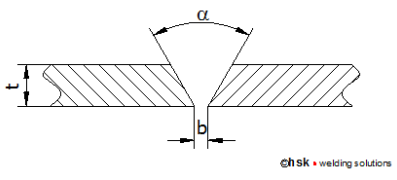
Emmerthaler Apparatebau GmbH 31860 Emmerthal Langes Feld 4	WPS silencer 1 st stage DN 1200 PN10	WPS-Nr. / *WPS no.* Rev. WPS 2000064641 RN1-RN6 Seite / *Page* 1 von / *of* 2

Ort *Location*:	n.a.	Prüfer oder Prüfstelle: *Examiner or test centre:*	
WPQR-Nr. *WPQR No.*:	n.a.	Art der Vorbereitung und Reinigung: *Method of preparation and cleaning:*	Plasma cutting
Schweißerqualifikation *Welder qualification*:	n.a.	Bearbeitung der Wurzellage: *Processing the root weld:*	Grinding
Schweißprozess *Welding process*:	135-(MAG), 121-(UP)	Spezifikation Grundwerkstoff(e): *Parent material specification:*	Gruppennr. ISO 15608: *Group no ISO 15608:*
Nahtart *Joint type*:	siehe Zeichnung / *see manufacturing drawing*	[1.0425], P265GH	1.1
Kunde *Customer*:	Aerzener Maschinenfabrik	[1.0425], P265GH	1.1
Auftrags-Nr. *Order no.*:	4500495448	Werkstoffdicke *Material thickness*:	20 mm
Zeichnungs-Nr. *Drawing no.*:	2000064641	Außendurchmesser *Outside diameter*:	1200 - 2500 mm
Teile-Nr. *Part no.*:	circumferential seam no.: N 1 - N6	Schweißposition *Welding position*:	PA

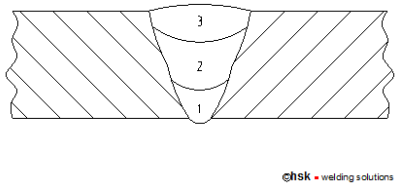
Maße: / *Dimensions:*

t1=20 mm
b= 3-4mm
α=60°
t2=20mm

Gestaltung der Verbindung / *Joint design*



Schweißfolge / *Welding sequence*



Bemerkung / *Remark*:
Flux : Lincoln 860
Typ:SA AB 1 66 AC H 5 DIN EN 760
Dry : 2 Std. 350 °C

Einzelheiten für das Schweißen / *Welding details*

	Schweißlage *Welding pass*	Prozess *Process*	Ø Schweiß-zusatz *Ø weld filler*	Gas	Strom *Current*	Spannung *Voltage*	Stromart / Polung *Current / Polarity*	Draht-vorschub-geschw. *Wire feed rate*	Schweiß-geschwindig-keit *Travel speed*	Wärme-einbringung *Heat input*
A	Root pass 2	135	1 mm	Gas-1	160-180 A	16-19 V	= / +	3,8-4,5 m/min	14-18 cm/min	0,683 - 1,173 kJ/mm
B	Filler pass 3	121	2,4-3,2 mm		380 A	28 V	= / -	automatisch	55 cm/min	1,161 kJ/mm
C	Cappass 3	121	2,4-3,2 mm		450 A	31 V	= / -	automatisch	60 cm/min	1,395 kJ/mm
D	Backingpass 1	121	2,4-3,2 mm		450 A	31 V	= / -	automatisch	60 cm/min	1,395 kJ/mm

Schweißzusatz / Schweißpulver / *Welding filler / welding flux*

Sondervorschriften für Trocknung / *Special regulations for drying*

Prozess / *Process*	Bezeichnung *Designation*	Ø Schweiß-zusatz *Ø weld filler*	Markenname *Brand name*	Hersteller *Manufacturer*	Zeit *Time*	Temperatur *Temperature*
135	DIN EN 440	1 mm	Carbofil 1a	Oerlikon		
121	EN 756	2,4-3,2 mm	L61 LW860	Lincoln		

Schutzgas / *Shielding gas*

	Typ *Type*	Markenname *Brand name*	Hersteller *Manufacturer*	Menge *Volume*	Vorströmzeit *Pre-purge time*	Nachströmzeit *Post-purge time*
Gas-1	Schutzgas / *Shielding*: M21-ArC-18			12 - 15 l/min	0,5 s	3 s

Erstellt mit schweissassistent® von hsk-welding solutions

Emmerthaler Apparatebau GmbH 31860 Emmerthal Langes Feld 4	WPS silencer 1 st stage DN 1200 PN10	WPS-Nr. / *WPS no.* Rev. WPS 2000064641 RN1-RN6 Seite / *Page* 2 von / *of* 2

Weitere Informationen / *Further information*

	Parameter	Wert / *Value*
A	Düsen- / Gaskappengröße *Nozzle /gas cup size*	16
A	Werkstoffübergang *Material transfer*	Kurzlichtbogen
A	Kontaktrohrabstand *Distance contact tube/work piece*	10 - 20 mm
B	Kontaktrohrabstand *Distance contact tube/work piece*	25-30 mm
C	Kontaktrohrabstand *Distance contact tube/work piece*	25-30 mm
D	Kontaktrohrabstand *Distance contact tube/work piece*	25-30 mm

Schweißraupenform / *Weld bead form*	Strichraupe / *stringer bead*
Vorwärmtemperatur *Preheat temperature*:	>25mm 100 °C
Zwischenlagentemperatur *Interpass temperature*:	≤ 250 °C

Datum, Erstellt / *Date, prepared*: 16.12.2021 Hahn	Datum, Geprüft / *Date, checked*: 16.12.2021 Namislo	Datum, Freigegeben / *Date, released*:
Unterschrift / *Signature*	Unterschrift / *Signature*	Unterschrift / *Signature*

Erstellt mit schweissassistent® von hsk-welding solutions

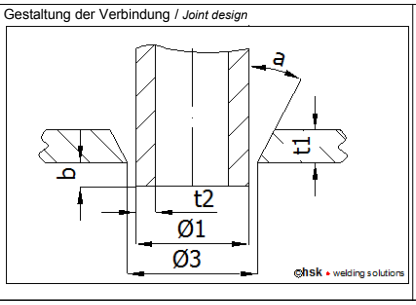
Emmerthaler Apparatebau GmbH 31860 Emmerthal Langes Feld 4	WPS silencer 1 st stage DN 1200 PN10	WPS-Nr. / *WPS no.* Rev. WPS2000064641 STN1-STN6 Seite / *Page* 1 von / *of* 2

Ort *Location*:	n.a.	Prüfer oder Prüfstelle: *Examiner or test centre:*	
WPQR-Nr. *WPQR No.*:	n.a.	Art der Vorbereitung und Reinigung: *Method of preparation and cleaning:*	Plasma cutting
Schweißerqualifikation *Welder qualification*:	n.a.	Bearbeitung der Wurzellage: *Processing the root weld:*	Grinding
Schweißprozess *Welding process*:	135-(MAG)	Spezifikation Grundwerkstoff(e): *Parent material specification:*	Gruppennr. ISO 15608: *Group no ISO 15608:*
Nahtart *Joint type*:	siehe Zeichnung / *see manufacturing drawing*	[1.0425], P265GH	1.1
Kunde *Customer*:	Aerzener Maschinenfabrik	[1.0425], P265GH	1.1
Auftrags-Nr. *Order no.*:	4500495448	Werkstoffdicke *Material thickness*:	20 mm
Zeichnungs-Nr. *Drawing no.*:	2000064641	Außendurchmesser *Outside diameter*:	DN100 - DN1200 mm
Teile-Nr. *Part no.*:	circumferential HV seams no.: STN 1 - ST6	Schweißposition *Welding position*:	PA

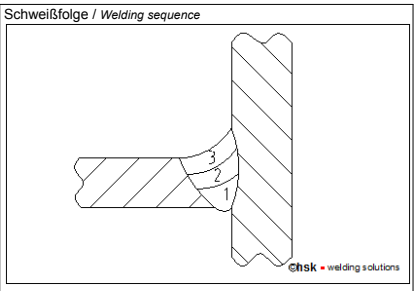
Maße: / *Dimensions:*

t1=20 mm
Ø1= 114 - 1200mm
α=40 -45°
t2=20mm

Gestaltung der Verbindung / *Joint design*



Schweißfolge / *Welding sequence*



Bemerkung / *Remark*:
Flux : Lincoln 860
Typ:SA AB 1 66 AC H 5 DIN EN 760
Dry : 2 Std. 350 °C

Einzelheiten für das Schweißen / *Welding details*

	Schweißlage *Welding pass*	Prozess *Process*	Ø Schweiß-zusatz *Ø weld filler*	Gas	Strom *Current*	Spannung *Voltage*	Stromart / Polung *Current / Polarity*	Draht-vorschub-geschw. *Wire feed rate*	Schweiß-geschwindig-keit *Travel speed*	Wärme-einbringung *Heat input*
A	Root pass 1	135	1-1,2 mm	Gas-1	160-180 A	16-19 V	= / +	3,8-4,5 m/min	14-18 cm/min	0,683 - 1,173 kJ/mm
B	filler passes 2	135	1-1,2 mm	Gas-1	220-260 A	28-30 V	= / +	12 - 14 m/min	18-25 cm/min	1,183 - 2,08 kJ/mm
C	Cap passes 3	135	1-1,2 mm	Gas-1	220 - 260 A	28 - 30 V	= / +	12 - 14 m/min	18-25 cm/min	1,183 - 2,08 kJ/mm

Schweißzusatz / Schweißpulver / *Welding filler / welding flux* Sondervorschriften für Trocknung / *Special regulations for drying*

Prozess / *Process*	Bezeichnung *Designation*	Ø Schweiß-zusatz *Ø weld filler*	Markenname *Brand name*	Hersteller *Manufacturer*	Zeit *Time*	Temperatur *Temperature*
135	DIN EN 440	1-1,2 mm	Carbofil 1a	Oerlikon		

Schutzgas / *Shielding gas*

	Typ *Type*	Markenname *Brand name*	Hersteller *Manufacturer*	Menge *Volume*	Vorströmzeit *Pre-purge time*	Nachströmzeit *Post-purge time*
Gas-1	Schutzgas / *Shielding*: M21-ArC-18			12 - 15 l/min	0,5 s	3 s

Erstellt mit schweissassistent® von hsk-welding solutions

Emmerthaler Apparatebau GmbH 31860 Emmerthal Langes Feld 4	WPS silencer 1 st stage DN 1200 PN10	WPS-Nr. / *WPS no.* Rev. WPS2000064641 STN1-STN6 Seite / *Page* 2 von / *of* 2

Weitere Informationen / *Further information*

	Parameter	Wert / *Value*
A	Düsen- / Gaskappengröße *Nozzle /gas cup size*	16
A	Werkstoffübergang *Material transfer*	Kurzlichtbogen
A	Kontaktrohrabstand *Distance contact tube/work piece*	10 - 20 mm
B	Düsen- / Gaskappengröße *Nozzle /gas cup size*	16
B	Werkstoffübergang *Material transfer*	Sprühbogen
B	Kontaktrohrabstand *Distance contact tube/work piece*	10 - 20 mm
C	Düsen- / Gaskappengröße *Nozzle /gas cup size*	16
C	Werkstoffübergang *Material transfer*	Sprühlichtbogen
C	Kontaktrohrabstand *Distance contact tube/work piece*	10 - 20 mm

Schweißraupenform / *Weld bead form*	Strichraupe / *stringer bead*
Vorwärmtemperatur *Preheat temperature*:	>25mm 100 °C
Zwischenlagentemperatur *Interpass temperature*:	≤ 250 °C

Datum, Erstellt / *Date, prepared*: 16.12.2021 Hahn	Datum, Geprüft / *Date, checked*: 16.12.2021 Namislo	Datum, Freigegeben / *Date, released*:
Unterschrift / *Signature*	Unterschrift / *Signature*	Unterschrift / *Signature*

Erstellt mit schweissassistent® von hsk-welding solutions

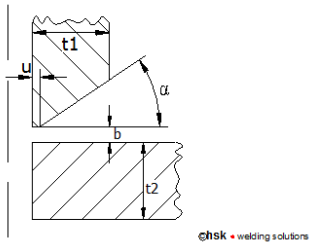
Emmerthaler Apparatebau GmbH 31860 Emmerthal Langes Feld 4	WPS silencer 1 st stage DN 1200 PN10	WPS-Nr. / *WPS no.* Rev. WPS2000064641 N15_N16_N19 Seite / *Page* 1 von / *of* 2

Ort *Location*:	n.a.	Prüfer oder Prüfstelle: *Examiner or test centre:*	
WPQR-Nr. *WPQR No.*:	n.a.	Art der Vorbereitung und Reinigung: *Method of preparation and cleaning:*	Plasma cutting
Schweißerqualifikation *Welder qualification*:	n.a.	Bearbeitung der Wurzellage: *Processing the root weld:*	Grinding
Schweißprozess *Welding process*:	135-(MAG), 121-(UP)	Spezifikation Grundwerkstoff(e): *Parent material specification:*	Gruppennr. ISO 15608: *Group no ISO 15608:*
Nahtart *Joint type*:	siehe Zeichnung / *see manufacturing drawing*	[1.0425], P265GH	1.1
Kunde *Customer*:	Aerzener Maschinenfabrik	[1.0425], P265GH	1.1
Auftrags-Nr. *Order no.*:	4500495448	Werkstoffdicke *Material thickness*:	20 mm
Zeichnungs-Nr. *Drawing no.*:	2000064641	Außendurchmesser *Outside diameter*:	1200 - 2500 mm
Teile-Nr. *Part no.*:	circumferential HV seams no.: N 15, N16, N19	Schweißposition *Welding position*:	PA

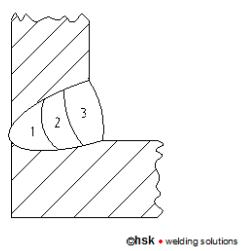
Maße: / *Dimensions:*

t1=20 mm
b= 3-4mm
α=45°
t2=20mm

Gestaltung der Verbindung / *Joint design*



Schweißfolge / *Welding sequence*



Bemerkung / *Remark*:
Flux : Lincoln 860
Typ:SA AB 1 66 AC H 5 DIN EN 760
Dry : 2 Std. 350 °C

Einzelheiten für das Schweißen / *Welding details*

	Schweißlage *Welding pass*	Prozess *Process*	Ø Schweiß-zusatz *Ø weld filler*	Gas	Strom *Current*	Spannung *Voltage*	Stromart / Polung *Current / Polarity*	Draht-vorschub-geschw. *Wire feed rate*	Schweiß-geschwindig-keit *Travel speed*	Wärme-einbringung *Heat input*
A	Root pass 1	135	1 mm	Gas-1	160-180 A	16-19 V	= / +	3,8-4,5 m/min	14-18 cm/min	0,683 - 1,173 kJ/mm
B	Filler passes 3	121	2,4-3,2 mm		380-420 A	28-30 V	= / -	automatisch	55 cm/min	1,161 - 1,375 kJ/mm
C	Cappasses 3	121	2,4-3,2 mm		420- 480 A	31-33 V	= / -	automatisch	60 cm/min	1,302 - 1,584 kJ/mm

Schweißzusatz / Schweißpulver / *Welding filler / welding flux* Sondervorschriften für Trocknung / *Special regulations for drying*

Prozess / *Process*	Bezeichnung *Designation*	Ø Schweiß-zusatz *Ø weld filler*	Markenname *Brand name*	Hersteller *Manufacturer*	Zeit *Time*	Temperatur *Temperature*
135	DIN EN 440	1 mm	Carbofil 1a	Oerlikon		
121	EN 756	2,4-3,2 mm	L61 LW860	Lincoln		

Schutzgas / *Shielding gas*

	Typ *Type*	Markenname *Brand name*	Hersteller *Manufacturer*	Menge *Volume*	Vorströmzeit *Pre-purge time*	Nachströmzeit *Post-purge time*
Gas-1	Schutzgas / *Shielding*: M21-ArC-18			12 - 15 l/min	0,5 s	3 s

Weitere Informationen / *Further information*

	Parameter	Wert / *Value*
A	Düsen- / Gaskappengröße *Nozzle /gas cup size*	16
A	Werkstoffübergang *Material transfer*	Kurzlichtbogen
A	Kontaktrohrabstand *Distance contact tube/work piece*	10 - 20 mm
B	Kontaktrohrabstand *Distance contact tube/work piece*	25-30 mm
C	Kontaktrohrabstand *Distance contact tube/work piece*	25-30 mm

Schweißraupenform / *Weld bead form*	Strichraupe / *stringer bead*
Vorwärmtemperatur *Preheat temperature*:	>25mm 100 °C
Zwischenlagentemperatur *Interpass temperature*:	≤ 250 °C

Erstellt mit schweissassistent® von hsk-welding solutions

Emmerthaler Apparatebau GmbH 31860 Emmerthal Langes Feld 4	WPS silencer 1 st stage DN 1200 PN10	WPS-Nr. / *WPS no.* Rev. WPS2000064641 N15_N16_N19 Seite / *Page* 2 von / *of* 2

Datum, Erstellt / *Date, prepared*: 16.12.2021 Hahn	Datum, Geprüft / *Date, checked*: 16.12.2021 Namislo	Datum, Freigegeben / *Date, released*:
Unterschrift / *Signature*	Unterschrift / *Signature*	Unterschrift / *Signature*

Erstellt mit schweissassistent® von hsk-welding solutions

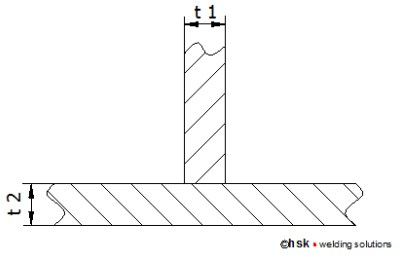
Emmerthaler Apparatebau GmbH 31860 Emmerthal Langes Feld 4	WPS Silencer 2 st stage	WPS-Nr. / *WPS no.* Rev. WPS 2000064641 Fillet Welds Seite / *Page* 1 von / *of* 2

Ort *Location*:	n.a.	Prüfer oder Prüfstelle: *Examiner or test centre:*	Hahn	
WPQR-Nr. *WPQR No.*:	n.a.	Art der Vorbereitung und Reinigung: *Method of preparation and cleaning:*	Plasma cutting	
Schweißerqualifikation *Welder qualification*:	n.a.	Bearbeitung der Wurzellage: *Processing the root weld:*	Grinding	
Schweißprozess *Welding process*:	135-(MAG)	Spezifikation Grundwerkstoff(e): *Parent material specification:*		Gruppennr. ISO 15608: *Group no ISO 15608:*
Nahtart *Joint type*:	Kehlnaht / *fillet weld*	[1.0425], P265GH		1.1
Kunde *Customer*:	Aerzener Maschinenfabrik	[1.0425], P265GH		1.1
Auftrags-Nr. *Order no.*:	4500495448	Werkstoffdicke *Material thickness*:	20 mm	
Zeichnungs-Nr. *Drawing no.*:	2000064641	Außendurchmesser *Outside diameter:*	2200 mm	
Teile-Nr. *Part no.*:	Fillet Weld N1 - N17	Schweißposition *Welding position*:	PA	

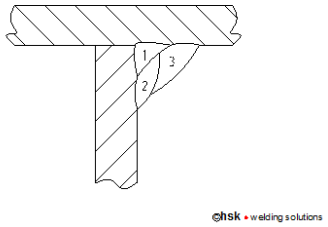
Maße: / *Dimensions:*

t1=20 mm
t2=20mm
a Maße = 0,7xtmin.

Gestaltung der Verbindung / *Joint design*



Schweißfolge / *Welding sequence*



Bemerkung / *Remark*:
A Maße für kehlnahte siehe angaben auf der Zeichnung 2000064641
thickness fillet welds on drawing

Einzelheiten für das Schweißen / *Welding details*

	Schweißlage *Welding pass*	Prozess *Process*	Ø Schweiß-zusatz *Ø weld filler*	Gas	Strom *Current*	Spannung *Voltage*	Stromart / Polung *Current / Polarity*	Draht-vorschub-geschw. *Wire feed rate*	Schweiß-geschwindig-keit *Travel speed*	Wärme-einbringung *Heat input*
A	Root pass 1	135	1,2 mm	Gas-1	250 A	28 V	= / +	7,5 m/min	25 cm/min	1,344 kJ/mm
B	Filler pass 2	135	1,2 mm	Gas-1	250 A	28 V	= / +	7,5 m/min	25 cm/min	1,344 kJ/mm
C	Cap pass 3	135	1,2 mm	Gas-1	250 A	28 V	= / +	7,5 m/min	25 cm/min	1,344 kJ/mm

Schweißzusatz / Schweißpulver / *Welding filler / welding flux* Sondervorschriften für Trocknung / *Special regulations for drying*

Prozess / *Process*	Bezeichnung *Designation*	Ø Schweiß-zusatz *Ø weld filler*	Markenname *Brand name*	Hersteller *Manufacturer*	Zeit *Time*	Temperatur *Temperature*
135	EN ISO 14341-A - G 46 4 M21 4Si1	1,2 mm	BÖHLER EMK 8	böhler welding		

Schutzgas / *Shielding gas*

	Typ *Type*	Markenname *Brand name*	Hersteller *Manufacturer*	Menge *Volume*	Vorströmzeit *Pre-purge time*	Nachströmzeit *Post-purge time*
Gas-1	Schutzgas / *Shielding*: M21-ArC-18			12 - 15 l/min	0,5 s	3 s

Weitere Informationen / *Further information*

	Parameter	Wert / *Value*
A	Düsen- / Gaskappengröße *Nozzle /gas cup size*	16
A	Werkstoffübergang *Material transfer*	feintropfig / *Spray*
A	Kontaktrohrabstand *Distance contact tube/work piece*	10 - 15 mm
B	Düsen- / Gaskappengröße *Nozzle /gas cup size*	16
B	Werkstoffübergang *Material transfer*	feintropfig / *Spray*
B	Kontaktrohrabstand *Distance contact tube/work piece*	10 - 15 mm
C	Düsen- / Gaskappengröße *Nozzle /gas cup size*	16
C	Werkstoffübergang *Material transfer*	feintropfig / *Spray*
C	Kontaktrohrabstand *Distance contact tube/work piece*	10 - 15 mm

Schweißraupenform / *Weld bead form*	Strichraupe / *stringer bead*
Vorwärmtemperatur *Preheat temperature:*	>25mm 100°C °C
Zwischenlagentemperatur *Interpass temperature*:	≤ 250 °C

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Emmerthaler Apparatebau GmbH 31860 Emmerthal Langes Feld 4	WPS Silencer 2 st stage	WPS-Nr. / *WPS no.* Rev. WPS 2000064641 Fillet Welds Seite / *Page* 2 von / *of* 2

Datum, Erstellt / *Date, prepared*: 03.01.2022 Hahn	Datum, Geprüft / *Date, checked*: 03.01.2022 Namislo	Datum, Freigegeben / *Date, released*: 03.01.2022 Hahn
Unterschrift / *Signature*	Unterschrift / *Signature*	Unterschrift / *Signature*

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EMMERTHAL	**2000064641_1st stage _berechnung**	

Worksheet for pressure vessel design

Drawing No. 2000064641_1st stage	Project No. EAV2101539	Sheet 1 of

Client AM | DGRL 2014/68/EU (97/23/EG)

Description Reflexionsschalldämpfer 1st stage DN1200

Project calculated according to AD 2000

Material data according to AD 2000

Design data		
Max. allowable working pressure	3.5 bar	bar
Test pressure in vertical position	bar	bar
Test pressure in horizontal position	5.4 bar	bar
External pressure	0 bar	bar
Design temperature	100 °C	°C
Corrosion allowance	1 mm	mm
Joint efficiency	0.85	
Volume	30840 l	m³

Category IV
Module B

Comments

Strength Calculation Software *Program System ATLAS* *Version 8.33.2*
Developed by *Lauterbach Verfahrenstechnik GmbH*
Certified per DIN EN ISO 9001:2015 *Certificate Number 01 100 044763*

	2000064641_1st stage _berechnung	

Design of pressure vessels: Design pressure / test pressure - AD 2000 B0: 2014-11; HP 30: 2016-05

AD - B0 Design pressure according to AD 2000 - B0 section 4

Allowable operating pressure	p	3.5	bar
Additional operating pressure	p_{add}	0	bar
Diameter of vessel (inside)	D_i	2460	mm
Max. liquid level, operation	H_F	2460	mm
Max. liquid level, test (= vessel height)	H	2460	mm
Density of the operation medium	ρ_F	1	kg/m³
Density of the test medium	ρ_P	1000	kg/m³
Spec. weight (operation medium)	γ_F	**0.001**	dN/dm³
Spec. weight (test medium)	γ_P	**1**	dN/dm³

Permit additional strength

Permit additional 10% strength in the shell (see also AD-S3/6, 1. Scope)?	N	(Y/N)
Take strength increasement also in account for additional operating pressure	N	(Y/N)
Increase also test pressure by 10%	N	(Y/N)

Operating pressure for calculation at the lowest point	p_{berF}	**3.5**	bar

Material table

Max. operating temperature	T	100	°C
Pressure for design strength value	p_{mat}	**3.5**	bar

Material		max. Thickness	$R_{20°C}$ ambient	Operation R_P	$R_{20°C}/R_P$
1	1.0425	20 mm	255 N/mm²	232 N/mm²	**1.099**
2		mm	N/mm²	N/mm²	
3		mm	N/mm²	N/mm²	
4		mm	N/mm²	N/mm²	
5		mm	N/mm²	N/mm²	
6		mm	N/mm²	N/mm²	
7		mm	N/mm²	N/mm²	
8		mm	N/mm²	N/mm²	

Test pressure calculation with smallest →s / largest →l ratio S

AD 2000 HP 30: Calculation of the pressure at point A during the test

1. Content during test liquid

Vessel clad with material sensitive to strain or pressure as described in 4.18.2? (Y/N) N

2. Test performed only with layed-down vessel (acc. to 4.10.3)

Results

Coefficient for test pressure (4.17 - 4.19)	F_p	**1.43**	
Additional test pressure (e.g. vacuum in opposite operating side)		0	bar
Additional test pressure including F_p		**0**	bar
Pressure measured at point A during the test according to 4.10	P_p	**5.374**	bar
Max. allowed test pressure			bar
Limiting part of vessel			
Remark			
Calculation test pressure at lowest point	P_{berp}	**5.374**	bar

EMMERTHAL	2000064641_1st stage _berechnung	

Equations

[4.17]

$$Fp = Max \begin{cases} 1.43 \\ 1.25 \cdot \dfrac{R_{20C}}{R_P} \end{cases}$$

4.10.3 Test pressure at midpoint A for only horizontal vessel test

[4.10.3]

$$P_p = F_p \cdot P + Max \begin{cases} 0.1 \cdot \gamma_P \cdot \left(H + \dfrac{D_i}{2} \right) \\ 0.1 \cdot \dfrac{\gamma_P \cdot D_i}{2} + 0.1 \cdot \gamma_F \cdot H_F \end{cases} =$$

$$1.43 \cdot 3.5\ \text{bar} + Max \begin{cases} 0.1 \cdot 1\ \text{dN/dm}^3 \cdot \left(2.46\ \text{m} + \dfrac{2.46\ \text{m}}{2} \right) \\ 0.1 \cdot \dfrac{1\ \text{dN/dm}^3 \cdot 2.46\ \text{m}}{2} + 0.1 \cdot 0.001\ \text{dN/dm}^3 \cdot 2.46\ \text{m} \end{cases} = 5.374\ \text{bar}$$

P_p 5.374, for pressure test acc. 4.10. only with layed-down vessel (acc. to 4.10.3)

where P=1.1·P in case of 10% additional strength reserve N

Options for additional strength 2

1 p_{berF} = 1.1 · p + 0.1 · H_F/γ_F
2 p_{berF} = 1.1 · (p + 0.1 · H_F/γ_F)
3 p_{berF} = 1.15 · (p + 0.1 · H_F/γ_F) (incl. 5% allowance acc. B0)

Calculation test pressure at the lowest point (horizontal)

$$P_{berp} = P_p + 0.1 \cdot \gamma_P \cdot \frac{D_i}{2} - 0.05 \cdot P = 5.374\ \text{bar}$$

(-0.05·P acc. AD-B0 section 4.1 note 1)

	2000064641_1st stage _berechnung	

Shell
Cylindrical shells under internal pressure - AD 2000 B1: 2000-10
Cylindrical shells

Design

Outside diameter		D_a	2500	mm
Design temperature		T	100	°C
Design pressure		p	3.5	bar
Test pressure		p'	5.4	bar

Material

Material		1.0425		
Nominal design strength	(operation)	K	232	N/mm²
Nominal design strength	(Test)	K'	255	N/mm²
Safety factor	(operation)	S	1.5	
Safety factor	(Test)	S'	1.05	
Wall thickness mill tolerance		c_1	0.6	mm
Corrosion / erosion allowance		c_2	1	mm
Density		ρ	7.85	t/m³
Joint efficiency factor		v	0.85	

Geometry

Actual wall thickness		s_e	20	mm
Outside diameter		D_a	2500	mm
Inside diameter	D_a-2·s_e	D_i	**2460**	mm
Ratio		D_a/D_i	**1.016**	

Results

Allowable design pressure		p_{allB}	**19.5**	bar
Allowable test pressure		p_{allP}	**30.61**	bar
Required wall thickness	(operation)	s_B	**4.923**	mm
Required wall thickness	(Test)	s_P	**4.866**	mm
Required wall thickness	max(s_B;s_P)	s	**4.923**	mm

Openings according to B9

Wall thickness without allowances	s_e-c_1-c_2	s_0	**18.4**	mm
Allowable unreinforced opening with σ_{all} = K/S		d_{A1} <	**2358**	mm
within a welding zone with σ_{all} = v·K/S holds:		d_{A2} <	**1941**	mm
Multiple openings are isolated if l>2·b		l >	**427.1**	mm

Volumes and weights

Length (Height)		L	5720	mm
Outside volume	L·π/4·D_a^2	V_A	**28.08**	m³
Inside volume	L·π/4·D_i^2	V_I	**27187**	l
Volume of the component	V_A-V_I	V_B	**0.8913**	m³
Weight (empty)	V_B· ρ · 9.81 m/s²	G_B	**68.64**	kN
Weight (water filled)	G_B+V_I · 1000 kg/m³ · 9.81 m/s²	G_W	**335.3**	kN

Comments

Equations
Operation

$$s_B = \frac{D_a \cdot p}{20 \cdot \frac{K}{S} \cdot v + p} + c_1 + c_2 = \frac{2500\ \text{mm} \cdot 3.5\ \text{bar}}{20 \cdot \frac{232\ \text{N/mm}^2}{1.5} \cdot 0.85 + 3.5\ \text{bar}} + 0.6\ \text{mm} + 1\ \text{mm} = 4.923\ \text{mm}$$

Test

$$s_P = \frac{D_a \cdot p'}{20 \cdot \frac{K'}{S'} \cdot v + p'} + c_1 + c_2 = \frac{2500\ \text{mm} \cdot 5.4\ \text{bar}}{20 \cdot \frac{255\ \text{N/mm}^2}{1.05} \cdot 0.85 + 5.4\ \text{bar}} + 0.6\ \text{mm} + 1\ \text{mm} = 4.866\ \text{mm}$$

EMMERTHAL	**2000064641_1st stage _berechnung**	

Head
Kloepper type ends under internal and external pressure - AD 2000 B3: 2011-05

Type of head	**Torispherical head (Kloepper type)**
Pressure	Internal pressure
Manufacturing	End with knuckle and crown of equal wall thickness
Allowances acc. to DIN 28011	Yes

Outside diameter of head	D_a	2500	mm
Design pressure	p	3.5	bar
Test pressure	p'	5.4	bar
Maximum nozzle diameter outside $0.6 \cdot D_a$ *)	d_i	0	mm

*) *For di = 0, all openings lie completely within $0.6 \cdot D_a$ and can be calculated as spherical openings acc. AD-B9.*

Material

Design temperature		T	100	°C
Material		1.0425		
Nominal design strength	operation	K	232	N/mm²
Nominal design strength	testing	K'	255	N/mm²
Modulus of elasticity at design temperature		E	207000	N/mm²
Safety factor	operation	S	1.5	
Safety factor	testing	S'	1.05	
Wall thickness manufacturing tolerance		c_1	**0.5**	mm
Corrosion / erosion allowance		c_2	1	mm
Joint efficiency		v	1	

Geometry

Final wall thickness		s_e	20	mm
Final crown wall thickness		s_K	**20**	mm
Shape factor		β	**2.992**	
Skirt height		h	**70**	mm
Required skirt height		h	**20.06**	mm
Run-out length		x	**100**	mm
Crown height		h_2	**474.6**	mm
Allowable unreinforced opening within $0.6 \cdot D_a$			**1500**	mm
Inside crown diameter		D_i	**5000**	mm

Required wall thicknesses

Required knuckle wall thickness	operation	**7.565**	mm

Required wall thicknesses based on the final wall thickness

Required wall thickness		**5.732**	mm
Required knuckle wall thickness	operation	**5.732**	mm
Required knuckle wall thickness	testing	**5.659**	mm
Required crown wall thickness	operation	**4.35**	mm
Required crown wall thickness	testing	**4.3**	mm
Strength condition		✓	

Weights / Volume

Weight (empty)	**10.37**	kN
Weight (operating)	**10.37**	kN
Weight (water-filled)	**28.58**	kN
Volume (contents)	**1.821**	m³

Comments

	2000064641_1st stage _berechnung	

Equations

Validity range for torispherical and semi-ellipsoidal heads

$$0.001 \leq \frac{s_e - c_1 - c_2}{D_a} = \frac{20\ \text{mm} - 0.5\ \text{mm} - 1\ \text{mm}}{2500\ \text{mm}} = 0.0074 \leq 0.1$$

Knuckle or hemispherical connection, operation

$$s = \frac{D_a \cdot p \cdot \beta}{40 \cdot \frac{K}{S} \cdot v} + c_1 + c_2 = \frac{2500\ \text{mm} \cdot 3.5\ \text{bar} \cdot 2.992}{40 \cdot \frac{232\ \text{N/mm}^2}{1.5} \cdot 1} + 0.5\ \text{mm} + 1\ \text{mm} = 5.732\ \text{mm}$$

Crown, operation

$$s = \frac{(D_i + 2 \cdot s_K) \cdot p}{40 \cdot \frac{K}{S} \cdot v + p} + c_1 + c_2 = \frac{(5000\ \text{mm} + 2 \cdot 20\ \text{mm}) \cdot 3.5\ \text{bar}}{40 \cdot \frac{232\ \text{N/mm}^2}{1.5} \cdot 1 + 3.5\ \text{bar}} + 0.5\ \text{mm} + 1\ \text{mm} = 4.35\ \text{mm}$$

Knuckle or hemispherical connection, testing

$$s = \frac{D_a \cdot p' \cdot \beta}{40 \cdot \frac{K'}{S'} \cdot v} + c_1 + c_2 = \frac{2500\ \text{mm} \cdot 5.4\ \text{bar} \cdot 2.992}{40 \cdot \frac{255\ \text{N/mm}^2}{1.05} \cdot 1} + 0.5\ \text{mm} + 1\ \text{mm} = 5.659\ \text{mm}$$

Crown, testing

$$s = \frac{(D_i + 2 \cdot s_K) \cdot p'}{40 \cdot \frac{K'}{S'} \cdot v + p'} + c_1 + c_2 = \frac{(5000\ \text{mm} + 2 \cdot 20\ \text{mm}) \cdot 5.4\ \text{bar}}{40 \cdot \frac{255\ \text{N/mm}^2}{1.05} \cdot 1 + 5.4\ \text{bar}} + 0.5\ \text{mm} + 1\ \text{mm} = 4.3\ \text{mm}$$

EMMERTHAL	**2000064641_1st stage _berechnung**	

Nozzle I + II
Single openings in cylindrical, conical and spherical shells - AD 2000 B9: 2010-02, corrected version 2016-09

Calculation options

Cylindrical body			
Single opening			
Operation			
Design temperature	T	100	°C
Design pressure	p	3.5	bar

	Opening 1
Type of opening	Set-through nozzle
Inclination	Vertical
Reinforcement	Yes

Materials

	Shell			Nozzle 1		
Material	1.0425			1.0425		
Design strength Operation	K_{Op}	232	N/mm²	K_{Op}	232	N/mm²
Safety factor Operation	S_{Op}	1.5		S_{Op}	1.5	
Allowance	c_1	0.6	mm	c_1	0.6	mm
Allowance	c_2	1	mm	c_2	1	mm
Design allowance				c_3	0	mm
Nominal design stress	f	**154.7**	N/mm²	f	**154.7**	N/mm²

	Reinforcement 1		
Material	1.0425		
Design strength Operation	K_{Op}	232	N/mm²
Safety factor Operation	S_{Op}	1.5	
Allowance	c_1	0.7	mm
Allowance	c_2	1	mm
Nominal design stress	f	**154.7**	N/mm²

Geometrical data Opening 1

Graphics

Outside diameter	$d_{a,1}$	1219	mm
Final wall thickness	$S_{S1,n}$	20	mm
Final inside diameter	$d_{i,n,1}$	**1179**	mm
Corroded inside diameter	$d_{i,1}$	**1182**	mm
External projection	l_{S1}	350	mm
Inward protruding length	m_1	35	mm
Final thickness of reinforcement	h_{R1}	25	mm
Width of the reinforcement (Longitudinal direction, area I)	$b_{I,R1}$	50	mm
Available width of shell	$b_{1,avl}$	60	mm

Geometrical data Shell

Outside diameter	D_a	2500	mm
Final wall thickness	s_e	20	mm
Design wall thickness	s_a	**18.4**	mm
Final inside diameter	$D_{i,n}$	**2460**	mm
Corroded inside diameter	D_i	**2463**	mm
Ligament (web) between two nozzles	l		mm

Pressurized area

		Opening 1	
Longitudinal direction, area I			
Shell	$A_{pS,I}$	**824556**	mm²
Nozzle	$A_{pS1,I}$	**120696**	mm²
Total	$A_{p,I}$	**945252**	mm²

EMMERTHAL	**2000064641_1st stage _berechnung**	

Load-bearing cross-sectional area

		Opening 1	
Shell	$A_{\sigma 0}$	1104	mm²
Longitudinal direction, area l			
Nozzle	$A_{\sigma 1,l}$	4401	mm²
Reinforcement	$A_{\sigma 2,l}$	1000	mm²

Utilisation

		Opening 1	
Longitudinal direction, area l	U_l	32.92	%

Results

Wall thickness at opening edge		$s_{A,1}$	36.67	mm
Wall thickness ratio		s_{S1}/s_A	0.5247	
Design width		b_1	296	mm
Width of shell contributing to the reinforcement	$b_{1,max}=\min(b_1; b_{1,avl})$	$b_{1,max}$	60	mm
Minimum ligament without mutual influence		$l_{min,1}$	592	mm
Length of nozzle contributing to the reinforcement, longitudinal		$l_{S1,max}$	185.8	mm

Geometrical conditions

1.1(1a) ✓

$$0.002 \le \frac{s_a}{D_a} \Leftrightarrow 0.002 \le \frac{18.4\ \text{mm}}{2500\ \text{mm}}$$

1.1(1b) ✓

$$\frac{s_a}{D_a} \le 0.1 \Leftrightarrow \frac{18.4\ \text{mm}}{2500\ \text{mm}} \le 0.1$$

All geometrical conditions ✓

Strength conditions

Region I ✓

$$f_{red,S1} \cdot \left(\left(f - \frac{p}{20} \right) \cdot A_{\sigma 0,1} + \left(f_{S1} - \frac{p}{20} \right) \cdot A_{\sigma 1l,1} + \left(f_{R1} - \frac{p}{20} \right) \cdot A_{\sigma 2l,1} \right) \ge \frac{p}{10} \cdot A_{pl,1} \Leftrightarrow$$

$$1 \cdot \left(\left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 1104\ \text{mm}^2 + \left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 4401\ \text{mm}^2 + \left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 1000\ \text{mm}^2 \right) \ge \frac{3.5\ \text{bar}}{10} \cdot 945252\ \text{mm}^2$$

EMMERTHAL	**2000064641_1st stage _berechnung**	

Nozzle III + IV
Single openings in cylindrical, conical and spherical shells - AD 2000 B9: 2010-02, corrected version 2016-09

Calculation options

Cylindrical body			
Single opening			
Operation			
Design temperature	T	100	°C
Design pressure	p	3.5	bar

		Opening 1
Type of opening		Set-in block flange

Materials

	Shell			**Nozzle 1**		
Material	1.0425			1.0425		
Design strength Operation	K_{Op}	232	N/mm²	K_{Op}	223	N/mm²
Safety factor Operation	S_{Op}	1.5		S_{Op}	1.5	
Allowance	c_1	0.6	mm	c_1	0.9	mm
Allowance	c_2	1	mm	c_2	0	mm
Design allowance				c_3	0	mm
Nominal design stress	f	**154.7**	N/mm²	f	**148.7**	N/mm²

Geometrical data Opening 1

Graphics

Outside diameter	$d_{a,1}$	285	mm
Inside diameter of opening	$d_{i,Opening1}$	**285**	mm
Final inside diameter	$d_{i,n,1}$	**150**	mm
Corroded inside diameter	$d_{i,1}$	**151.8**	mm
Final width of block flange	b_{S1}	67.5	mm
Final height of block flange	h_{BS1}	50	mm
Inward protruding length	m_1	5	mm
Available width of shell	$b_{1,avl}$	70	mm

Geometrical data Shell

Outside diameter	D_a	2500	mm
Final wall thickness	s_e	20	mm
Design wall thickness	s_a	**18.4**	mm
Final inside diameter	$D_{i,n}$	**2460**	mm
Corroded inside diameter	D_i	**2463**	mm
Ligament (web) between two nozzles	l		mm

Pressurized area

		Opening 1	
Longitudinal direction, area l			
Shell	$A_{pS,l}$	**261715**	mm²
Nozzle	$A_{pS1,l}$	**3416**	mm²
Total	$A_{p,l}$	**265131**	mm²

Load-bearing cross-sectional area

		Opening 1	
Shell	$A_{\sigma 0}$	**1288**	mm²
Longitudinal direction, area l			
Nozzle	$A_{\sigma 1,l}$	**3270**	mm²

Utilisation

		Opening 1	
Longitudinal direction, area l	U_l	**13.56**	%

	2000064641_1st stage _berechnung	

Results

Wall thickness at opening edge		$s_{A,1}$	50	mm
Design width		b_1	348.7	mm
Width of shell contributing to the reinforcement	$b_{1,max}=\min(b_1; b_{1,avl})$	$b_{1,max}$	70	mm
Minimum ligament without mutual influence		$l_{min,1}$	697.3	mm

Geometrical conditions

1.1(1a) ✓

$$0.002 \le \frac{s_a}{D_a} \Leftrightarrow 0.002 \le \frac{18.4\ \text{mm}}{2500\ \text{mm}}$$

1.1(1b) ✓

$$\frac{s_a}{D_a} \le 0.1 \Leftrightarrow \frac{18.4\ \text{mm}}{2500\ \text{mm}} \le 0.1$$

All geometrical conditions ✓

Strength conditions

Region I ✓

$$f_{red,S1} \cdot \left(\left(f - \frac{p}{20} \right) \cdot A_{\sigma 0,1} + \left(f_{S1} - \frac{p}{20} \right) \cdot A_{\sigma 1l,1} \right) \ge \frac{p}{10} \cdot A_{pl,1} \Leftrightarrow$$

$$1 \cdot \left(\left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 1288\ \text{mm}^2 + \left(148.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 3270\ \text{mm}^2 \right) \ge \frac{3.5\ \text{bar}}{10} \cdot 265131\ \text{mm}^2$$

EMMERTHAL	**2000064641_1st stage _berechnung**	

Nozzle V + VI
Single openings in cylindrical, conical and spherical shells - AD 2000 B9: 2010-02, corrected version 2016-09

Calculation options

Cylindrical body			
Single opening			
Operation			
Design temperature	T	100	°C
Design pressure	p	3.5	bar

		Opening 1
Type of opening		Set-in block flange

Materials

	Shell			**Nozzle 1**		
Material	1.0425			1.0425		
Design strength Operation	K_{Op}	232	N/mm²	K_{Op}	232	N/mm²
Safety factor Operation	S_{Op}	1.5		S_{Op}	1.5	
Allowance	c_1	0.6	mm	c_1	0.9	mm
Allowance	c_2	1	mm	c_2	0	mm
Design allowance				c_3	0	mm
Nominal design stress	f	**154.7**	N/mm²	f	**154.7**	N/mm²

Geometrical data Opening 1

Graphics

Outside diameter	$d_{a,1}$	220	mm
Inside diameter of opening	$d_{i,Opening1}$	**220**	mm
Final inside diameter	$d_{i,n,1}$	**100**	mm
Corroded inside diameter	$d_{i,1}$	**101.8**	mm
Final width of block flange	b_{S1}	60	mm
Final height of block flange	h_{BS1}	40	mm
Inward protruding length	m_1	0	mm
Available width of shell	$b_{1,avl}$	115	mm

Geometrical data Shell

Outside diameter	D_a	2500	mm
Final wall thickness	s_e	20	mm
Design wall thickness	s_a	**18.4**	mm
Final inside diameter	$D_{i,n}$	**2460**	mm
Corroded inside diameter	D_i	**2463**	mm
Ligament (web) between two nozzles	l		mm

Pressurized area

		Opening 1	
Longitudinal direction, area l			
Shell	$A_{pS,l}$	**277110**	mm²
Nozzle	$A_{pS1,l}$	**2036**	mm²
Total	$A_{p,l}$	**279146**	mm²

Load-bearing cross-sectional area

		Opening 1	
Shell	$A_{\sigma 0}$	**2116**	mm²
Longitudinal direction, area l			
Nozzle	$A_{\sigma 1,l}$	**2311**	mm²

Utilisation

		Opening 1	
Longitudinal direction, area l	U_l	**14.29**	%

	2000064641_1st stage _berechnung	

Results

Wall thickness at opening edge		$s_{A,1}$	40	mm
Design width		b_1	309.9	mm
Width of shell contributing to the reinforcement	$b_{1,max}=\min(b_1; b_{1,avl})$	$b_{1,max}$	115	mm
Minimum ligament without mutual influence		$l_{min,1}$	619.9	mm

Geometrical conditions

1.1(1a) ✓

$$0.002 \le \frac{s_a}{D_a} \Leftrightarrow 0.002 \le \frac{18.4\ \text{mm}}{2500\ \text{mm}}$$

1.1(1b) ✓

$$\frac{s_a}{D_a} \le 0.1 \Leftrightarrow \frac{18.4\ \text{mm}}{2500\ \text{mm}} \le 0.1$$

All geometrical conditions ✓

Strength conditions

Region I ✓

$$f_{red,S1} \cdot \left(\left(f - \frac{p}{20} \right) \cdot A_{\sigma 0,1} + \left(f_{S1} - \frac{p}{20} \right) \cdot A_{\sigma 1l,1} \right) \ge \frac{p}{10} \cdot A_{pl,1} \Leftrightarrow$$

$$1 \cdot \left(\left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 2116\ \text{mm}^2 + \left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 2311\ \text{mm}^2 \right) \ge \frac{3.5\ \text{bar}}{10} \cdot 279146\ \text{mm}^2$$

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2000064641_1st stage _berechnung

General safety verification of horizontal pressure vessels on saddles - AD 2000 S3/2: 2004-02

4.1 Approximate strength proof and geometry acc. section 2.3.3

Design data

Inside vessel diameter	D	2460	mm	
Final wall thickness	s_e	20	mm	
Enclosing angle of the saddle support	δ_1	120	°	(90°, 120°)
Reinforcement plate thickness without allowances	e_v	20	mm	
Cylinder length	L	5720	mm	
Distance between cylinder end and support	a_1	320	mm	
Axial width of saddle of saddle support	b_1	360	mm	
Width of reinforcement plate	b_2	0	mm	
Weld joint factor	v	0.85		
Density of filling medium	R_f	1000	kg/m³	
Design pressure	p	3.5	bar	

Material

Design temperature	T	100	°C
Material	1.0425		
Material strength	K	232	N/mm²
Safety factor	S	1.5	
Wall thickness manufacturing tolerance	c_1	0.6	mm
Corrosion / Erosion allowance	c_2	1	mm
Allowable design stress	f	**154.7**	N/mm²

Intermediate results

Vessel wall thickness without allowances	$e = s_e - c_1 - c_2$	e	**18.4**	mm
Parameter K11 (acc. section 5.2.2.1)		K_{11}	**0.07781**	
Max. cylinder length (acc. Fig. 3)		L_{max}	**20593**	mm

Conditions acc. 4.1 **(satisfied=1, violated=0)**

L	=	5720	≤	**20593**	= L_{max}	**1**
p	=	3.5	≥	0		**1**
f	=	**154.7**	≥	130 MPa		**1**
a_1	=	320	≤	**1230**	= 0.5 D	**1**
b_1	=	360	≥	**234**	= 1.1 √De	**1**
v	=	0.85	≥	0.8		**1**
R_f	=	1000	≤	1000 kg/m³		**1**

4.1 Only for saddle support with reinforcement

b_2	=	0	≥	**731.4**	= K_{11} D + 1.5 b_1
e_v	=	20	≥	**18.4**	= e

2.3.3 Geometrical condition **(satisfied=1, violated=0)**

60°	≤	120	$=\delta_1$	≤ 180°		**1**
e/D	=	**0.00748**		≤ 0.05		**1**

2.3.3 For saddle support with reinforcement plate

e	=	**18.4**	≤	20 = e_v	≤	**27.6**	= 1.5·e		**1**
Reinforcement plate				b_3	≥	**246**	= 0.1·D		

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Section 1.5

$$\frac{b_1}{D} \le 0.2 \Leftrightarrow \frac{360\ \text{mm}}{2460\ \text{mm}} \le 0.2$$ 1

$$\frac{b_2}{b_1} \le 3.0 \Leftrightarrow \frac{0\ \text{mm}}{360\ \text{mm}} \le 3.0$$ 1

$b_1 = 360 \le 0.2 \cdot 2460 = 0.2 \cdot D$ 1

$b_2 = 0 \le 3 \cdot 360 = 3 \cdot b_1$ 1

Evaluated geometrical conditions are **satisfied**

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General safety verification of horizontal pressure vessels on saddles - AD 2000 S3/2: 2004-02

4.2 Actual forces and moments acc. AD S 3/2

General design specifications

Total vessel weight load		G	175	kN
Cylinder length		L	5858	mm
Vessel inside diameter		D	2500	mm
Length of one end cap		h_2	495	mm
Distance from cylinder end to adjacent support		a_1	248	mm
Number of supports (2...8)		n	2	(2-8)

Intermediate results

Equivalent cylindrical shell length = a_1+2 · h2/3		a_3	**578**	mm
Support distance		l_1	**5362**	mm
Parameter		a_3/l_1	**0.1078**	

Load

Line load	$q = G / (L + 4/3 \cdot h_2)$	q	**26.85**	N/mm
Moment	$M_o = q \cdot D^2 / 16$	M_o	**1.049e+7**	Nmm

Forces and moments for support type A (n=2)

Support force	$F_1 = F_2 = G / 2$	F_1,F_2	***87.5***	kN
Support moment	M_1,M_2	M_1,M_2	***-6.003***	kN·m
Lateral force	Q_1,Q_2	Q_1,Q_2	***71.98***	kN
Moment between support 1 and 2		M	**102.5**	kN·m

Forces and moments for support type B (n>2)

Support i =	1		2		3		4	
ω_i	**1**		**0**		**0**		**0**	
F_i	**87500**	N	**0**	N	**0**	N	**0**	N
Q_i	**71981**	N	**0**	N	**0**	N	**0**	N
$\lvert M_i \rvert$	**-6002919**	Nmm	**0**	Nmm	**0**	Nmm	**0**	Nmm

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General safety verification of horizontal pressure vessels on saddles - AD 2000 S3/2: 2004-02

5.2.1 Cylindrical shell without reinforcing plate: Strength verification

General design specifications

Vessel inside diameter		D	2460	mm
Final wall thickness		s_e	20	mm
Width of saddle support		b_1	360	mm
Enclosing angle of the web plate		δ_1	120	°
Overhanging length of the cylinder		a_1	320	mm
Load point №	1			
Existing saddle load at load point		F_i	***87.5***	kN
Existing saddle moment load point		M_i	-6.003	kN·m
Existing saddle shear force at saddle		Q_i	***71.98***	kN
Allowable bending moment		allM	***10529***	kN·m
Allowable shear force		allQ	***17683***	kN
Allowable compressive axial force		F_N	***16983***	kN
Design temperature		T	100	°C
Design pressure		p	3.5	bar
External design pressure		p_a	0	bar
Allowable external pressure		p_f	1	bar
Load case (operation=1; test and installation=2)			1	

Material

Material		1.0425		
Nominal design strength		K	232	N/mm²
Safety factor		S	1.5	
Wall thickness manufacturing tolerance		c_1	0.6	mm
Corrosion / Erosion allowance		c_2	1	mm
Allowable design stress		f	**154.7**	N/mm²
Wall thickness without allowances	$e = s_e - c_1 - c_2$	e	**18.4**	mm
Saferty factor acc. to 5.1 (Eq. 2)		S_{51}	**1.5**	

Intermediate results

Global membrane stress σ_{mx} **0.06864** N/mm²

Efficiency ratio of the shell

ϑ_{212}	**-3.55e-4**	ϑ_{213}	**0**
ϑ_{222}	**0.06015**	ϑ_{223}	**0.121**

Ratio of the local membrane stress to the local bending stress

ϑ_{12}	**-0.05174**	ϑ_{13}	**-2.17**
ϑ_{22}	**-3.55e-4**	ϑ_{23}	**0**

Limiting bending stress at saddles 2 and 3

σ_{gr2} **288.3** N/mm² σ_{gr3} **76.46** N/mm²

Parameters

K_2	**1.2**	K_3	**0.25**	K_4	**0.6451**
K_5	**0.9816**	K_6	**0.3464**	K_7	**0.6344**
K_8	**0.1594**	K_9	**0.5566**	K_{10}	**0.5154**

Allowable support force due to loading

in longitudinal direction	$allF_2$	**3218883**	N
in circumferential direction	$allF_3$	**1480458**	N
Equivalent axial force load point i	F_e	**43867**	N

Strength verification

F_i = ***87500*** ≤ min **3218883** ; **1480458** = min($allF_2$; $allF_3$)

Stability verification

$|p_a|/p_f + |M_i|/allM + F_e/F_N + (|Q_i|/allQ)^2$ = **0.00317** ≤ 1

Lauterbach Verfahrenstechnik 8.33.2 16 24.11.2021

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2.3.3 Geometrical condition **(satisfied=1, violated=0)**

60°	≤	120 = δ_1	≤	180°	1
e/D	=	**0.00748**	≤	0.05	1

Section 1.5 (not applicable without reinforcement b2=0)

$$\frac{b_1}{D} \leq 0.2 \Leftrightarrow \frac{360\ \text{mm}}{2460\ \text{mm}} \leq 0.2$$ 1

$$\frac{b_2}{b_1} \leq 3.0 \Leftrightarrow \frac{0\ \text{mm}}{360\ \text{mm}} \leq 3.0$$ 1

Saddle plate	b_1	=	360 ≤ 0.2 ·	2460 = 0.2·D		1
Reinforcement plate	b_2	=	0 ≤ 3·b_1			1

Strength conditions	**SATISFIED**
Evaluated geometrical conditions	**satisfied**

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Global Loads - DIN EN 13445-3/16.14: 2018-12

Allowable individual loads EN 13445-3/16.14

Load case			Operation	
Calculation temperature		t	100	°C

Geometry of the cylindrical shell

Mean shell diameter		D	2480	mm
Cylinder length (incl. cylindrical part of head)		L	5858	mm
Nominal thickness		e_n	20	mm
Deviation from perfect shape		w	2	mm
Length of template for checking shape deviations		l	100	mm
Tolerance		w/l	**0.02**	

Material data of the cylinder

Material designation		1.0425		
Microstructure		Ferrite		
Design strength		K_{de}	**232**	N/mm²
Design safety factor		S_{de}	**1.5**	
Nominal design stress		f	**154.7**	N/mm²
Modulus of elasticity		E	**207000**	N/mm²
Poisson's ratio		v	0.3	
$R_{p0.2}$ at 20°C		$R_{p0.2,20C}$	255	N/mm²
$R_{p0.2}$ at operating temperature		$R_{p0.2,T}$	232	N/mm²
$R_{p1.0}$ at 20°C		$R_{p1.0,20C}$		N/mm²
$R_{p1.0}$ at operating temperature		$R_{p1,0,T}$		N/mm²
Safety factor for elastic limit	(8.4.2-2)	S_{el}	**1**	
allowable elastic limit	(R_{p02}/S_{el} or R_{p1}/S_{el})	σ_e	**232**	N/mm²
Wall thickness mill tolerance		c_1	0.6	mm
Corrosion allowance		c_2	1	mm

Results (acc. section 16.14)

Inside diameter	D - e_a	D_i	**2462**	mm
Analysis thickness		e_a	**18.4**	mm
Scaled diameter		D/e_a	**134.8**	
Factor (16.14-15)		K	**8.01**	
Factor (16.14-16/17)		α	**0.3208**	
Factor (16.14-18/19)		Δ	**0.5106**	

Allowable individual loads

Longitudinal compressive stress	(σe*Δ acc. 16.14-20)	$\sigma_{c,all}$	**118.5**	N/mm²
Maximum tensile force	(16.14-1)	$F_{t,max}$	**22173**	kN
Maximum compressive force	(16.14-2)	$F_{c,max}$	***16983***	kN
Bending moment	(16.14-3)	M_{max}	***10529***	kN·m
Shear force	(horizontal vessel 16.8-30/31)	Q_{max}	***17683***	kN

Remark

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Calculation

$$K=\frac{1.21\cdot E\cdot e_a}{\sigma_e\cdot D}=\frac{1.21\cdot 207000\ \text{N/mm}^2\cdot 18.4\ \text{mm}}{232\ \text{N/mm}^2\cdot 2480\ \text{mm}}=8.01$$ (16.14-15)

(16.14-16)

for D/e_a = **134.8** ≤ 424

$$\alpha_1=\frac{0.83}{\sqrt{1+0.005\cdot D/e_a}}=$$

$$\frac{0.83}{\sqrt{1+0.005\cdot 134.8}}=0.6415$$

for 0.01 ≤ w/l ≤ 0.02

$$\alpha=\left(1.5-50\cdot\frac{w}{l}\right)\cdot\alpha_1=(1.5-50\cdot 0.02)\cdot 0.6415=0.3208$$

(16.14-18/19)

for α·K ≥ 0.5

$$\Delta=\frac{\left[1-\frac{0.4123}{(\alpha\cdot K)^{0.6}}\right]}{1.5}=\frac{\left[1-\frac{0.4123}{(0.3208\cdot 8.01)^{0.6}}\right]}{1.5}=0.5106$$

$$\sigma_{c,all}=\sigma_e\cdot\Delta=232\ \text{N/mm}^2\cdot 0.5106=118.5\ \text{N/mm}^2$$ (16.14-20)

(16.14-1)

$$F_t=\pi\cdot D\cdot e_a\cdot\frac{f}{1000}=\pi\cdot 2480\ \text{mm}\cdot 18.4\ \text{mm}\cdot\frac{154.7\ \text{N/mm}^2}{1000}=22173\ \text{kN}$$

(16.14-2)

$$F_c=\pi\cdot D\cdot e_a\cdot\frac{\sigma_{c,all}}{1000}=\pi\cdot 2480\ \text{mm}\cdot 18.4\ \text{mm}\cdot\frac{118.5\ \text{N/mm}^2}{1000}=16983\ \text{kN}$$

(16.14-3)

$$M_{max}=\pi\cdot D^2\cdot e_a\cdot\frac{\sigma_{c,all}}{4000000}=$$

$$\pi\cdot(2480\ \text{mm})^2\cdot 18.4\ \text{mm}\cdot\frac{118.5\ \text{N/mm}^2}{4000000}=10529\ \text{kNm}$$

Section 16.8.7

For

$$\frac{2\cdot L}{D}\le 8.7\cdot\sqrt{\frac{D}{2\cdot e_a}}$$

$$Q_{max}=\frac{\pi\cdot D}{4}\cdot e_a\cdot E\cdot\left[\frac{e_a}{0.5\cdot D}\right]^{1.25}\cdot\sqrt{\frac{D}{2\cdot L}\cdot\left[1+42\cdot\left[\frac{D}{2\cdot L}\right]^3\cdot\left[\frac{e_a}{0.5\cdot D}\right]^{1.5}\right]}$$

For

$$\frac{2\cdot L}{D}>8.7\cdot\sqrt{\frac{D}{2\cdot e_a}}$$

$$Q_{max}=\frac{\pi\cdot D}{3\cdot 4}\cdot e_a\cdot E\cdot\left[\frac{2\cdot e_a}{D}\right]^{1.5}$$

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General safety verification of horizontal pressure vessels on saddles - AD 2000 S3/2: 2004-02

6. Verification of the saddle

General design specifications

Load point №	1			
Existing load at the saddle support		F_i	85	kN
Thickness of the saddle web plate without allowances		e_s	20	mm
Length of saddle support plate		l_2	1998	mm
Width of saddle support		b_1	360	mm
Effective web plate height (Fig. 6)		b_e	750	mm
Section modulus in A-A of the saddle support		W_A	**4677512**	mm³
Enclosing angle of the web plate		δ_1	120	°
Enclosing angle of the saddle plate		δ_2	120	°
Partial enclosing angle according to Figure 8		ψ	60	°
Design temperature		T	100	°C
Vessel inside diameter		D	2460	mm

Web plate material

Material		1.0425		
Nominal design strength		K_s	232	N/mm²
Safety factor		S_s	1.5	
Allowable design stress		f_s	**154.7**	N/mm²
Modulus of elasticity		E_s	212000	N/mm²

Intermediate results

Quotient		b_e/l_2	**0.3754**	
Factor K13 from Figure 7		K_{13}	**1.161**	
Strain factor $\varepsilon_S = f_s \cdot 10^3/E_s$		ε_S	**0.7296**	
Stability factor for plate buckling		φ	**0.6022**	
$allF_4$	according to Equation 15	$allF_4$	**3721924**	N
$allF_5$	according to Equation 16	$allF_5$	**2037570**	N
$allF_6$	according to Equation 17	$allF_6$	**1928777**	N

Saddle strength verification (14) is **SATISFIED**

$$F_i \leq \min[allF_4; allF_5; allF_6]$$

$$85000 \leq \min[\ 3721924;\ 2037570;\ 1928777]$$

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Finite-Elemente LV - COMSOL

Select model	Zylinder mit Stutzen			
Boundary conditions				
Design temperature		T	100	°C
Design pressure		p	3.5	bar
Materials				
Shell				
Material	1.0425			
Nominal design strength		K	232	N/mm²
Safety factor		S	1.5	
Allowable stress shell		f	**154.7**	N/mm²
Allowable stress reinforcement		f	**154.7**	N/mm²
Allowable stress welding		f	**154.7**	N/mm²
Wall thickness manufacturing tolerance		c_1	0.6	mm
Corrosion allowance		c_2	1	mm
Modulus of elasticity at 20°C		E_{20}	212000	N/mm²
Nozzle				
Material	1.0425			
Nominal design strength		K	232	N/mm²
Safety factor		S	1.5	
Allowable stress		f	**154.7**	N/mm²
Wall thickness manufacturing tolerance		c_1	0.6	mm
Corrosion allowance		c_2	1	mm
Modulus of elasticity at 20°C		E_{20}	212000	N/mm²
Geometrical data				
Shell				
Outside diameter		D_a	2500	mm
Length of cylindrical shell		L	5718	mm
Nominal thickness		e_{nom}	20	mm
Calculation wall thickness		e	**18.4**	mm
Nozzle				
Type	Eingesteckter Stutzen			
Flanged nozzle	steif			
Type of intersection	Nicht ausgehalst			
Nominal Diameter		DN		
Outside diameter nozzle		d_a	1219	mm
Nozzle projection outside		l	350	mm
Nominal thickness		e_{nom}	20	mm
Calculation wall thickness		e	**18.4**	mm
Weld thickness		a		mm
Radial offset		a_r	0	mm
Tangential displacement		b	720	mm
Inclination of the nozzle to the shell radius		θ	0	°
Drehung Stutzen um Radius Schale		ϕ	0	°
Reinforcement				
Select reinforcement	Mit Verstärkung			
Diameter of reinforcement		d_a	1323	mm
Nominal thickness of reinforcement		e_{nom}	25	mm
Calculation thickness of reinforcement		e	**23.4**	mm
Weld thickness		a		mm
Mesh				
Mximum element size			50	mm
Minimum number of bolts			25	mm

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Additional loads at end of nozzle

Reference plane load application	Stutzenende
Reaction force at the opening due to internal pressure	berücksichtigen
Nozzle Specification	Freie Eingabe

		External Forces				External Moments
Force in X-axis direction	F_x	125 kN	Moment around X-axis	M_x	120 kN·m
Force in Y-axis direction	F_y	130 kN	Moment around Y-axis	M_y	90 kN·m
Force in Z-axis direction	F_z	65 kN	Moment around Z-axis	M_z	115 kN·m

Results

Stress Rating

Body		Stress	Allowable Stress	Utilization
Close to nozzle / reinforcement transition				
Local primary membrane stress	P_L	110.3 N/mm²	**232** N/mm²	**47.55** %
Local primary membrane stress plus secondary stress	P_L+Q	249.1 N/mm²	**464** N/mm²	**53.68** %
General				
General total primary membrane stress	P_m	65.39 N/mm²	**154.7** N/mm²	**42.28** %
General total primary stress	P_m+P_b	108.2 N/mm²	**232** N/mm²	**46.66** %
Maximum utilization			Φ_{Util}	**53.68** %

Nozzle		Stress	Allowable Stress	Utilization
Close to head / reinforcement				
Local primary membrane stress	P_L	158.7 N/mm²	**232** N/mm²	**68.4** %
Local primary membrane stress plus secondary stress	P_L+Q	453.4 N/mm²	**464** N/mm²	**97.72** %
General				
General total primary membrane stress	P_m	48.29 N/mm²	**154.7** N/mm²	**31.22** %
General total primary stress	P_m+P_b	102.3 N/mm²	**232** N/mm²	**44.12** %
Maximum utilization			Φ_{Util}	**97.72** %

Reinforcement		Stress	Allowable Stress	Utilization
Close to nozzle				
Local primary membrane stress	P_L	158.5 N/mm²	**232** N/mm²	**68.32** %
Local primary membrane stress plus secondary stress	P_L+Q	453.2 N/mm²	**464** N/mm²	**97.67** %
Close to head transition				
Local primary membrane stress	P_L	158.5 N/mm²	**232** N/mm²	**68.32** %
Local primary membrane stress plus secondary stress	P_L+Q	453.2 N/mm²	**464** N/mm²	**97.67** %
General				
General total primary membrane stress	P_m	0 N/mm²	**154.7** N/mm²	**0** %
General total primary stress	P_m+P_b	0 N/mm²	**232** N/mm²	**0** %
Maximum utilization			Φ_{Util}	**97.67** %
Maximum utilization total			max Φ_{Util}	**97.72** %

Nozzle Movement

Displacement at the end of the nozzle

Δx	0.29 mm	Δy	3.09 mm	Δz	3.09 mm

Rotation around axis

$\Delta\phi_x$	0.17 °	$\Delta\phi_y$	0 °	$\Delta\phi_z$	0.12 °

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Lifting lugs - DIN EN 13445-3/16.7: 2018-12

Longitudinal lifting lugs with reinforcing plate

Design case	Operation		
Type of shell	Cylinder		
Design temperature	Temp	100	°C
Design pressure	P	3.5	bar
Impact factor	γ	1	
Angle between the resulting lifting force and the normal to the shell wall	β	60	°
Angle between the resulting lifting force and the direction of the weight force	δ	30	°
Total vessel weight	W	145000	N
Number of lugs	N	2	
Resulting force at one lug	F_R	**83716**	N
Outside diameter of shell	D_e	2500	mm
Nominal wall thickness of shell	e_n	20	mm

Material of shell 1.0425

Strength	Testing	K'	255	N/mm²	Operation	K	232	N/mm²
Safety	Testing	S'	1.05		Operation	S	1.5	
Allowable design stress						f	**154.7**	N/mm²
Manufacturing allowance for shell						c_{1S}	0.6	mm
Corrosion allowance for shell						c_{2S}	1	mm
Coefficient						K_2	**1.25**	

Material of lug 1.0425

Strength	Testing	K_L'	265	N/mm²	Operation	K_L	241	N/mm²
Safety	Testing	S_L'	1.05		Operation	S_L	1.5	
Allowable design stress						f_L	**160.7**	N/mm²
Joint efficiency factor						V_N	0.7	
Thickness of fillet weld						V_{a1}	14	mm
Height of lug						h	180	mm
Thickness of lug						s_l	16	mm
Length of lug						b_1	210	mm
Width of lug at bolt hole						b_4	210	mm
Diameter of bolt hole						d_2	50	mm
Eccentricity of load						a_1	0	mm
Distance from load to shell						a_2	75	mm
Number of lugs						N	2	

Material of reinforcing plate 1.0425

Strength	Testing	K'	255	N/mm²	Operation	K	232	N/mm²
Safety	Testing	S'	1.05		Operation	S	1.5	
Allowable design stress						f	**154.7**	N/mm²
Width of reinforcing plate						b_2	160	mm
Length of reinforcing plate						b_3	315	mm
Thickness of reinforcing plate						e_2	20	mm

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Results

Analysis wall thickness of shell	e_a	**18.4**	mm
Equivalent diameter	D_{eq}	**2463**	mm
Range of validity		**0.00812**	
Local force at the shell	F_R	**83716**	N
Ratio of local membrane/bending stress	v_1	**0.1184**	
Ratio of global membrane/bending stress	v_2	**0.06059**	
Coefficient	λ_1	**1.48**	
Coefficient	K_1	**1.421**	
Coefficient	$K_{1,RKF}$	**0.4245**	
Global membrane stress	σ_m	**11.71**	N/mm²
Coefficient	K_{13}	**0.7835**	
Coefficient	K_{14}	**1.614**	
Coefficient	K_{15}	**1.734**	
Allowable bending stress of shell	$\sigma_{b,all}$	**274.8**	N/mm²
Maximum allowable local force at shell	$F_{R,max}$	**198322**	N
Allowable lug force	F_L	**209772**	N
Allowable weld force	F_V	**200512**	N

Strength

F_R =	**83716** N	≤	$F_{R,max}$ =	**198322** N	Conditions satisfied
F_R =	**83716** N	≤	F_L =	**209772** N	
F_R =	**83716** N	≤	F_V =	**200512** N	

Geometrical condition

0.001 ≤ e_n/D_{eq} =	**0.00812**	≤	0.05		Condition satisfied
e_2 =	20 mm	>	e_n =	20 mm	Condition satisfied
b_3 =	315 mm	≤	$1.5 \cdot b_1$ =	**315** mm	Condition satisfied

	2000064641_1st stage _berechnung	

Equations

$$e_a = e_n - c_{1S} - c_{2S} = 20\ \text{mm} - 0.6\ \text{mm} - 1\ \text{mm} = 18.4\ \text{mm}$$

(16.7-1)

$$F_R = \frac{W}{N \cdot \cos(\delta)} \cdot \gamma = \frac{145000\ \text{N}}{2 \cdot \cos(30°)} \cdot 1 = 83716\ \text{N}$$

(16.6-13)

$$\lambda_1 = \frac{b_3}{\sqrt{D_{eq} \cdot e_a}} = \frac{315\ \text{mm}}{\sqrt{2463\ \text{mm} \cdot 18.4\ \text{mm}}} = 1.48$$

(16.6-8)

$$v_2 = \frac{\sigma_m}{K_2 \cdot f} = \frac{11.71\ \text{N/mm}^2}{1.25 \cdot 154.7\ \text{N/mm}^2} = 0.06059$$

(16.6-14)

$$v_1 = Min\begin{cases} 0.08 \cdot \lambda_1 \\ 0.2 \end{cases} = Min\begin{cases} 0.08 \cdot 1.48 \\ 0.2 \end{cases} = 0.1184$$

For cylindrical shell

(16.6-9)

$$\sigma_m = \frac{P \cdot D_{eq}}{4 \cdot e_a} = \frac{0.35\ \text{MPa} \cdot 2463\ \text{mm}}{4 \cdot 18.4\ \text{mm}} = 11.71\ \text{N/mm}^2$$

(16.6-15)

$$K_{13} = \frac{1}{1.2 \cdot \sqrt{1 + 0.06 \cdot \lambda 1^2}} = \frac{1}{1.2 \cdot \sqrt{1 + 0.06 \cdot (1.48)^2}} = 0.7835$$

(16.6-16)

$$K_{14} = \frac{1}{0.6 \cdot \sqrt{1 + 0.03 \cdot \lambda 1^2}} = \frac{1}{0.6 \cdot \sqrt{1 + 0.03 \cdot (1.48)^2}} = 1.614$$

(16.7-2)

$$K_{15} = Min\begin{cases} 2 \\ 1 + 2.6 \cdot \left(\frac{D_{eq}}{e_a}\right)^{0.3} \cdot \frac{b_2}{D_{eq}} = \end{cases}$$

$$Min\begin{cases} 2 \\ 1 + 2.6 \cdot \left(\frac{2463\ \text{mm}}{18.4\ \text{mm}}\right)^{0.3} \cdot \frac{160\ \text{mm}}{2463\ \text{mm}} = 1.734 \end{cases}$$

(16.6-7)

$$K_1 = \frac{(1 - v2^2)}{v_3 + \sqrt{v3^2 + (1 - v2^2) \cdot v1^2}} =$$

$$\frac{(1 - (0.06059)^2)}{0.3405 + \sqrt{(0.3405)^2 + (1 - (0.06059)^2) \cdot (0.1184)^2}} = 1.421$$

$$v_3 = \frac{1}{3} + v_1 \cdot v_2 = \frac{1}{3} + 0.1184 \cdot 0.06059 = 0.3405$$

(16.6-6)

$$\sigma_{b,all} = K_1 \cdot K_2 \cdot f = 1.421 \cdot 1.25 \cdot 154.7\ \text{N/mm}^2 = 274.8\ \text{N/mm}^2$$

	2000064641_1st stage _berechnung	

(16.7-5)

$$F_{R,max} = \frac{K_{15} \cdot \sigma_{b,all} \cdot ea^2}{K_{13} \cdot |\cos\beta| + \frac{K_{14} |\cdot (a_2 + e_2) \cdot \sin\beta - a_1 \cdot \cos\beta|}{b_3}} =$$

$$\frac{1.734 \cdot 274.8\ \text{N/mm}^2 \cdot (18.4\ \text{mm})^2}{0.7835 \cdot |\cos 60°| + \frac{1.614 |\cdot (75\ \text{mm} + 20\ \text{mm}) \cdot \sin 60° - 0\ \text{mm} \cdot \cos 60°|}{315\ \text{mm}}} = 198322\ \text{N}$$

F_R = **83716** ≤ $F_{R,max}$ = **198322** Conditions satisfied

Proof of lug

(RKF BR - A 62 2)

$$F_L = \frac{1.5 \cdot f_L \cdot s_1 \cdot (b_4 - d_2)}{\left\{\sqrt{3 + \left(\frac{b_4 + d_2}{b_4 - d_2} \cdot 0.207\right)^2} + 0.207 \cdot \frac{b_4 + d_2}{b_4 - d_2}\right\} \cdot (1 + 0.4)} =$$

$$\frac{1.5 \cdot 160.7\ \text{N/mm}^2 \cdot 16\ \text{mm} \cdot (210\ \text{mm} - 50\ \text{mm})}{\left\{\sqrt{3 + \left(\frac{210\ \text{mm} + 50\ \text{mm}}{210\ \text{mm} - 50\ \text{mm}} \cdot 0.207\right)^2} + 0.207 \cdot \frac{210\ \text{mm} + 50\ \text{mm}}{210\ \text{mm} - 50\ \text{mm}}\right\} \cdot (1 + 0.4)} = 209772\ \text{N}$$

(RKF BR - A 62 3)

$$F_V = \frac{2 \cdot f_L \cdot V_N \cdot V_{a1} \cdot b_1 \cdot K_{1,RKF}}{(1 + 0.4)} =$$

$$\frac{2 \cdot 160.7\ \text{N/mm}^2 \cdot 0.7 \cdot 14\ \text{mm} \cdot 210\ \text{mm} \cdot 0.4245}{(1 + 0.4)} = 200512\ \text{N}$$

EMMERTHAL	**2000064641_1st stage _berechnung**	

Appendix: Material documentation

Section 3: AD-B1/SHELL
Section 4: AD-B3/Head
Section 5: Schale/Nozzle I + II
Section 5: Verstärkung1/Nozzle I + II
Section 6: Schale/Nozzle III + IV
Section 6: Stutzen1/Nozzle III + IV
Section 7: Schale/Nozzle V + VI
Section 7: Stutzen1/Nozzle V + VI
Section 11: Druckbehälter/11 S32
Section 13: Druckbehälter/13 S32
Section 14: Schale/14 EN16.14
Section 15: Versteifungsring/15 S32
Section 16: Schale/16 FELV
Section 16: Stutzen/16 FELV
Section 17: Schale/17 EN16.07
Section 17: verstärkung/17 EN16.07
Section 17: Öse/17 EN16.07

Material specification:		
Material code: 1.0425	Regulation: AD W 1:2020-04	Spec. No.: EN 10028-2:2017-10
Short name: P265GH	Product: Plate	
Delivery condition: +N		

Design conditions and dimensions:	
Temperature [°C]: 100	Thickness [mm]: 20
Pressure [bar]: 3.5	Outside diameter [mm]: 2500

Material values for test and design conditions:		
	Test condition	Operating condition
Nominal design strength [N/mm²]:	255	232
Safety factor:	1.05	1.5
Allowable stress [N/mm²]:	242.9	154.7
Modulus of elasticity [kN/mm²]:	212	207

Wall thickness tolerance [mm]: 0.6 acc. to EN 10029 Class A

Strength values at 20°C						
Notch impact work	Thermal conductivity	R_{eH}	density	Tensile strength	Tensile strength	ultimate strain
KV	.	.	.	$R_{m, min}$	$R_{m, max}$	A
.	W/(m K)	N/mm²	kg/dm³	N/mm²	N/mm²	%
16<t≤40	.	16<t≤40	.	16<t≤40	16<t≤40	16<t≤40
40	51	255	7.85	410	530	22

Strength values as a function of temperature										
T	°C	condition	50	100	150	200	250	300	350	400
$R_{P0.2}$	N/mm²	16<t≤40	247	232	215	197	181	166	154	145

Strength values as a function of temperature with design lifetime of 100000 h													
T	°C	condition	380	390	400	410	420	430	440	450	460	470	480
$R_{P1.0}$	N/mm²	100.000h	118	106	95	84	73	65	57	49	42	35	30
$R_{m, min}$	N/mm²	100.000h	165	148	132	118	103	91	79	69	59	50	42

	2000064641_1st stage _berechnung	

Young's modulus-values in dependence of the temperature										
T	°C	-100	0	20	100	200	300	400	500	600
E	kN/mm²	217	213	212	207	199	192	184	175	164

Mean coefficient of thermal expansion-values in dependence of the temperature										
T	°C	-100	0	20	100	200	300	400	500	600
α_m	1e-6/K	10.8	11.7	11.9	12.5	13.0	13.6	14.1	14.5	14.9

Differential coefficient of thermal expansion-values in dependence of the temperature										
T	°C	-100	0	20	100	200	300	400	500	600
α_{diff}	1e-6/K	9.3	11.6	11.9	13.0	14.0	15.0	15.9	16.6	16.4

Design conditions and dimensions:	
Temperature [°C]: 100	Thickness [mm]: 25
Pressure [bar]: 3.5	Outside diameter [mm]:

Wall thickness tolerance [mm]: 0.7 acc. to EN 10029 Class A

Design conditions and dimensions:	
Temperature [°C]: 100	Thickness [mm]: 50
Pressure [bar]: 3.5	Outside diameter [mm]: 285

Material values for test and design conditions:		
	Test condition	Operating condition
Nominal design strength [N/mm²]:	245	223
Safety factor:	1.05	1.5
Allowable stress [N/mm²]:	233.3	148.7
Modulus of elasticity [kN/mm²]:	212	207

Wall thickness tolerance [mm]: 0.9 acc. to EN 10029 Class A

Strength values at 20°C						
Notch impact work	Thermal conductivity	R_{eH}	density	Tensile strength	Tensile strength	ultimate strain
KV	.	.	.	$R_{m, min}$	$R_{m, max}$	A
.	W/(m K)	N/mm²	kg/dm³	N/mm²	N/mm²	%
40<t≤60	.	40<t≤60	.	40<t≤60	40<t≤60	40<t≤60
40	51	245	7.85	410	530	22

Strength values as a function of temperature										
T	°C	condition	50	100	150	200	250	300	350	400
$R_{P0.2}$	N/mm²	40<t≤60	237	223	206	190	174	160	148	139

Design conditions and dimensions:	
Temperature [°C]: 100	Thickness [mm]: 16
Pressure [bar]: 3.5	Outside diameter [mm]:

Material values for test and design conditions:		
	Test condition	Operating condition
Nominal design strength [N/mm²]:	265	241
Safety factor:	1.05	1.5

EMMERTHAL	**2000064641_1st stage _berechnung**	

Allowable stress [N/mm²]:	252.4	160.7
Modulus of elasticity [kN/mm²]:	212	207

Strength values at 20°C						
Notch impact work	Thermal conductivity	R_{eH}	density	Tensile strength	Tensile strength	ultimate strain
KV	.	.	.	$R_{m, min}$	$R_{m, max}$	A
.	W/(m K)	N/mm²	kg/dm³	N/mm²	N/mm²	%
t≤16	.	t≤16	.	t≤16	t≤16	t≤16
40	51	265	7.85	410	530	22

Strength values as a function of temperature										
T	°C	condition	50	100	150	200	250	300	350	400
$R_{P0.2}$	N/mm²	t≤16	256	241	223	205	188	173	160	150

EMMERTHAL	**2000064641_2nd stage _berechnung**	

Worksheet for pressure vessel design

Drawing No. 2000064641_2nd stage	Project No. EAV2101539	Sheet 1 of

Client AM	DGRL 2014/68/EU (97/23/EG)

Description	Reflexionsschalldämpfer 2nd stage DN1200
Project calculated according to	AD 2000
Material data according to	AD 2000

Design data		
Max. allowable working pressure	3.5 bar	bar
Test pressure in vertical position	bar	bar
Test pressure in horizontal position	5.4 bar	bar
External pressure	0 bar	bar
Design temperature	100 °C	°C
Corrosion allowance	1 mm	mm
Joint efficiency	0.85	
Volume	27890 l	m³

Category IV
Module B

Comments

Strength Calculation Software *Program System ATLAS* *Version 8.33.2*
Developed by *Lauterbach Verfahrenstechnik GmbH*
Certified per DIN EN ISO 9001:2015 *Certificate Number 01 100 044763*

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2000064641_2nd stage _berechnung

Design of pressure vessels: Design pressure / test pressure - AD 2000 B0: 2014-11; HP 30: 2016-05

AD - B0 Design pressure according to AD 2000 - B0 section 4

Allowable operating pressure	p	3.5	bar
Additional operating pressure	p_{add}	0	bar
Diameter of vessel (inside)	D_i	2360	mm
Max. liquid level, operation	H_F	2360	mm
Max. liquid level, test (= vessel height)	H	2360	mm
Density of the operation medium	ρ_F	1	kg/m³
Density of the test medium	ρ_P	1000	kg/m³
Spec. weight (operation medium)	γ_F	**0.001**	dN/dm³
Spec. weight (test medium)	γ_P	**1**	dN/dm³

Permit additional strength

Permit additional 10% strength in the shell (see also AD-S3/6, 1. Scope)?	N	(Y/N)
Take strength increasement also in account for additional operating pressure	N	(Y/N)
Increase also test pressure by 10%	N	(Y/N)

Operating pressure for calculation at the lowest point p_{berF} **3.5** bar

Material table

Max. operating temperature	T	100	°C
Pressure for design strength value	p_{mat}	**3.5**	bar

Material	max. Thickness	$R_{20°C}$ ambient	Operation R_P	$R_{20°C}/R_P$
1 1.0425	20 mm	255 N/mm²	232 N/mm²	**1.099**
2	mm	N/mm²	N/mm²	
3	mm	N/mm²	N/mm²	
4	mm	N/mm²	N/mm²	
5	mm	N/mm²	N/mm²	
6	mm	N/mm²	N/mm²	
7	mm	N/mm²	N/mm²	
8	mm	N/mm²	N/mm²	

Test pressure calculation with smallest →s / largest →l ratio S

AD 2000 HP 30: Calculation of the pressure at point A during the test

1. Content during test liquid

Vessel clad with material sensitive to strain or pressure as described in 4.18.2? (Y/N) N

2. Test performed only with layed-down vessel (acc. to 4.10.3)

Results

Coefficient for test pressure (4.17 - 4.19)	F_p	**1.43**	
Additional test pressure (e.g. vacuum in opposite operating side)		0	bar
Additional test pressure including F_p		**0**	bar
Pressure measured at point A during the test according to 4.10	P_p	**5.359**	bar
Max. allowed test pressure			bar
Limiting part of vessel			
Remark			
Calculation test pressure at lowest point	P_{berp}	**5.359**	bar

	2000064641_2nd stage _berechnung	

Equations

[4.17]

$$Fp = Max \begin{cases} 1.43 \\ 1.25 \cdot \dfrac{R_{20C}}{R_P} \end{cases}$$

4.10.3 Test pressure at midpoint A for only horizontal vessel test

[4.10.3]

$$P_p = F_p \cdot P + Max \begin{cases} 0.1 \cdot \gamma_P \cdot \left(H + \dfrac{D_i}{2} \right) \\ 0.1 \cdot \dfrac{\gamma_P \cdot D_i}{2} + 0.1 \cdot \gamma_F \cdot H_F \end{cases} =$$

$$1.43 \cdot 3.5\ \text{bar} + Max \begin{cases} 0.1 \cdot 1\ \text{dN/dm}^3 \cdot \left(2.36\ \text{m} + \dfrac{2.36\ \text{m}}{2} \right) \\ 0.1 \cdot \dfrac{1\ \text{dN/dm}^3 \cdot 2.36\ \text{m}}{2} + 0.1 \cdot 0.001\ \text{dN/dm}^3 \cdot 2.36\ \text{m} \end{cases} = 5.359\ \text{bar}$$

P_p **5.359**, for pressure test acc. 4.10. only with layed-down vessel (acc. to 4.10.3)

where P=1.1·P in case of 10% additional strength reserve N

Options for additional strength 2

1 p_{berF} = 1.1 · p + 0.1 · H_F/γ_F
2 p_{berF} = 1.1 · (p + 0.1 · H_F/γ_F)
3 p_{berF} = 1.15 · (p + 0.1 · H_F/γ_F) (incl. 5% allowance acc. B0)

Calculation test pressure at the lowest point (horizontal)

$$P_{berp} = P_p + 0.1 \cdot \gamma_P \cdot \frac{D_i}{2} - 0.05 \cdot P = 5.359\ \text{bar}$$

(-0.05·P acc. AD-B0 section 4.1 note 1)

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2000064641_2nd stage _berechnung

Shell
Cylindrical shells under internal pressure - AD 2000 B1: 2000-10

Cylindrical shells

Design

Outside diameter		D_a	2400	mm
Design temperature		T	100	°C
Design pressure		p	3.5	bar
Test pressure		p'	5.4	bar

Material

Material		1.0425		
Nominal design strength	(operation)	K	232	N/mm²
Nominal design strength	(Test)	K'	255	N/mm²
Safety factor	(operation)	S	1.5	
Safety factor	(Test)	S'	1.05	
Wall thickness mill tolerance		c_1	0.6	mm
Corrosion / erosion allowance		c_2	1	mm
Density		ρ	7.85	t/m³
Joint efficiency factor		v	0.85	

Geometry

Actual wall thickness		s_e	20	mm
Outside diameter		D_a	2400	mm
Inside diameter	D_a-2·s_e	D_i	**2360**	mm
Ratio		D_a/D_i	**1.017**	

Results

Allowable design pressure		p_{allB}	**20.31**	bar
Allowable test pressure		p_{allP}	**31.9**	bar
Required wall thickness	(operation)	s_B	**4.79**	mm
Required wall thickness	(Test)	s_P	**4.735**	mm
Required wall thickness	max(s_B;s_P)	s	**4.79**	mm

Openings according to B9

Wall thickness without allowances	s_e-c_1-c_2	s_0	**18.4**	mm
Allowable unreinforced opening with σ_{all} = K/S		d_{A1} <	**2360**	mm
within a welding zone with σ_{all} = v·K/S holds:		d_{A2} <	**1998**	mm
Multiple openings are isolated if l>2·b		l >	**418.4**	mm

Volumes and weights

Length (Height)		L	5630	mm
Outside volume	L·π/4·D_a^2	V_A	**25.47**	m³
Inside volume	L·π/4·D_i^2	V_I	**24628**	l
Volume of the component	V_A-V_I	V_B	**0.8419**	m³
Weight (empty)	V_B· ρ · 9.81 m/s²	G_B	**64.83**	kN
Weight (water filled)	G_B+V_I · 1000 kg/m³ · 9.81 m/s²	G_W	**306.4**	kN

Comments

Equations
Operation

$$s_B = \frac{D_a \cdot p}{20 \cdot \frac{K}{S} \cdot v + p} + c_1 + c_2 = \frac{2400\ \text{mm} \cdot 3.5\ \text{bar}}{20 \cdot \frac{232\ \text{N/mm}^2}{1.5} \cdot 0.85 + 3.5\ \text{bar}} + 0.6\ \text{mm} + 1\ \text{mm} = 4.79\ \text{mm}$$

Test

$$s_P = \frac{D_a \cdot p'}{20 \cdot \frac{K'}{S'} \cdot v + p'} + c_1 + c_2 = \frac{2400\ \text{mm} \cdot 5.4\ \text{bar}}{20 \cdot \frac{255\ \text{N/mm}^2}{1.05} \cdot 0.85 + 5.4\ \text{bar}} + 0.6\ \text{mm} + 1\ \text{mm} = 4.735\ \text{mm}$$

	2000064641_2nd stage _berechnung	

Head
Kloepper type ends under internal and external pressure - AD 2000 B3: 2011-05

Type of head	**Torispherical head (Kloepper type)**
Pressure	Internal pressure
Manufacturing	End with knuckle and crown of equal wall thickness
Allowances acc. to DIN 28011	Yes

Outside diameter of head		D_a	2400	mm
Design pressure		p	3.5	bar
Test pressure		p'	5.4	bar
Maximum nozzle diameter outside $0.6 \cdot D_a$ *)		d_i	0	mm

*) *For di = 0, all openings lie completely within $0.6 \cdot D_a$ and can be calculated as spherical openings acc. AD-B9.*

Material

Design temperature		T	100	°C
Material		1.0425		
Nominal design strength	operation	K	232	N/mm²
Nominal design strength	testing	K'	255	N/mm²
Modulus of elasticity at design temperature		E	207000	N/mm²
Safety factor	operation	S	1.5	
Safety factor	testing	S'	1.05	
Wall thickness manufacturing tolerance		c_1	**0.5**	mm
Corrosion / erosion allowance		c_2	1	mm
Joint efficiency		v	1	

Geometry

Final wall thickness		s_e	20	mm
Final crown wall thickness		s_K	**20**	mm
Shape factor		β	**2.961**	
Skirt height		h	**70**	mm
Required skirt height		h	**19.32**	mm
Run-out length		x	**100**	mm
Crown height		h_2	**455.3**	mm
Allowable unreinforced opening within $0.6 \cdot D_a$			**1440**	mm
Inside crown diameter		D_i	**4800**	mm

Required wall thicknesses

Required knuckle wall thickness	operation	**7.323**	mm

Required wall thicknesses based on the final wall thickness

Required wall thickness		**5.52**	mm
Required knuckle wall thickness	operation	**5.52**	mm
Required knuckle wall thickness	testing	**5.45**	mm
Required crown wall thickness	operation	**4.237**	mm
Required crown wall thickness	testing	**4.189**	mm
Strength condition		✓	

Weights / Volume

Weight (empty)	**9.589**	kN
Weight (operating)	**9.589**	kN
Weight (water-filled)	**25.8**	kN
Volume (contents)	**1.621**	m³

Comments

	2000064641_2nd stage _berechnung	

Equations

Validity range for torispherical and semi-ellipsoidal heads

$$0.001 \leq \frac{s_e - c_1 - c_2}{D_a} = \frac{20\ \text{mm} - 0.5\ \text{mm} - 1\ \text{mm}}{2400\ \text{mm}} = 0.007708 \leq 0.1$$

Knuckle or hemispherical connection, operation

$$s = \frac{D_a \cdot p \cdot \beta}{40 \cdot \frac{K}{S} \cdot v} + c_1 + c_2 = \frac{2400\ \text{mm} \cdot 3.5\ \text{bar} \cdot 2.961}{40 \cdot \frac{232\ \text{N/mm}^2}{1.5} \cdot 1} + 0.5\ \text{mm} + 1\ \text{mm} = 5.52\ \text{mm}$$

Crown, operation

$$s = \frac{(D_i + 2 \cdot s_K) \cdot p}{40 \cdot \frac{K}{S} \cdot v + p} + c_1 + c_2 = \frac{(4800\ \text{mm} + 2 \cdot 20\ \text{mm}) \cdot 3.5\ \text{bar}}{40 \cdot \frac{232\ \text{N/mm}^2}{1.5} \cdot 1 + 3.5\ \text{bar}} + 0.5\ \text{mm} + 1\ \text{mm} = 4.237\ \text{mm}$$

Knuckle or hemispherical connection, testing

$$s = \frac{D_a \cdot p' \cdot \beta}{40 \cdot \frac{K'}{S'} \cdot v} + c_1 + c_2 = \frac{2400\ \text{mm} \cdot 5.4\ \text{bar} \cdot 2.961}{40 \cdot \frac{255\ \text{N/mm}^2}{1.05} \cdot 1} + 0.5\ \text{mm} + 1\ \text{mm} = 5.45\ \text{mm}$$

Crown, testing

$$s = \frac{(D_i + 2 \cdot s_K) \cdot p'}{40 \cdot \frac{K'}{S'} \cdot v + p'} + c_1 + c_2 = \frac{(4800\ \text{mm} + 2 \cdot 20\ \text{mm}) \cdot 5.4\ \text{bar}}{40 \cdot \frac{255\ \text{N/mm}^2}{1.05} \cdot 1 + 5.4\ \text{bar}} + 0.5\ \text{mm} + 1\ \text{mm} = 4.189\ \text{mm}$$

	2000064641_2nd stage _berechnung	

Nozzle I + II
Single openings in cylindrical, conical and spherical shells - AD 2000 B9: 2010-02, corrected version 2016-09

Calculation options

Cylindrical body			
Single opening			
Operation			
Design temperature	T	100	°C
Design pressure	p	3.5	bar

	Opening 1
Type of opening	Set-through nozzle
Inclination	Vertical
Reinforcement	Yes

Materials

	Shell			Nozzle 1		
Material	1.0425			1.0425		
Design strength Operation	K_{Op}	232	N/mm²	K_{Op}	232	N/mm²
Safety factor Operation	S_{Op}	1.5		S_{Op}	1.5	
Allowance	c_1	0.6	mm	c_1	0.6	mm
Allowance	c_2	1	mm	c_2	1	mm
Design allowance				c_3	0	mm
Nominal design stress	f	**154.7**	N/mm²	f	**154.7**	N/mm²

	Reinforcement 1		
Material	1.0425		
Design strength Operation	K_{Op}	232	N/mm²
Safety factor Operation	S_{Op}	1.5	
Allowance	c_1	0.7	mm
Allowance	c_2	1	mm
Nominal design stress	f	**154.7**	N/mm²

Geometrical data Opening 1

Graphics

Outside diameter	$d_{a,1}$	1219	mm
Final wall thickness	$S_{S1,n}$	20	mm
Final inside diameter	$d_{i,n,1}$	**1179**	mm
Corroded inside diameter	$d_{i,1}$	**1182**	mm
External projection	l_{S1}	350	mm
Inward protruding length	m_1	35	mm
Final thickness of reinforcement	h_{R1}	25	mm
Width of the reinforcement (Longitudinal direction, area I)	$b_{I,R1}$	50	mm
Available width of shell	$b_{1,avl}$	60	mm

Geometrical data Shell

Outside diameter	D_a	2400	mm
Final wall thickness	s_e	20	mm
Design wall thickness	s_a	**18.4**	mm
Final inside diameter	$D_{i,n}$	**2360**	mm
Corroded inside diameter	D_i	**2363**	mm
Ligament (web) between two nozzles	l		mm

Pressurized area

		Opening 1	
Longitudinal direction, area I			
Shell	$A_{pS,I}$	**791081**	mm²
Nozzle	$A_{pS1,I}$	**120696**	mm²
Total	$A_{p,I}$	**911777**	mm²

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2000064641_2nd stage _berechnung

Load-bearing cross-sectional area

		Opening 1	
Shell	$A_{\sigma 0}$	1104	mm²
Longitudinal direction, area I			
Nozzle	$A_{\sigma 1,I}$	4401	mm²
Reinforcement	$A_{\sigma 2,I}$	1000	mm²

Utilisation

		Opening 1	
Longitudinal direction, area I	U_I	31.75	%

Results

Wall thickness at opening edge		$s_{A,1}$	36.67	mm
Wall thickness ratio		s_{S1}/s_A	0.5247	
Design width		b_1	290	mm
Width of shell contributing to the reinforcement	$b_{1,max}=\min(b_1; b_{1,avI})$	$b_{1,max}$	60	mm
Minimum ligament without mutual influence		$l_{min,1}$	580	mm
Length of nozzle contributing to the reinforcement, longitudinal		$l_{S1,max}$	185.8	mm

Geometrical conditions

1.1(1a) ✓

$$0.002 \le \frac{s_a}{D_a} \Leftrightarrow 0.002 \le \frac{18.4\ \text{mm}}{2400\ \text{mm}}$$

1.1(1b) ✓

$$\frac{s_a}{D_a} \le 0.1 \Leftrightarrow \frac{18.4\ \text{mm}}{2400\ \text{mm}} \le 0.1$$

All geometrical conditions ✓

Strength conditions

Region I ✓

$$f_{red,S1} \cdot \left(\left(f - \frac{p}{20} \right) \cdot A_{\sigma 0,1} + \left(f_{S1} - \frac{p}{20} \right) \cdot A_{\sigma 1I,1} + \left(f_{R1} - \frac{p}{20} \right) \cdot A_{\sigma 2I,1} \right) \ge \frac{p}{10} \cdot A_{pI,1} \Leftrightarrow$$

$$1 \cdot \left(\left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 1104\ \text{mm}^2 + \left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 4401\ \text{mm}^2 + \left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 1000\ \text{mm}^2 \right) \ge \frac{3.5\ \text{bar}}{10} \cdot 911777\ \text{mm}^2$$

EMMERTHAL	**2000064641_2nd stage _berechnung**	

Nozzle III + IV
Single openings in cylindrical, conical and spherical shells - AD 2000 B9: 2010-02, corrected version 2016-09

Calculation options

Cylindrical body			
Single opening			
Operation			
Design temperature	T	100	°C
Design pressure	p	3.5	bar

		Opening 1
Type of opening		Set-in block flange

Materials

	Shell			**Nozzle 1**		
Material	1.0425			1.0425		
Design strength Operation	K_{Op}	232	N/mm²	K_{Op}	223	N/mm²
Safety factor Operation	S_{Op}	1.5		S_{Op}	1.5	
Allowance	c_1	0.6	mm	c_1	0.9	mm
Allowance	c_2	1	mm	c_2	0	mm
Design allowance				c_3	0	mm
Nominal design stress	f	**154.7**	N/mm²	f	**148.7**	N/mm²

Geometrical data Opening 1

Graphics

Outside diameter	$d_{a,1}$	285	mm
Inside diameter of opening	$d_{i,Opening1}$	**285**	mm
Final inside diameter	$d_{i,n,1}$	**150**	mm
Corroded inside diameter	$d_{i,1}$	**151.8**	mm
Final width of block flange	b_{S1}	67.5	mm
Final height of block flange	h_{BS1}	50	mm
Inward protruding length	m_1	5	mm
Available width of shell	$b_{1,avl}$	70	mm

Geometrical data Shell

Outside diameter	D_a	2400	mm
Final wall thickness	s_e	20	mm
Design wall thickness	s_a	**18.4**	mm
Final inside diameter	$D_{i,n}$	**2360**	mm
Corroded inside diameter	D_i	**2363**	mm
Ligament (web) between two nozzles	l		mm

Pressurized area

		Opening 1	
Longitudinal direction, area l			
Shell	$A_{pS,l}$	**251090**	mm²
Nozzle	$A_{pS1,l}$	**3416**	mm²
Total	$A_{p,l}$	**254506**	mm²

Load-bearing cross-sectional area

		Opening 1	
Shell	$A_{\sigma 0}$	**1288**	mm²
Longitudinal direction, area l			
Nozzle	$A_{\sigma 1,l}$	**3270**	mm²

Utilisation

		Opening 1	
Longitudinal direction, area l	U_l	**13.01**	%

	2000064641_2nd stage _berechnung	

Results

Wall thickness at opening edge		$s_{A,1}$	50	mm
Design width		b_1	341.6	mm
Width of shell contributing to the reinforcement	$b_{1,max}=\min(b_1; b_{1,avl})$	$b_{1,max}$	70	mm
Minimum ligament without mutual influence		$l_{min,1}$	683.3	mm

Geometrical conditions

1.1(1a) ✓

$$0.002 \le \frac{s_a}{D_a} \Leftrightarrow 0.002 \le \frac{18.4\ \text{mm}}{2400\ \text{mm}}$$

1.1(1b) ✓

$$\frac{s_a}{D_a} \le 0.1 \Leftrightarrow \frac{18.4\ \text{mm}}{2400\ \text{mm}} \le 0.1$$

All geometrical conditions ✓

Strength conditions

Region I ✓

$$f_{red,S1} \cdot \left(\left(f - \frac{p}{20} \right) \cdot A_{\sigma 0,1} + \left(f_{S1} - \frac{p}{20} \right) \cdot A_{\sigma 1l,1} \right) \ge \frac{p}{10} \cdot A_{pl,1} \Leftrightarrow$$

$$1 \cdot \left(\left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 1288\ \text{mm}^2 + \left(148.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 3270\ \text{mm}^2 \right) \ge \frac{3.5\ \text{bar}}{10} \cdot 254506\ \text{mm}^2$$

EMMERTHAL	**2000064641_2nd stage _berechnung**	

Nozzle V + VI
Single openings in cylindrical, conical and spherical shells - AD 2000 B9: 2010-02, corrected version 2016-09

Calculation options

Cylindrical body			
Single opening			
Operation			
Design temperature	T	100	°C
Design pressure	p	3.5	bar

		Opening 1
Type of opening		Set-in block flange

Materials

	Shell			**Nozzle 1**		
Material	1.0425			1.0425		
Design strength Operation	K_{Op}	232	N/mm²	K_{Op}	232	N/mm²
Safety factor Operation	S_{Op}	1.5		S_{Op}	1.5	
Allowance	c_1	0.6	mm	c_1	0.9	mm
Allowance	c_2	1	mm	c_2	0	mm
Design allowance				c_3	0	mm
Nominal design stress	f	**154.7**	N/mm²	f	**154.7**	N/mm²

Geometrical data Opening 1

Graphics

Outside diameter	$d_{a,1}$	220	mm
Inside diameter of opening	$d_{i,Opening1}$	**220**	mm
Final inside diameter	$d_{i,n,1}$	**100**	mm
Corroded inside diameter	$d_{i,1}$	**101.8**	mm
Final width of block flange	b_{S1}	60	mm
Final height of block flange	h_{BS1}	40	mm
Inward protruding length	m_1	0	mm
Available width of shell	$b_{1,avl}$	115	mm

Geometrical data Shell

Outside diameter	D_a	2400	mm
Final wall thickness	s_e	20	mm
Design wall thickness	s_a	**18.4**	mm
Final inside diameter	$D_{i,n}$	**2360**	mm
Corroded inside diameter	D_i	**2363**	mm
Ligament (web) between two nozzles	l		mm

Pressurized area

		Opening 1	
Longitudinal direction, area l			
Shell	$A_{pS,l}$	**265860**	mm²
Nozzle	$A_{pS1,l}$	**2036**	mm²
Total	$A_{p,l}$	**267896**	mm²

Load-bearing cross-sectional area

		Opening 1	
Shell	$A_{\sigma 0}$	**2116**	mm²
Longitudinal direction, area l			
Nozzle	$A_{\sigma 1,l}$	**2311**	mm²

Utilisation

		Opening 1	
Longitudinal direction, area l	U_l	**13.71**	%

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2000064641_2nd stage _berechnung

Results

Wall thickness at opening edge		$s_{A,1}$	**40**	mm
Design width		b_1	**303.7**	mm
Width of shell contributing to the reinforcement	$b_{1,max}=\min(b_1; b_{1,avl})$	$b_{1,max}$	**115**	mm
Minimum ligament without mutual influence		$l_{min,1}$	**607.4**	mm

Geometrical conditions

1.1(1a) ✓

$$0.002 \le \frac{s_a}{D_a} \Leftrightarrow 0.002 \le \frac{18.4\ \text{mm}}{2400\ \text{mm}}$$

1.1(1b) ✓

$$\frac{s_a}{D_a} \le 0.1 \Leftrightarrow \frac{18.4\ \text{mm}}{2400\ \text{mm}} \le 0.1$$

All geometrical conditions ✓

Strength conditions

Region I ✓

$$f_{red,S1} \cdot \left(\left(f - \frac{p}{20} \right) \cdot A_{\sigma 0,1} + \left(f_{S1} - \frac{p}{20} \right) \cdot A_{\sigma 1l,1} \right) \ge \frac{p}{10} \cdot A_{pl,1} \Leftrightarrow$$

$$1 \cdot \left(\left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 2116\ \text{mm}^2 + \left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 2311\ \text{mm}^2 \right) \ge \frac{3.5\ \text{bar}}{10} \cdot 267896\ \text{mm}^2$$

	2000064641_2nd stage _berechnung	

General safety verification of horizontal pressure vessels on saddles - AD 2000 S3/2: 2004-02

4.1 Approximate strength proof and geometry acc. section 2.3.3

Design data

Inside vessel diameter	D	2360	mm	
Final wall thickness	s_e	20	mm	
Enclosing angle of the saddle support	δ_1	120	°	(90°, 120°)
Reinforcement plate thickness without allowances	e_v	20	mm	
Cylinder length	L	5630	mm	
Distance between cylinder end and support	a_1	375	mm	
Axial width of saddle of saddle support	b_1	360	mm	
Width of reinforcement plate	b_2	0	mm	
Weld joint factor	v	0.85		
Density of filling medium	R_f	1000	kg/m³	
Design pressure	p	3.5	bar	

Material

Design temperature	T	100	°C
Material	1.0425		
Material strength	K	232	N/mm²
Safety factor	S	1.5	
Wall thickness manufacturing tolerance	c_1	0.6	mm
Corrosion / Erosion allowance	c_2	1	mm
Allowable design stress	f	**154.7**	N/mm²

Intermediate results

Vessel wall thickness without allowances	$e = s_e - c_1 - c_2$	e	**18.4**	mm
Parameter K11 (acc. section 5.2.2.1)		K_{11}	**0.0789**	
Max. cylinder length (acc. Fig. 3)		L_{max}	**20509**	mm

Conditions acc. 4.1 (satisfied=1, violated=0)

L	=	5630	≤	**20509**	= L_{max}	**1**
p	=	3.5	≥	0		**1**
f	=	**154.7**	≥	130 MPa		**1**
a_1	=	375	≤	**1180**	= 0.5 D	**1**
b_1	=	360	≥	**229.2**	= 1.1 √De	**1**
v	=	0.85	≥	0.8		**1**
R_f	=	1000	≤	1000 kg/m³		**1**

4.1 Only for saddle support with reinforcement

b_2	=	0	≥	**726.2**	= K_{11} D + 1.5 b_1
e_v	=	20	≥	**18.4**	= e

2.3.3 Geometrical condition (satisfied=1, violated=0)

60°	≤	120	$=\delta_1$	≤	180°	**1**
e/D	=	**0.007797**		≤	0.05	**1**

2.3.3 For saddle support with reinforcement plate

e	=	**18.4**	≤	20 = e_v	≤	**27.6**	=	1.5·e	**1**
Reinforcement plate				b_3	≥	**236**	= 0.1·D		

	2000064641_2nd stage _berechnung	

Section 1.5

$$\frac{b_1}{D} \le 0.2 \Leftrightarrow \frac{360\ \text{mm}}{2360\ \text{mm}} \le 0.2$$ 1

$$\frac{b_2}{b_1} \le 3.0 \Leftrightarrow \frac{0\ \text{mm}}{360\ \text{mm}} \le 3.0$$ 1

$b_1 = 360 \le 0.2 \cdot 2360 = 0.2 \cdot D$ 1

$b_2 = 0 \le 3 \cdot 360 = 3 \cdot b_1$ 1

Evaluated geometrical conditions are **satisfied**

	2000064641_2nd stage _berechnung	

General safety verification of horizontal pressure vessels on saddles - AD 2000 S3/2: 2004-02

4.2 Actual forces and moments acc. AD S 3/2

General design specifications

Total vessel weight load		G	164	kN
Cylinder length		L	5630	mm
Vessel inside diameter		D	2400	mm
Length of one end cap		h_2	475	mm
Distance from cylinder end to adjacent support		a_1	305	mm
Number of supports (2...8)		n	2	(2-8)

Intermediate results

Equivalent cylindrical shell length = a_1+2 · h2/3		a_3	**621.7**	mm
Support distance		l_1	**5020**	mm
Parameter		a_3/l_1	**0.1238**	

Load

Line load	$q = G / (L + 4/3 \cdot h_2)$	q	**26.18**	N/mm
Moment	$M_o = q \cdot D^2 / 16$	M_o	**9426290**	Nmm

Forces and moments for support type A (n=2)

Support force	$F_1 = F_2 = G / 2$	F_1,F_2	***82***	kN
Support moment	M_1,M_2	M_1,M_2	***-4.367***	kN·m
Lateral force	Q_1,Q_2	Q_1,Q_2	***65.72***	kN
Moment between support 1 and 2		M	**86.85**	kN·m

Forces and moments for support type B (n>2)

Support i =	1		2		3		4	
ω_i	**1**		**0**		**0**		**0**	
F_i	**82000**	N	**0**	N	**0**	N	**0**	N
Q_i	**65722**	N	**0**	N	**0**	N	**0**	N
$\lvert M_i \rvert$	**-4366605**	Nmm	**0**	Nmm	**0**	Nmm	**0**	Nmm

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General safety verification of horizontal pressure vessels on saddles - AD 2000 S3/2: 2004-02

5.2.1 Cylindrical shell without reinforcing plate: Strength verification

General design specifications

Vessel inside diameter		D	2460	mm
Final wall thickness		s_e	20	mm
Width of saddle support		b_1	360	mm
Enclosing angle of the web plate		δ_1	120	°
Overhanging length of the cylinder		a_1	320	mm
Load point №	1			
Existing saddle load at load point		F_i	***82***	kN
Existing saddle moment load point		M_i	-4.67	kN·m
Existing saddle shear force at saddle		Q_i	***65.72***	kN
Allowable bending moment		allM	***9784***	kN·m
Allowable shear force		allQ	***17854***	kN
Allowable compressive axial force		F_N	***16443***	kN
Design temperature		T	100	°C
Design pressure		p	3.5	bar
External design pressure		p_a	0	bar
Allowable external pressure		p_f	1	bar
Load case (operation=1; test and installation=2)			1	

Material

Material		1.0425		
Nominal design strength		K	232	N/mm²
Safety factor		S	1.5	
Wall thickness manufacturing tolerance		c_1	0.6	mm
Corrosion / Erosion allowance		c_2	1	mm
Allowable design stress		f	**154.7**	N/mm²
Wall thickness without allowances	$e = s_e - c_1 - c_2$	e	**18.4**	mm
Saferty factor acc. to 5.1 (Eq. 2)		S_{51}	**1.5**	

Intermediate results

Global membrane stress σ_{mx} **0.0534** N/mm²

Efficiency ratio of the shell

ϑ_{212}	**-2.76e-4**	ϑ_{213}	**0**
ϑ_{222}	**0.06023**	ϑ_{223}	**0.121**

Ratio of the local membrane stress to the local bending stress

ϑ_{12}	**-0.05174**	ϑ_{13}	**-2.17**
ϑ_{22}	**-2.76e-4**	ϑ_{23}	**0**

Limiting bending stress at saddles 2 and 3

σ_{gr2} **288.3** N/mm² σ_{gr3} **76.46** N/mm²

Parameters

K_2	**1.2**	K_3	**0.25**	K_4	**0.6451**
K_5	**0.9816**	K_6	**0.3464**	K_7	**0.6344**
K_8	**0.1594**	K_9	**0.5566**	K_{10}	**0.5154**

Allowable support force due to loading

in longitudinal direction	$allF_2$	**3218908**	N
in circumferential direction	$allF_3$	**1480458**	N
Equivalent axial force load point i	F_e	**41110**	N

Strength verification

F_i = ***82000*** ≤ min **3218908** ; **1480458** = min($allF_2$; $allF_3$)

Stability verification

$|p_a|/p_f + |M_i|/allM + F_e/F_N + (|Q_i|/allQ)^2$ = **0.002991** ≤ 1

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2.3.3 Geometrical condition **(satisfied=1, violated=0)**

60°	≤	120 = δ_1	≤ 180°	1
e/D	=	**0.00748**	≤ 0.05	1

Section 1.5 (not applicable without reinforcement b2=0)

$$\frac{b_1}{D} \leq 0.2 \Leftrightarrow \frac{360\ \text{mm}}{2460\ \text{mm}} \leq 0.2$$ **1**

$$\frac{b_2}{b_1} \leq 3.0 \Leftrightarrow \frac{0\ \text{mm}}{360\ \text{mm}} \leq 3.0$$ **1**

Saddle plate	b_1 =	360 ≤ 0.2 ·	2460 = 0.2·D	1
Reinforcement plate	b_2 =	0 ≤ 3·b_1		1

Strength conditions	**SATISFIED**
Evaluated geometrical conditions	**satisfied**

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Global Loads - DIN EN 13445-3/16.14: 2018-12

Allowable individual loads EN 13445-3/16.14

Load case			Operation	
Calculation temperature		t	100	°C

Geometry of the cylindrical shell

Mean shell diameter		D	2380	mm
Cylinder length (incl. cylindrical part of head)		L	5630	mm
Nominal thickness		e_n	20	mm
Deviation from perfect shape		w	2	mm
Length of template for checking shape deviations		l	100	mm
Tolerance		w/l	**0.02**	

Material data of the cylinder

Material designation		1.0425		
Microstructure		Ferrite		
Design strength		K_{de}	**232**	N/mm²
Design safety factor		S_{de}	**1.5**	
Nominal design stress		f	**154.7**	N/mm²
Modulus of elasticity		E	**207000**	N/mm²
Poisson's ratio		v	0.3	
$R_{p0.2}$ at 20°C		$R_{p0.2,20C}$	255	N/mm²
$R_{p0.2}$ at operating temperature		$R_{p0.2,T}$	232	N/mm²
$R_{p1.0}$ at 20°C		$R_{p1.0,20C}$		N/mm²
$R_{p1.0}$ at operating temperature		$R_{p1,0,T}$		N/mm²
Safety factor for elastic limit	(8.4.2-2)	S_{el}	**1**	
allowable elastic limit	(R_{p02}/S_{el} or R_{p1}/S_{el})	σ_e	**232**	N/mm²
Wall thickness mill tolerance		c_1	0.6	mm
Corrosion allowance		c_2	1	mm

Results (acc. section 16.14)

Inside diameter	$D - e_a$	D_i	**2362**	mm
Analysis thickness		e_a	**18.4**	mm
Scaled diameter		D/e_a	**129.3**	
Factor (16.14-15)		K	**8.347**	
Factor (16.14-16/17)		α	**0.3234**	
Factor (16.14-18/19)		Δ	**0.5152**	

Allowable individual loads

Longitudinal compressive stress	(σe*Δ acc. 16.14-20)	$\sigma_{c,all}$	**119.5**	N/mm²
Maximum tensile force	(16.14-1)	$F_{t,max}$	**21279**	kN
Maximum compressive force	(16.14-2)	$F_{c,max}$	***16443***	kN
Bending moment	(16.14-3)	M_{max}	***9784***	kN·m
Shear force	(horizontal vessel 16.8-30/31)	Q_{max}	***17854***	kN

Remark

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Calculation

$$K=\frac{1.21\cdot E\cdot e_a}{\sigma_e\cdot D}=\frac{1.21\cdot 207000\ \text{N/mm}^2\cdot 18.4\ \text{mm}}{232\ \text{N/mm}^2\cdot 2380\ \text{mm}}=8.347$$ (16.14-15)

(16.14-16)

for D/e_a = **129.3** ≤ 424

$$\alpha_1=\frac{0.83}{\sqrt{1+0.005\cdot D/e_a}}=$$

$$\frac{0.83}{\sqrt{1+0.005\cdot 129.3}}=0.6468$$

for 0.01 ≤ w/l ≤ 0.02

$$\alpha=\left(1.5-50\cdot\frac{w}{l}\right)\cdot\alpha_1=(1.5-50\cdot 0.02)\cdot 0.6468=0.3234$$

(16.14-18/19)

for α·K ≥ 0.5

$$\Delta=\frac{\left[1-\frac{0.4123}{(\alpha\cdot K)^{0.6}}\right]}{1.5}=\frac{\left[1-\frac{0.4123}{(0.3234\cdot 8.347)^{0.6}}\right]}{1.5}=0.5152$$

$$\sigma_{c,all}=\sigma_e\cdot\Delta=232\ \text{N/mm}^2\cdot 0.5152=119.5\ \text{N/mm}^2$$ (16.14-20)

(16.14-1)

$$F_t=\pi\cdot D\cdot e_a\cdot\frac{f}{1000}=\pi\cdot 2380\ \text{mm}\cdot 18.4\ \text{mm}\cdot\frac{154.7\ \text{N/mm}^2}{1000}=21279\ \text{kN}$$

(16.14-2)

$$F_c=\pi\cdot D\cdot e_a\cdot\frac{\sigma_{c,all}}{1000}=\pi\cdot 2380\ \text{mm}\cdot 18.4\ \text{mm}\cdot\frac{119.5\ \text{N/mm}^2}{1000}=16443\ \text{kN}$$

(16.14-3)

$$M_{max}=\pi\cdot D^2\cdot e_a\cdot\frac{\sigma_{c,all}}{4000000}=$$

$$\pi\cdot(2380\ \text{mm})^2\cdot 18.4\ \text{mm}\cdot\frac{119.5\ \text{N/mm}^2}{4000000}=9784\ \text{kNm}$$

Section 16.8.7

For

$$\frac{2\cdot L}{D}\le 8.7\cdot\sqrt{\frac{D}{2\cdot e_a}}$$

$$Q_{max}=\frac{\pi\cdot D}{4}\cdot e_a\cdot E\cdot\left[\frac{e_a}{0.5\cdot D}\right]^{1.25}\cdot\sqrt{\frac{D}{2\cdot L}\cdot\left[1+42\cdot\left[\frac{D}{2\cdot L}\right]^3\cdot\left[\frac{e_a}{0.5\cdot D}\right]^{1.5}\right]}$$

For

$$\frac{2\cdot L}{D}>8.7\cdot\sqrt{\frac{D}{2\cdot e_a}}$$

$$Q_{max}=\frac{\pi\cdot D}{3\cdot 4}\cdot e_a\cdot E\cdot\left[\frac{2\cdot e_a}{D}\right]^{1.5}$$

	2000064641_2nd stage _berechnung	

General safety verification of horizontal pressure vessels on saddles - AD 2000 S3/2: 2004-02

6. Verification of the saddle

General design specifications

Load point №	1			
Existing load at the saddle support		F_i	80	kN
Thickness of the saddle web plate without allowances		e_s	20	mm
Length of saddle support plate		l_2	1696	mm
Width of saddle support		b_1	360	mm
Effective web plate height (Fig. 6)		b_e	650	mm
Section modulus in A-A of the saddle support		W_A	**4677512**	mm³
Enclosing angle of the web plate		δ_1	120	°
Enclosing angle of the saddle plate		δ_2	120	°
Partial enclosing angle according to Figure 8		ψ	60	°
Design temperature		T	100	°C
Vessel inside diameter		D	2360	mm

Web plate material

Material	1.0425		
Nominal design strength	K_s	232	N/mm²
Safety factor	S_s	1.5	
Allowable design stress	f_s	**154.7**	N/mm²
Modulus of elasticity	E_s	212000	N/mm²

Intermediate results

Quotient	b_e/l_2	**0.3833**	
Factor K13 from Figure 7	K_{13}	**1.168**	
Strain factor $\varepsilon_S = f_s \cdot 10^3/E_s$	ε_S	**0.7296**	
Stability factor for plate buckling	φ	**0.7107**	
$allF_4$ according to Equation 15	$allF_4$	**3728431**	N
$allF_5$ according to Equation 16	$allF_5$	**2123908**	N
$allF_6$ according to Equation 17	$allF_6$	**1928777**	N

Saddle strength verification (14) is **SATISFIED**

$$F_i \leq \min[allF_4; allF_5; allF_6]$$

$$80000 \leq \min[\ \mathbf{3728431};\ \mathbf{2123908};\ \mathbf{1928777}]$$

EMMERTHAL	**2000064641_2nd stage _berechnung**	

Finite-Elemente LV - COMSOL

Select model	Zylinder mit Stutzen			
Boundary conditions				
Design temperature		T	100	°C
Design pressure		p	3.5	bar
Materials				
Shell				
Material	1.0425			
Nominal design strength		K	232	N/mm²
Safety factor		S	1.5	
Allowable stress shell		f	**154.7**	N/mm²
Allowable stress reinforcement		f	**154.7**	N/mm²
Allowable stress welding		f	**154.7**	N/mm²
Wall thickness manufacturing tolerance		c_1	0.6	mm
Corrosion allowance		c_2	1	mm
Modulus of elasticity at 20°C		E_{20}	212000	N/mm²
Nozzle				
Material	1.0425			
Nominal design strength		K	232	N/mm²
Safety factor		S	1.5	
Allowable stress		f	**154.7**	N/mm²
Wall thickness manufacturing tolerance		c_1	0.6	mm
Corrosion allowance		c_2	1	mm
Modulus of elasticity at 20°C		E_{20}	212000	N/mm²
Geometrical data				
Shell				
Outside diameter		D_a	2400	mm
Length of cylindrical shell		L	5630	mm
Nominal thickness		e_{nom}	20	mm
Calculation wall thickness		e	**18.4**	mm
Nozzle				
Type	Eingesteckter Stutzen			
Flanged nozzle	steif			
Type of intersection	Nicht ausgehalst			
Nominal Diameter		DN		
Outside diameter nozzle		d_a	1219	mm
Nozzle projection outside		l	350	mm
Nominal thickness		e_{nom}	20	mm
Calculation wall thickness		e	**18.4**	mm
Weld thickness		a		mm
Radial offset		a_r	0	mm
Tangential displacement		b	1020	mm
Inclination of the nozzle to the shell radius		θ	0	°
Drehung Stutzen um Radius Schale		ϕ	0	°
Reinforcement				
Select reinforcement	Mit Verstärkung			
Diameter of reinforcement		d_a	1323	mm
Nominal thickness of reinforcement		e_{nom}	25	mm
Calculation thickness of reinforcement		e	**23.4**	mm
Weld thickness		a		mm
Mesh				
Mximum element size			50	mm
Minimum number of bolts			25	mm

EMMERTHAL	**2000064641_2nd stage _berechnung**	

Additional loads at end of nozzle

Reference plane load application	Stutzenende
Reaction force at the opening due to internal pressure	berücksichtigen
Nozzle Specification	Freie Eingabe

		External Forces				External Moments
Force in X-axis direction	F_x	125 kN	Moment around X-axis	M_x	120 kN·m
Force in Y-axis direction	F_y	130 kN	Moment around Y-axis	M_y	90 kN·m
Force in Z-axis direction	F_z	65 kN	Moment around Z-axis	M_z	115 kN·m

Results

Stress Rating

Body		Stress	Allowable Stress	Utilization
Close to nozzle / reinforcement transition				
Local primary membrane stress	P_L	107.2 N/mm²	**232** N/mm²	**46.2** %
Local primary membrane stress plus secondary stress	P_L+Q	259.6 N/mm²	**464** N/mm²	**55.94** %
General				
General total primary membrane stress	P_m	60.21 N/mm²	**154.7** N/mm²	**38.93** %
General total primary stress	P_m+P_b	107.6 N/mm²	**232** N/mm²	**46.37** %
Maximum utilization			Φ_{Util}	**55.94** %

Nozzle		Stress	Allowable Stress	Utilization
Close to head / reinforcement				
Local primary membrane stress	P_L	154 N/mm²	**232** N/mm²	**66.4** %
Local primary membrane stress plus secondary stress	P_L+Q	439.2 N/mm²	**464** N/mm²	**94.65** %
General				
General total primary membrane stress	P_m	48.07 N/mm²	**154.7** N/mm²	**31.08** %
General total primary stress	P_m+P_b	101.2 N/mm²	**232** N/mm²	**43.63** %
Maximum utilization			Φ_{Util}	**94.65** %

Reinforcement		Stress	Allowable Stress	Utilization
Close to nozzle				
Local primary membrane stress	P_L	153.9 N/mm²	**232** N/mm²	**66.32** %
Local primary membrane stress plus secondary stress	P_L+Q	439 N/mm²	**464** N/mm²	**94.61** %
Close to head transition				
Local primary membrane stress	P_L	153.9 N/mm²	**232** N/mm²	**66.32** %
Local primary membrane stress plus secondary stress	P_L+Q	439 N/mm²	**464** N/mm²	**94.61** %
General				
General total primary membrane stress	P_m	0 N/mm²	**154.7** N/mm²	**0** %
General total primary stress	P_m+P_b	0 N/mm²	**232** N/mm²	**0** %
Maximum utilization			Φ_{Util}	**94.61** %
Maximum utilization total			max Φ_{Util}	**94.65** %

Nozzle Movement

Displacement at the end of the nozzle

Δx	0.33 mm	Δy	3.17 mm	Δz	3.17 mm

Rotation around axis

$\Delta\phi_x$	0.17 °	$\Delta\phi_y$	0 °	$\Delta\phi_z$	0.11 °

EMMERTHAL	**2000064641_2nd stage _berechnung**	

Lifting lugs - DIN EN 13445-3/16.7: 2018-12

Longitudinal lifting lugs with reinforcing plate

Design case					Operation		
Type of shell					Cylinder		
Design temperature					Temp	100	°C
Design pressure					P	3.5	bar
Impact factor					γ	1	
Angle between the resulting lifting force and the normal to the shell wall					β	60	°
Angle between the resulting lifting force and the direction of the weight force					δ	30	°
Total vessel weight					W	134000	N
Number of lugs					N	2	
Resulting force at one lug					F_R	**77365**	N
Outside diameter of shell					D_e	2400	mm
Nominal wall thickness of shell					e_n	20	mm
Material of shell					1.0425		
Strength	Testing	K'	255	N/mm² Operation	K	232	N/mm²
Safety	Testing	S'	1.05	Operation	S	1.5	
Allowable design stress					f	**154.7**	N/mm²
Manufacturing allowance for shell					c_{1S}	0.6	mm
Corrosion allowance for shell					c_{2S}	1	mm
Coefficient					K_2	**1.25**	
Material of lug					1.0425		
Strength	Testing	K_L'	265	N/mm² Operation	K_L	241	N/mm²
Safety	Testing	S_L'	1.05	Operation	S_L	1.5	
Allowable design stress					f_L	**160.7**	N/mm²
Joint efficiency factor					V_N	0.7	
Thickness of fillet weld					V_{a1}	14	mm
Height of lug					h	180	mm
Thickness of lug					s_l	16	mm
Length of lug					b_1	210	mm
Width of lug at bolt hole					b_4	210	mm
Diameter of bolt hole					d_2	50	mm
Eccentricity of load					a_1	0	mm
Distance from load to shell					a_2	75	mm
Number of lugs					N	2	
Material of reinforcing plate					1.0425		
Strength	Testing	K'	255	N/mm² Operation	K	232	N/mm²
Safety	Testing	S'	1.05	Operation	S	1.5	
Allowable design stress					f	**154.7**	N/mm²
Width of reinforcing plate					b_2	160	mm
Length of reinforcing plate					b_3	315	mm
Thickness of reinforcing plate					e_2	20	mm

EMMERTHAL

2000064641_2nd stage _berechnung

Results

Analysis wall thickness of shell	e_a	**18.4**	mm
Equivalent diameter	D_{eq}	**2363**	mm
Range of validity		**0.008463**	
Local force at the shell	F_R	**77365**	N
Ratio of local membrane/bending stress	v_1	**0.1208**	
Ratio of global membrane/bending stress	v_2	**0.05813**	
Coefficient	λ_1	**1.511**	
Coefficient	K_1	**1.421**	
Coefficient	$K_{1,RKF}$	**0.4245**	
Global membrane stress	σ_m	**11.24**	N/mm²
Coefficient	K_{13}	**0.7815**	
Coefficient	K_{14}	**1.612**	
Coefficient	K_{15}	**1.755**	
Allowable bending stress of shell	$\sigma_{b,all}$	**274.7**	N/mm²
Maximum allowable local force at shell	$F_{R,max}$	**201071**	N
Allowable lug force	F_L	**209772**	N
Allowable weld force	F_V	**200512**	N

Strength

F_R =	**77365** N	≤	$F_{R,max}$ =	**201071** N	Conditions satisfied
F_R =	**77365** N	≤	F_L =	**209772** N	
F_R =	**77365** N	≤	F_V =	**200512** N	

Geometrical condition

0.001	≤ e_n/D_{eq} =	**0.008463**	≤	0.05		Condition satisfied
e_2 =	20 mm	>	e_n =	20 mm		Condition satisfied
b_3 =	315 mm	≤	$1.5 \cdot b_1$ =	**315** mm		Condition satisfied

	2000064641_2nd stage _berechnung	

Equations

$$e_a = e_n - c_{1S} - c_{2S} = 20\ \text{mm} - 0.6\ \text{mm} - 1\ \text{mm} = 18.4\ \text{mm}$$

$$F_R = \frac{W}{N \cdot \cos(\delta)} \cdot \gamma = \frac{134000\ \text{N}}{2 \cdot \cos(30°)} \cdot 1 = 77365\ \text{N} \qquad (16.7\text{-}1)$$

$$\lambda_1 = \frac{b_3}{\sqrt{D_{eq} \cdot e_a}} = \frac{315\ \text{mm}}{\sqrt{2363\ \text{mm} \cdot 18.4\ \text{mm}}} = 1.511 \qquad (16.6\text{-}13)$$

$$v_2 = \frac{\sigma_m}{K_2 \cdot f} = \frac{11.24\ \text{N/mm}^2}{1.25 \cdot 154.7\ \text{N/mm}^2} = 0.05813 \qquad (16.6\text{-}8)$$

$$v_1 = Min\begin{cases} 0.08 \cdot \lambda_1 \\ 0.2 \end{cases} = Min\begin{cases} 0.08 \cdot 1.511 \\ 0.2 \end{cases} = 0.1208 \qquad (16.6\text{-}14)$$

For cylindrical shell

$$\sigma_m = \frac{P \cdot D_{eq}}{4 \cdot e_a} = \frac{0.35\ \text{MPa} \cdot 2363\ \text{mm}}{4 \cdot 18.4\ \text{mm}} = 11.24\ \text{N/mm}^2 \qquad (16.6\text{-}9)$$

$$K_{13} = \frac{1}{1.2 \cdot \sqrt{1 + 0.06 \cdot \lambda 1^2}} = \frac{1}{1.2 \cdot \sqrt{1 + 0.06 \cdot (1.511)^2}} = 0.7815 \qquad (16.6\text{-}15)$$

$$K_{14} = \frac{1}{0.6 \cdot \sqrt{1 + 0.03 \cdot \lambda 1^2}} = \frac{1}{0.6 \cdot \sqrt{1 + 0.03 \cdot (1.511)^2}} = 1.612 \qquad (16.6\text{-}16)$$

$$K_{15} = Min\begin{cases} 2 \\ 1 + 2.6 \cdot \left(\frac{D_{eq}}{e_a}\right)^{0.3} \cdot \frac{b_2}{D_{eq}} = \end{cases} \qquad (16.7\text{-}2)$$

$$Min\begin{cases} 2 \\ 1 + 2.6 \cdot \left(\frac{2363\ \text{mm}}{18.4\ \text{mm}}\right)^{0.3} \cdot \frac{160\ \text{mm}}{2363\ \text{mm}} = 1.755 \end{cases}$$

$$K_1 = \frac{(1 - v2^2)}{v_3 + \sqrt{v3^2 + (1 - v2^2) \cdot v1^2}} = \qquad (16.6\text{-}7)$$

$$\frac{(1 - (0.05813)^2)}{0.3404 + \sqrt{(0.3404)^2 + (1 - (0.05813)^2) \cdot (0.1208)^2}} = 1.421$$

$$v_3 = \frac{1}{3} + v_1 \cdot v_2 = \frac{1}{3} + 0.1208 \cdot 0.05813 = 0.3404$$

$$\sigma_{b,all} = K_1 \cdot K_2 \cdot f = 1.421 \cdot 1.25 \cdot 154.7\ \text{N/mm}^2 = 274.7\ \text{N/mm}^2 \qquad (16.6\text{-}6)$$

	2000064641_2nd stage _berechnung	

(16.7-5)

$$F_{R,max} = \frac{K_{15} \cdot \sigma_{b,all} \cdot ea^2}{K_{13} \cdot |\cos\beta| + \frac{K_{14} \cdot |(a_2+e_2) \cdot \sin\beta - a_1 \cdot \cos\beta|}{b_3}} =$$

$$\frac{1.755 \cdot 274.7\ \text{N/mm}^2 \cdot (18.4\ \text{mm})^2}{0.7815 \cdot |\cos 60°| + \frac{1.612 \cdot |(75\ \text{mm}+20\ \text{mm}) \cdot \sin 60° - 0\ \text{mm} \cdot \cos 60°|}{315\ \text{mm}}} = 201071\ \text{N}$$

F_R = **77365** ≤ $F_{R,max}$ = **201071** Conditions satisfied

Proof of lug

(RKF BR - A 62 2)

$$F_L = \frac{1.5 \cdot f_L \cdot s_1 \cdot (b_4 - d_2)}{\left\{\sqrt{3 + \left(\frac{b_4+d_2}{b_4-d_2} \cdot 0.207\right)^2} + 0.207 \cdot \frac{b_4+d_2}{b_4-d_2}\right\} \cdot (1+0.4)} =$$

$$\frac{1.5 \cdot 160.7\ \text{N/mm}^2 \cdot 16\ \text{mm} \cdot (210\ \text{mm} - 50\ \text{mm})}{\left\{\sqrt{3 + \left(\frac{210\ \text{mm}+50\ \text{mm}}{210\ \text{mm}-50\ \text{mm}} \cdot 0.207\right)^2} + 0.207 \cdot \frac{210\ \text{mm}+50\ \text{mm}}{210\ \text{mm}-50\ \text{mm}}\right\} \cdot (1+0.4)} = 209772\ \text{N}$$

(RKF BR - A 62 3)

$$F_V = \frac{2 \cdot f_L \cdot V_N \cdot V_{a1} \cdot b_1 \cdot K_{1,RKF}}{(1+0.4)} =$$

$$\frac{2 \cdot 160.7\ \text{N/mm}^2 \cdot 0.7 \cdot 14\ \text{mm} \cdot 210\ \text{mm} \cdot 0.4245}{(1+0.4)} = 200512\ \text{N}$$

EMMERTHAL	**2000064641_2nd stage _berechnung**	

Appendix: Material documentation

Section 3: AD-B1/SHELL
Section 4: AD-B3/Head
Section 5: Schale/Nozzle I + II
Section 5: Verstärkung1/Nozzle I + II
Section 6: Schale/Nozzle III + IV
Section 6: Stutzen1/Nozzle III + IV
Section 7: Schale/Nozzle V + VI
Section 7: Stutzen1/Nozzle V + VI
Section 11: Druckbehälter/11 S32
Section 13: Druckbehälter/13 S32
Section 14: Schale/14 EN16.14
Section 15: Versteifungsring/15 S32
Section 16: Schale/16 FELV
Section 16: Stutzen/16 FELV
Section 17: Schale/17 EN16.07
Section 17: verstärkung/17 EN16.07
Section 17: Öse/17 EN16.07

Material specification:		
Material code: 1.0425	Regulation: AD W 1:2020-04	Spec. No.: EN 10028-2:2017-10
Short name: P265GH	Product: Plate	
Delivery condition: +N		

Design conditions and dimensions:	
Temperature [°C]: 100	Thickness [mm]: 20
Pressure [bar]: 3.5	Outside diameter [mm]: 2400

Material values for test and design conditions:		
	Test condition	Operating condition
Nominal design strength [N/mm²]:	255	232
Safety factor:	1.05	1.5
Allowable stress [N/mm²]:	242.9	154.7
Modulus of elasticity [kN/mm²]:	212	207

Wall thickness tolerance [mm]: 0.6 acc. to EN 10029 Class A

Strength values at 20°C						
Notch impact work	Thermal conductivity	R_{eH}	density	Tensile strength	Tensile strength	ultimate strain
KV	.	.	.	$R_{m, min}$	$R_{m, max}$	A
.	W/(m K)	N/mm²	kg/dm³	N/mm²	N/mm²	%
16<t≤40	.	16<t≤40	.	16<t≤40	16<t≤40	16<t≤40
40	51	255	7.85	410	530	22

Strength values as a function of temperature										
T	°C	condition	50	100	150	200	250	300	350	400
$R_{P0.2}$	N/mm²	16<t≤40	247	232	215	197	181	166	154	145

Strength values as a function of temperature with design lifetime of 100000 h													
T	°C	condition	380	390	400	410	420	430	440	450	460	470	480
$R_{P1.0}$	N/mm²	100.000h	118	106	95	84	73	65	57	49	42	35	30
$R_{m, min}$	N/mm²	100.000h	165	148	132	118	103	91	79	69	59	50	42

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2000064641_2nd stage _berechnung

Young's modulus-values in dependence of the temperature										
T	°C	-100	0	20	100	200	300	400	500	600
E	kN/mm²	217	213	212	207	199	192	184	175	164

Mean coefficient of thermal expansion-values in dependence of the temperature										
T	°C	-100	0	20	100	200	300	400	500	600
α_m	1e-6/K	10.8	11.7	11.9	12.5	13.0	13.6	14.1	14.5	14.9

Differential coefficient of thermal expansion-values in dependence of the temperature										
T	°C	-100	0	20	100	200	300	400	500	600
α_{diff}	1e-6/K	9.3	11.6	11.9	13.0	14.0	15.0	15.9	16.6	16.4

Design conditions and dimensions:	
Temperature [°C]: 100	Thickness [mm]: 25
Pressure [bar]: 3.5	Outside diameter [mm]:

Wall thickness tolerance [mm]: 0.7 acc. to EN 10029 Class A

Design conditions and dimensions:	
Temperature [°C]: 100	Thickness [mm]: 50
Pressure [bar]: 3.5	Outside diameter [mm]: 285

Material values for test and design conditions:		
	Test condition	Operating condition
Nominal design strength [N/mm²]:	245	223
Safety factor:	1.05	1.5
Allowable stress [N/mm²]:	233.3	148.7
Modulus of elasticity [kN/mm²]:	212	207

Wall thickness tolerance [mm]: 0.9 acc. to EN 10029 Class A

Strength values at 20°C						
Notch impact work	Thermal conductivity	R_{eH}	density	Tensile strength	Tensile strength	ultimate strain
KV	.	.	.	$R_{m, min}$	$R_{m, max}$	A
.	W/(m K)	N/mm²	kg/dm³	N/mm²	N/mm²	%
40<t≤60	.	40<t≤60	.	40<t≤60	40<t≤60	40<t≤60
40	51	245	7.85	410	530	22

Strength values as a function of temperature										
T	°C	condition	50	100	150	200	250	300	350	400
$R_{P0.2}$	N/mm²	40<t≤60	237	223	206	190	174	160	148	139

Design conditions and dimensions:	
Temperature [°C]: 100	Thickness [mm]: 16
Pressure [bar]: 3.5	Outside diameter [mm]:

Material values for test and design conditions:		
	Test condition	Operating condition
Nominal design strength [N/mm²]:	265	241
Safety factor:	1.05	1.5

EMMERTHAL	**2000064641_2nd stage _berechnung**	

Allowable stress [N/mm²]:	252.4	160.7
Modulus of elasticity [kN/mm²]:	212	207

Strength values at 20°C						
Notch impact work	Thermal conductivity	R_{eH}	density	Tensile strength	Tensile strength	ultimate strain
KV	.	.	.	$R_{m, min}$	$R_{m, max}$	A
.	W/(m K)	N/mm²	kg/dm³	N/mm²	N/mm²	%
t≤16	.	t≤16	.	t≤16	t≤16	t≤16
40	51	265	7.85	410	530	22

Strength values as a function of temperature										
T	°C	condition	50	100	150	200	250	300	350	400
$R_{P0.2}$	N/mm²	t≤16	256	241	223	205	188	173	160	150

EMMERTHAL	**2000064641_cooling gas _berechnung**	

Worksheet for pressure vessel design

Drawing No. 2000064641_cooling gas	Project No. EAV2101539	Sheet 1 of

Client AM	DGRL 2014/68/EU (97/23/EG)

Description	Reflexionsschalldämpfer cooling gas DN1200
Project calculated according to	AD 2000
Material data according to	AD 2000

Design data		
Max. allowable working pressure	3.5 bar	bar
Test pressure in vertical position	bar	bar
Test pressure in horizontal position	5.4 bar	bar
External pressure	0 bar	bar
Design temperature	100 °C	°C
Corrosion allowance	1 mm	mm
Joint efficiency	0.85	
Volume	27520 l	m³

Category IV
Module B

Comments

Strength Calculation Software *Program System ATLAS* *Version 8.33.2*
Developed by *Lauterbach Verfahrenstechnik GmbH*
Certified per DIN EN ISO 9001:2015 *Certificate Number 01 100 044763*

	2000064641_cooling gas _berechnung	

Design of pressure vessels: Design pressure / test pressure - AD 2000 B0: 2014-11; HP 30: 2016-05

AD - B0 Design pressure according to AD 2000 - B0 section 4

Allowable operating pressure	p	3.5	bar
Additional operating pressure	p_{add}	0	bar
Diameter of vessel (inside)	D_i	2360	mm
Max. liquid level, operation	H_F	2360	mm
Max. liquid level, test (= vessel height)	H	2360	mm
Density of the operation medium	ρ_F	1	kg/m³
Density of the test medium	ρ_P	1000	kg/m³
Spec. weight (operation medium)	γ_F	**0.001**	dN/dm³
Spec. weight (test medium)	γ_P	**1**	dN/dm³

Permit additional strength

Permit additional 10% strength in the shell (see also AD-S3/6, 1. Scope)?	N	(Y/N)
Take strength increasement also in account for additional operating pressure	N	(Y/N)
Increase also test pressure by 10%	N	(Y/N)

Operating pressure for calculation at the lowest point	p_{berF}	**3.5**	bar

Material table

Max. operating temperature	T	100	°C
Pressure for design strength value	p_{mat}	**3.5**	bar

Material	max. Thickness	$R_{20°C}$ ambient	Operation R_P	$R_{20°C}/R_P$
1 1.0425	20 mm	255 N/mm²	232 N/mm²	**1.099**
2	mm	N/mm²	N/mm²	
3	mm	N/mm²	N/mm²	
4	mm	N/mm²	N/mm²	
5	mm	N/mm²	N/mm²	
6	mm	N/mm²	N/mm²	
7	mm	N/mm²	N/mm²	
8	mm	N/mm²	N/mm²	

Test pressure calculation with smallest →s / largest →l ratio S

AD 2000 HP 30: Calculation of the pressure at point A during the test

1. Content during test liquid

Vessel clad with material sensitive to strain or pressure as described in 4.18.2? (Y/N) N

2. Test performed only with layed-down vessel (acc. to 4.10.3)

Results

Coefficient for test pressure (4.17 - 4.19)	F_p	**1.43**	
Additional test pressure (e.g. vacuum in opposite operating side)		0	bar
Additional test pressure including F_p		**0**	bar
Pressure measured at point A during the test according to 4.10	P_p	**5.359**	bar
Max. allowed test pressure			bar
Limiting part of vessel			
Remark			
Calculation test pressure at lowest point	P_{berp}	**5.359**	bar

	2000064641_cooling gas _berechnung	

Equations

[4.17]

$$Fp = Max \begin{cases} 1.43 \\ 1.25 \cdot \dfrac{R_{20C}}{R_P} \end{cases}$$

4.10.3 Test pressure at midpoint A for only horizontal vessel test

[4.10.3]

$$P_p = F_p \cdot P + Max \begin{cases} 0.1 \cdot \gamma_P \cdot \left(H + \dfrac{D_i}{2} \right) \\ 0.1 \cdot \dfrac{\gamma_P \cdot D_i}{2} + 0.1 \cdot \gamma_F \cdot H_F \end{cases} =$$

$$1.43 \cdot 3.5\ \text{bar} + Max \begin{cases} 0.1 \cdot 1\ \text{dN/dm}^3 \cdot \left(2.36\ \text{m} + \dfrac{2.36\ \text{m}}{2} \right) \\ 0.1 \cdot \dfrac{1\ \text{dN/dm}^3 \cdot 2.36\ \text{m}}{2} + 0.1 \cdot 0.001\ \text{dN/dm}^3 \cdot 2.36\ \text{m} \end{cases} = 5.359\ \text{bar}$$

P_p **5.359**, for pressure test acc. 4.10. only with layed-down vessel (acc. to 4.10.3)

where P=1.1·P in case of 10% additional strength reserve N

Options for additional strength 2

1 p_{berF} = 1.1 · p + 0.1 · H_F/γ_F
2 p_{berF} = 1.1 · (p + 0.1 · H_F/γ_F)
3 p_{berF} = 1.15 · (p + 0.1 · H_F/γ_F) (incl. 5% allowance acc. B0)

Calculation test pressure at the lowest point (horizontal)

$$P_{berp} = P_p + 0.1 \cdot \gamma_P \cdot \frac{D_i}{2} - 0.05 \cdot P = 5.359\ \text{bar}$$

(-0.05·P acc. AD-B0 section 4.1 note 1)

	2000064641_cooling gas _berechnung	

Shell
Cylindrical shells under internal pressure - AD 2000 B1: 2000-10
Cylindrical shells

Design

Outside diameter		D_a	2400	mm
Design temperature		T	100	°C
Design pressure		p	3.5	bar
Test pressure		p'	5.4	bar

Material

Material		1.0425		
Nominal design strength	(operation)	K	232	N/mm²
Nominal design strength	(Test)	K'	255	N/mm²
Safety factor	(operation)	S	1.5	
Safety factor	(Test)	S'	1.05	
Wall thickness mill tolerance		c_1	0.6	mm
Corrosion / erosion allowance		c_2	1	mm
Density		ρ	7.85	t/m³
Joint efficiency factor		v	0.85	

Geometry

Actual wall thickness		s_e	20	mm
Outside diameter		D_a	2400	mm
Inside diameter	D_a-2·s_e	D_i	**2360**	mm
Ratio		D_a/D_i	**1.017**	

Results

Allowable design pressure		p_{allB}	**20.31**	bar
Allowable test pressure		p_{allP}	**31.9**	bar
Required wall thickness	(operation)	s_B	**4.79**	mm
Required wall thickness	(Test)	s_P	**4.735**	mm
Required wall thickness	max(s_B;s_P)	s	**4.79**	mm

Openings according to B9

Wall thickness without allowances	s_e-c_1-c_2	s_0	**18.4**	mm
Allowable unreinforced opening with σ_{all} = K/S		d_{A1} <	**2360**	mm
within a welding zone with σ_{all} = v·K/S holds:		d_{A2} <	**1998**	mm
Multiple openings are isolated if l>2·b		l >	**418.4**	mm

Volumes and weights

Length (Height)		L	5550	mm
Outside volume	L·π/4·D_a^2	V_A	**25.11**	m³
Inside volume	L·π/4·D_i^2	V_I	**24278**	l
Volume of the component	V_A-V_I	V_B	**0.8299**	m³
Weight (empty)	V_B· ρ · 9.81 m/s²	G_B	**63.91**	kN
Weight (water filled)	G_B+V_I · 1000 kg/m³ · 9.81 m/s²	G_W	**302.1**	kN

Comments

Equations
Operation

$$s_B = \frac{D_a \cdot p}{20 \cdot \frac{K}{S} \cdot v + p} + c_1 + c_2 = \frac{2400\ \text{mm} \cdot 3.5\ \text{bar}}{20 \cdot \frac{232\ \text{N/mm}^2}{1.5} \cdot 0.85 + 3.5\ \text{bar}} + 0.6\ \text{mm} + 1\ \text{mm} = 4.79\ \text{mm}$$

Test

$$s_P = \frac{D_a \cdot p'}{20 \cdot \frac{K'}{S'} \cdot v + p'} + c_1 + c_2 = \frac{2400\ \text{mm} \cdot 5.4\ \text{bar}}{20 \cdot \frac{255\ \text{N/mm}^2}{1.05} \cdot 0.85 + 5.4\ \text{bar}} + 0.6\ \text{mm} + 1\ \text{mm} = 4.735\ \text{mm}$$

EMMERTHAL	**2000064641_cooling gas _berechnung**	

Head
Kloepper type ends under internal and external pressure - AD 2000 B3: 2011-05

Type of head	**Torispherical head (Kloepper type)**
Pressure	Internal pressure
Manufacturing	End with knuckle and crown of equal wall thickness
Allowances acc. to DIN 28011	Yes

Outside diameter of head	D_a	2400	mm
Design pressure	p	3.5	bar
Test pressure	p'	5.4	bar
Maximum nozzle diameter outside $0.6 \cdot D_a$ *)	d_i	0	mm

*) *For di = 0, all openings lie completely within $0.6 \cdot D_a$ and can be calculated as spherical openings acc. AD-B9.*

Material

Design temperature		T	100	°C
Material		1.0425		
Nominal design strength	operation	K	232	N/mm²
Nominal design strength	testing	K'	255	N/mm²
Modulus of elasticity at design temperature		E	207000	N/mm²
Safety factor	operation	S	1.5	
Safety factor	testing	S'	1.05	
Wall thickness manufacturing tolerance		c_1	**0.5**	mm
Corrosion / erosion allowance		c_2	1	mm
Joint efficiency		v	1	

Geometry

Final wall thickness		s_e	20	mm
Final crown wall thickness		s_K	**20**	mm
Shape factor		β	**2.961**	
Skirt height		h	**70**	mm
Required skirt height		h	**19.32**	mm
Run-out length		x	**100**	mm
Crown height		h_2	**455.3**	mm
Allowable unreinforced opening within $0.6 \cdot D_a$			**1440**	mm
Inside crown diameter		D_i	**4800**	mm

Required wall thicknesses

Required knuckle wall thickness	operation	**7.323**	mm

Required wall thicknesses based on the final wall thickness

Required wall thickness		**5.52**	mm
Required knuckle wall thickness	operation	**5.52**	mm
Required knuckle wall thickness	testing	**5.45**	mm
Required crown wall thickness	operation	**4.237**	mm
Required crown wall thickness	testing	**4.189**	mm
Strength condition		✓	

Weights / Volume

Weight (empty)	**9.589**	kN
Weight (operating)	**9.589**	kN
Weight (water-filled)	**25.8**	kN
Volume (contents)	**1.621**	m³

Comments

	2000064641_cooling gas _berechnung	

Equations

Validity range for torispherical and semi-ellipsoidal heads

$$0.001 \leq \frac{s_e - c_1 - c_2}{D_a} = \frac{20\ \text{mm} - 0.5\ \text{mm} - 1\ \text{mm}}{2400\ \text{mm}} = 0.007708 \leq 0.1$$

Knuckle or hemispherical connection, operation

$$s = \frac{D_a \cdot p \cdot \beta}{40 \cdot \frac{K}{S} \cdot v} + c_1 + c_2 = \frac{2400\ \text{mm} \cdot 3.5\ \text{bar} \cdot 2.961}{40 \cdot \frac{232\ \text{N/mm}^2}{1.5} \cdot 1} + 0.5\ \text{mm} + 1\ \text{mm} = 5.52\ \text{mm}$$

Crown, operation

$$s = \frac{(D_i + 2 \cdot s_K) \cdot p}{40 \cdot \frac{K}{S} \cdot v + p} + c_1 + c_2 = \frac{(4800\ \text{mm} + 2 \cdot 20\ \text{mm}) \cdot 3.5\ \text{bar}}{40 \cdot \frac{232\ \text{N/mm}^2}{1.5} \cdot 1 + 3.5\ \text{bar}} + 0.5\ \text{mm} + 1\ \text{mm} = 4.237\ \text{mm}$$

Knuckle or hemispherical connection, testing

$$s = \frac{D_a \cdot p' \cdot \beta}{40 \cdot \frac{K'}{S'} \cdot v} + c_1 + c_2 = \frac{2400\ \text{mm} \cdot 5.4\ \text{bar} \cdot 2.961}{40 \cdot \frac{255\ \text{N/mm}^2}{1.05} \cdot 1} + 0.5\ \text{mm} + 1\ \text{mm} = 5.45\ \text{mm}$$

Crown, testing

$$s = \frac{(D_i + 2 \cdot s_K) \cdot p'}{40 \cdot \frac{K'}{S'} \cdot v + p'} + c_1 + c_2 = \frac{(4800\ \text{mm} + 2 \cdot 20\ \text{mm}) \cdot 5.4\ \text{bar}}{40 \cdot \frac{255\ \text{N/mm}^2}{1.05} \cdot 1 + 5.4\ \text{bar}} + 0.5\ \text{mm} + 1\ \text{mm} = 4.189\ \text{mm}$$

EMMERTHAL	**2000064641_cooling gas _berechnung**	

Nozzle I + II
Single openings in cylindrical, conical and spherical shells - AD 2000 B9: 2010-02, corrected version 2016-09

Calculation options

Cylindrical body			
Single opening			
Operation			
Design temperature	T	100	°C
Design pressure	p	3.5	bar

	Opening 1
Type of opening	Set-through nozzle
Inclination	Vertical
Reinforcement	Yes

Materials

	Shell			Nozzle 1		
Material	1.0425			1.0425		
Design strength Operation	K_{Op}	232	N/mm²	K_{Op}	232	N/mm²
Safety factor Operation	S_{Op}	1.5		S_{Op}	1.5	
Allowance	c_1	0.6	mm	c_1	0.6	mm
Allowance	c_2	1	mm	c_2	1	mm
Design allowance				c_3	0	mm
Nominal design stress	f	**154.7**	N/mm²	f	**154.7**	N/mm²

	Reinforcement 1		
Material	1.0425		
Design strength Operation	K_{Op}	232	N/mm²
Safety factor Operation	S_{Op}	1.5	
Allowance	c_1	0.7	mm
Allowance	c_2	1	mm
Nominal design stress	f	**154.7**	N/mm²

Geometrical data Opening 1

Graphics

Outside diameter	$d_{a,1}$	1219	mm
Final wall thickness	$S_{S1,n}$	20	mm
Final inside diameter	$d_{i,n,1}$	**1179**	mm
Corroded inside diameter	$d_{i,1}$	**1182**	mm
External projection	l_{S1}	350	mm
Inward protruding length	m_1	35	mm
Final thickness of reinforcement	h_{R1}	25	mm
Width of the reinforcement (Longitudinal direction, area I)	$b_{I,R1}$	50	mm
Available width of shell	$b_{1,avl}$	200	mm

Geometrical data Shell

Outside diameter	D_a	2400	mm
Final wall thickness	s_e	20	mm
Design wall thickness	s_a	**18.4**	mm
Final inside diameter	$D_{i,n}$	**2360**	mm
Corroded inside diameter	D_i	**2363**	mm
Ligament (web) between two nozzles	l		mm

Pressurized area

		Opening 1	
Longitudinal direction, area I			
Shell	$A_{pS,I}$	**956505**	mm²
Nozzle	$A_{pS1,I}$	**120696**	mm²
Total	$A_{p,I}$	**1077201**	mm²

	2000064641_cooling gas _berechnung	

Load-bearing cross-sectional area

		Opening 1	
Shell	$A_{\sigma 0}$	3680	mm²
Longitudinal direction, area l			
Nozzle	$A_{\sigma 1,l}$	4401	mm²
Reinforcement	$A_{\sigma 2,l}$	1000	mm²

Utilisation

		Opening 1	
Longitudinal direction, area l	U_l	26.87	%

Results

Wall thickness at opening edge		$s_{A,1}$	25	mm
Wall thickness ratio		s_{S1}/s_A	0.7863	
Design width		b_1	236.3	mm
Width of shell contributing to the reinforcement	$b_{1,max}=\min(b_1; b_{1,avl})$	$b_{1,max}$	200	mm
Minimum ligament without mutual influence		$l_{min,1}$	472.6	mm
Length of nozzle contributing to the reinforcement, longitudinal		$l_{S1,max}$	185.8	mm

Geometrical conditions

1.1(1a) ✓

$$0.002 \le \frac{s_a}{D_a} \Leftrightarrow 0.002 \le \frac{18.4\ \text{mm}}{2400\ \text{mm}}$$

1.1(1b) ✓

$$\frac{s_a}{D_a} \le 0.1 \Leftrightarrow \frac{18.4\ \text{mm}}{2400\ \text{mm}} \le 0.1$$

All geometrical conditions ✓

Strength conditions

Region I ✓

$$f_{red,S1} \cdot \left(\left(f - \frac{p}{20} \right) \cdot A_{\sigma 0,1} + \left(f_{S1} - \frac{p}{20} \right) \cdot A_{\sigma 1l,1} + \left(f_{R1} - \frac{p}{20} \right) \cdot A_{\sigma 2l,1} \right) \ge \frac{p}{10} \cdot A_{pl,1} \Leftrightarrow$$

$$1 \cdot \left(\left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 3680\ \text{mm}^2 + \left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 4401\ \text{mm}^2 + \left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 1000\ \text{mm}^2 \right) \ge \frac{3.5\ \text{bar}}{10} \cdot 1077201\ \text{mm}^2$$

EMMERTHAL	**2000064641_cooling gas _berechnung**	

Nozzle III + IV
Single openings in cylindrical, conical and spherical shells - AD 2000 B9: 2010-02, corrected version 2016-09

Calculation options

Cylindrical body			
Single opening			
Operation			
Design temperature	T	100	°C
Design pressure	p	3.5	bar

		Opening 1
Type of opening		Set-in block flange

Materials

	Shell			**Nozzle 1**		
Material	1.0425			1.0425		
Design strength Operation	K_{Op}	232	N/mm²	K_{Op}	223	N/mm²
Safety factor Operation	S_{Op}	1.5		S_{Op}	1.5	
Allowance	c_1	0.6	mm	c_1	0.9	mm
Allowance	c_2	1	mm	c_2	0	mm
Design allowance				c_3	0	mm
Nominal design stress	f	**154.7**	N/mm²	f	**148.7**	N/mm²

Geometrical data Opening 1

Graphics

Outside diameter	$d_{a,1}$	285	mm
Inside diameter of opening	$d_{i,Opening1}$	**285**	mm
Final inside diameter	$d_{i,n,1}$	**150**	mm
Corroded inside diameter	$d_{i,1}$	**151.8**	mm
Final width of block flange	b_{S1}	67.5	mm
Final height of block flange	h_{BS1}	50	mm
Inward protruding length	m_1	5	mm
Available width of shell	$b_{1,avl}$	130	mm

Geometrical data Shell

Outside diameter	D_a	2400	mm
Final wall thickness	s_e	20	mm
Design wall thickness	s_a	**18.4**	mm
Final inside diameter	$D_{i,n}$	**2360**	mm
Corroded inside diameter	D_i	**2363**	mm
Ligament (web) between two nozzles	l		mm

Pressurized area

		Opening 1	
Longitudinal direction, area l			
Shell	$A_{pS,l}$	**321986**	mm²
Nozzle	$A_{pS1,l}$	**3416**	mm²
Total	$A_{p,l}$	**325402**	mm²

Load-bearing cross-sectional area

		Opening 1	
Shell	$A_{\sigma 0}$	**2392**	mm²
Longitudinal direction, area l			
Nozzle	$A_{\sigma 1,l}$	**3270**	mm²

Utilisation

		Opening 1	
Longitudinal direction, area l	U_l	**13.32**	%

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	2000064641_cooling gas _berechnung	

Results

Wall thickness at opening edge		$s_{A,1}$	50	mm
Design width		b_1	341.6	mm
Width of shell contributing to the reinforcement	$b_{1,max}=\min(b_1; b_{1,avl})$	$b_{1,max}$	130	mm
Minimum ligament without mutual influence		$l_{min,1}$	683.3	mm

Geometrical conditions

1.1(1a) ✓

$$0.002 \le \frac{s_a}{D_a} \Leftrightarrow 0.002 \le \frac{18.4\ \text{mm}}{2400\ \text{mm}}$$

1.1(1b) ✓

$$\frac{s_a}{D_a} \le 0.1 \Leftrightarrow \frac{18.4\ \text{mm}}{2400\ \text{mm}} \le 0.1$$

All geometrical conditions ✓

Strength conditions

Region I ✓

$$f_{red,S1} \cdot \left(\left(f - \frac{p}{20} \right) \cdot A_{\sigma 0,1} + \left(f_{S1} - \frac{p}{20} \right) \cdot A_{\sigma 1l,1} \right) \ge \frac{p}{10} \cdot A_{pl,1} \Leftrightarrow$$

$$1 \cdot \left(\left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 2392\ \text{mm}^2 + \left(148.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 3270\ \text{mm}^2 \right) \ge \frac{3.5\ \text{bar}}{10} \cdot 325402\ \text{mm}^2$$

EMMERTHAL	**2000064641_cooling gas _berechnung**	

Nozzle V + VI
Single openings in cylindrical, conical and spherical shells - AD 2000 B9: 2010-02, corrected version 2016-09

Calculation options

Cylindrical body			
Single opening			
Operation			
Design temperature	T	100	°C
Design pressure	p	3.5	bar

		Opening 1
Type of opening		Set-in block flange

Materials

	Shell			**Nozzle 1**		
Material	1.0425			1.0425		
Design strength Operation	K_{Op}	232	N/mm²	K_{Op}	232	N/mm²
Safety factor Operation	S_{Op}	1.5		S_{Op}	1.5	
Allowance	c_1	0.6	mm	c_1	0.9	mm
Allowance	c_2	1	mm	c_2	0	mm
Design allowance				c_3	0	mm
Nominal design stress	f	**154.7**	N/mm²	f	**154.7**	N/mm²

Geometrical data Opening 1

Graphics

Outside diameter	$d_{a,1}$	220	mm
Inside diameter of opening	$d_{i,Opening1}$	**220**	mm
Final inside diameter	$d_{i,n,1}$	**100**	mm
Corroded inside diameter	$d_{i,1}$	**101.8**	mm
Final width of block flange	b_{S1}	60	mm
Final height of block flange	h_{BS1}	40	mm
Inward protruding length	m_1	0	mm
Available width of shell	$b_{1,avl}$	270	mm

Geometrical data Shell

Outside diameter	D_a	2400	mm
Final wall thickness	s_e	20	mm
Design wall thickness	s_a	**18.4**	mm
Final inside diameter	$D_{i,n}$	**2360**	mm
Corroded inside diameter	D_i	**2363**	mm
Ligament (web) between two nozzles	l		mm

Pressurized area

		Opening 1	
Longitudinal direction, area l			
Shell	$A_{pS,l}$	**449008**	mm²
Nozzle	$A_{pS1,l}$	**2036**	mm²
Total	$A_{p,l}$	**451044**	mm²

Load-bearing cross-sectional area

		Opening 1	
Shell	$A_{\sigma 0}$	**4968**	mm²
Longitudinal direction, area l			
Nozzle	$A_{\sigma 1,l}$	**2311**	mm²

Utilisation

		Opening 1	
Longitudinal direction, area l	U_l	**14.04**	%

	2000064641_cooling gas _berechnung	

Results

Wall thickness at opening edge		$s_{A,1}$	40	mm
Design width		b_1	303.7	mm
Width of shell contributing to the reinforcement	$b_{1,max}=\min(b_1; b_{1,avl})$	$b_{1,max}$	270	mm
Minimum ligament without mutual influence		$l_{min,1}$	607.4	mm

Geometrical conditions

1.1(1a) ✓

$$0.002 \le \frac{s_a}{D_a} \Leftrightarrow 0.002 \le \frac{18.4\ \text{mm}}{2400\ \text{mm}}$$

1.1(1b) ✓

$$\frac{s_a}{D_a} \le 0.1 \Leftrightarrow \frac{18.4\ \text{mm}}{2400\ \text{mm}} \le 0.1$$

All geometrical conditions ✓

Strength conditions

Region I ✓

$$f_{red,S1} \cdot \left(\left(f - \frac{p}{20} \right) \cdot A_{\sigma 0,1} + \left(f_{S1} - \frac{p}{20} \right) \cdot A_{\sigma 1l,1} \right) \ge \frac{p}{10} \cdot A_{pl,1} \Leftrightarrow$$

$$1 \cdot \left(\left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 4968\ \text{mm}^2 + \left(154.7\ \text{N/mm}^2 - \frac{3.5\ \text{bar}}{20} \right) \cdot 2311\ \text{mm}^2 \right) \ge \frac{3.5\ \text{bar}}{10} \cdot 451044\ \text{mm}^2$$

EMMERTHAL	**2000064641_cooling gas _berechnung**	

General safety verification of horizontal pressure vessels on saddles - AD 2000 S3/2: 2004-02

4.1 Approximate strength proof and geometry acc. section 2.3.3

Design data

Inside vessel diameter	D	2360	mm	
Final wall thickness	s_e	20	mm	
Enclosing angle of the saddle support	δ_1	120	°	(90°, 120°)
Reinforcement plate thickness without allowances	e_v	20	mm	
Cylinder length	L	5550	mm	
Distance between cylinder end and support	a_1	345	mm	
Axial width of saddle of saddle support	b_1	360	mm	
Width of reinforcement plate	b_2	0	mm	
Weld joint factor	v	0.85		
Density of filling medium	R_f	1000	kg/m³	
Design pressure	p	3.5	bar	

Material

Design temperature	T	100	°C
Material	1.0425		
Material strength	K	232	N/mm²
Safety factor	S	1.5	
Wall thickness manufacturing tolerance	c_1	0.6	mm
Corrosion / Erosion allowance	c_2	1	mm
Allowable design stress	f	**154.7**	N/mm²

Intermediate results

Vessel wall thickness without allowances	$e = s_e - c_1 - c_2$	e	**18.4**	mm
Parameter K11 (acc. section 5.2.2.1)		K_{11}	**0.0789**	
Max. cylinder length (acc. Fig. 3)		L_{max}	**20509**	mm

Conditions acc. 4.1 (satisfied=1, violated=0)

L	=	5550	≤	**20509**	= L_{max}	**1**
p	=	3.5	≥	0		**1**
f	=	**154.7**	≥	130 MPa		**1**
a_1	=	345	≤	**1180**	= 0.5 D	**1**
b_1	=	360	≥	**229.2**	= 1.1 √De	**1**
v	=	0.85	≥	0.8		**1**
R_f	=	1000	≤	1000 kg/m³		**1**

4.1 Only for saddle support with reinforcement

b_2	=	0	≥	**726.2**	= K_{11} D + 1.5 b_1
e_v	=	20	≥	**18.4**	= e

2.3.3 Geometrical condition (satisfied=1, violated=0)

60°	≤	120	$=\delta_1$	≤ 180°		**1**
e/D	=	**0.007797**		≤ 0.05		**1**

2.3.3 For saddle support with reinforcement plate

e	=	**18.4**	≤	20 = e_v	≤	**27.6**	= 1.5·e		**1**
Reinforcement plate				b_3	≥	**236**	= 0.1·D		

	2000064641_cooling gas _berechnung	

Section 1.5

$$\frac{b_1}{D} \le 0.2 \Leftrightarrow \frac{360\ \text{mm}}{2360\ \text{mm}} \le 0.2$$ 1

$$\frac{b_2}{b_1} \le 3.0 \Leftrightarrow \frac{0\ \text{mm}}{360\ \text{mm}} \le 3.0$$ 1

$b_1 = 360 \le 0.2 \cdot 2360 = 0.2 \cdot D$ 1

$b_2 = 0 \le 3 \cdot 360 = 3 \cdot b_1$ 1

Evaluated geometrical conditions are **satisfied**

EMMERTHAL	**2000064641_cooling gas _berechnung**	

General safety verification of horizontal pressure vessels on saddles - AD 2000 S3/2: 2004-02

4.2 Actual forces and moments acc. AD S 3/2

General design specifications

Total vessel weight load		G	172	kN
Cylinder length		L	5550	mm
Vessel inside diameter		D	2400	mm
Length of one end cap		h_2	475	mm
Distance from cylinder end to adjacent support		a_1	270	mm
Number of supports (2...8)		n	2	(2-8)

Intermediate results

Equivalent cylindrical shell length = a_1+2 · h2/3		a_3	**586.7**	mm
Support distance		l_1	**5010**	mm
Parameter		a_3/l_1	**0.1171**	

Load

Line load	$q = G / (L + 4/3 \cdot h_2)$	q	**27.82**	N/mm
Moment	$M_o = q \cdot D^2 / 16$	M_o	**1.001e+7**	Nmm

Forces and moments for support type A (n=2)

Support force	$F_1 = F_2 = G / 2$	F_1,F_2	***86***	kN
Support moment	M_1,M_2	M_1,M_2	***-5.227***	kN·m
Lateral force	Q_1,Q_2	Q_1,Q_2	***69.68***	kN
Moment between support 1 and 2		M	**92.5**	kN·m

Forces and moments for support type B (n>2)

Support i =	1		2		3		4	
ω_i	**1**		**0**		**0**		**0**	
F_i	**86000**	N	**0**	N	**0**	N	**0**	N
Q_i	**69681**	N	**0**	N	**0**	N	**0**	N
$\lvert M_i \rvert$	**-5227069**	Nmm	**0**	Nmm	**0**	Nmm	**0**	Nmm

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5.2.1 Cylindrical shell without reinforcing plate: Strength verification

General design specifications

Vessel inside diameter		D	2460	mm
Final wall thickness		s_e	20	mm
Width of saddle support		b_1	360	mm
Enclosing angle of the web plate		δ_1	120	°
Overhanging length of the cylinder		a_1	320	mm
Load point №	1			
Existing saddle load at load point		F_i	***86***	kN
Existing saddle moment load point		M_i	-5.227	kN·m
Existing saddle shear force at saddle		Q_i	***69.68***	kN
Allowable bending moment		allM	***9784***	kN·m
Allowable shear force		allQ	***17982***	kN
Allowable compressive axial force		F_N	***16443***	kN
Design temperature		T	100	°C
Design pressure		p	3.5	bar
External design pressure		p_a	0	bar
Allowable external pressure		p_f	1	bar
Load case (operation=1; test and installation=2)			1	

Material

Material		1.0425		
Nominal design strength		K	232	N/mm²
Safety factor		S	1.5	
Wall thickness manufacturing tolerance		c_1	0.6	mm
Corrosion / Erosion allowance		c_2	1	mm
Allowable design stress		f	**154.7**	N/mm²
Wall thickness without allowances	$e = s_e - c_1 - c_2$	e	**18.4**	mm
Saferty factor acc. to 5.1 (Eq. 2)		S_{51}	**1.5**	

Intermediate results

Global membrane stress σ_{mx} **0.05977** N/mm²

Efficiency ratio of the shell

ϑ_{212}	**-3.09e-4**	ϑ_{213}	**0**
ϑ_{222}	**0.0602**	ϑ_{223}	**0.121**

Ratio of the local membrane stress to the local bending stress

ϑ_{12}	**-0.05174**	ϑ_{13}	**-2.17**
ϑ_{22}	**-3.09e-4**	ϑ_{23}	**0**

Limiting bending stress at saddles 2 and 3

σ_{gr2} **288.3** N/mm² σ_{gr3} **76.46** N/mm²

Parameters

K_2	**1.2**	K_3	**0.25**	K_4	**0.6451**
K_5	**0.9816**	K_6	**0.3464**	K_7	**0.6344**
K_8	**0.1594**	K_9	**0.5566**	K_{10}	**0.5154**

Allowable support force due to loading

in longitudinal direction	$allF_2$	**3218892**	N
in circumferential direction	$allF_3$	**1480458**	N
Equivalent axial force load point i	F_e	**43115**	N

Strength verification

F_i = ***86000*** ≤ min **3218892** ; **1480458** = min($allF_2$; $allF_3$)

Stability verification

$|p_a|/p_f + |M_i|/allM + F_e/F_N + (|Q_i|/allQ)^2$ = **0.003171** ≤ 1

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2.3.3 Geometrical condition **(satisfied=1, violated=0)**

60°	≤	120 = δ_1	≤	180°	1
e/D	=	**0.00748**	≤	0.05	1

Section 1.5 (not applicable without reinforcement b2=0)

$$\frac{b_1}{D} \leq 0.2 \Leftrightarrow \frac{360\ \text{mm}}{2460\ \text{mm}} \leq 0.2$$ 1

$$\frac{b_2}{b_1} \leq 3.0 \Leftrightarrow \frac{0\ \text{mm}}{360\ \text{mm}} \leq 3.0$$ 1

Saddle plate	b_1	=	360 ≤ 0.2 ·	2460 = 0.2·D		1
Reinforcement plate	b_2	=	0 ≤ 3·b_1			1

Strength conditions	**SATISFIED**
Evaluated geometrical conditions	**satisfied**

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Global Loads - DIN EN 13445-3/16.14: 2018-12

Allowable individual loads EN 13445-3/16.14

Load case			Operation	
Calculation temperature		t	100	°C

Geometry of the cylindrical shell

Mean shell diameter		D	2380	mm
Cylinder length (incl. cylindrical part of head)		L	5550	mm
Nominal thickness		e_n	20	mm
Deviation from perfect shape		w	2	mm
Length of template for checking shape deviations		l	100	mm
Tolerance		w/l	**0.02**	

Material data of the cylinder

Material designation		1.0425		
Microstructure		Ferrite		
Design strength		K_{de}	**232**	N/mm²
Design safety factor		S_{de}	**1.5**	
Nominal design stress		f	**154.7**	N/mm²
Modulus of elasticity		E	**207000**	N/mm²
Poisson's ratio		v	0.3	
$R_{p0.2}$ at 20°C		$R_{p0.2,20C}$	255	N/mm²
$R_{p0.2}$ at operating temperature		$R_{p0.2,T}$	232	N/mm²
$R_{p1.0}$ at 20°C		$R_{p1.0,20C}$		N/mm²
$R_{p1.0}$ at operating temperature		$R_{p1,0,T}$		N/mm²
Safety factor for elastic limit	(8.4.2-2)	S_{el}	**1**	
allowable elastic limit	(R_{p02}/S_{el} or R_{p1}/S_{el})	σ_e	**232**	N/mm²
Wall thickness mill tolerance		c_1	0.6	mm
Corrosion allowance		c_2	1	mm

Results (acc. section 16.14)

Inside diameter	$D - e_a$	D_i	**2362**	mm
Analysis thickness		e_a	**18.4**	mm
Scaled diameter		D/e_a	**129.3**	
Factor (16.14-15)		K	**8.347**	
Factor (16.14-16/17)		α	**0.3234**	
Factor (16.14-18/19)		Δ	**0.5152**	

Allowable individual loads

Longitudinal compressive stress	(σe*Δ acc. 16.14-20)	$\sigma_{c,all}$	**119.5**	N/mm²
Maximum tensile force	(16.14-1)	$F_{t,max}$	**21279**	kN
Maximum compressive force	(16.14-2)	$F_{c,max}$	***16443***	kN
Bending moment	(16.14-3)	M_{max}	***9784***	kN·m
Shear force	(horizontal vessel 16.8-30/31)	Q_{max}	***17982***	kN
Remark				

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Calculation

$$K=\frac{1.21\cdot E\cdot e_a}{\sigma_e\cdot D}=\frac{1.21\cdot 207000\ \text{N/mm}^2\cdot 18.4\ \text{mm}}{232\ \text{N/mm}^2\cdot 2380\ \text{mm}}=8.347$$ (16.14-15)

(16.14-16)

for D/e_a = **129.3** ≤ 424

$$\alpha_1=\frac{0.83}{\sqrt{1+0.005\cdot D/e_a}}=$$

$$\frac{0.83}{\sqrt{1+0.005\cdot 129.3}}=0.6468$$

for 0.01 ≤ w/l ≤ 0.02

$$\alpha=\left(1.5-50\cdot\frac{w}{l}\right)\cdot\alpha_1=(1.5-50\cdot 0.02)\cdot 0.6468=0.3234$$

(16.14-18/19)

for α·K ≥ 0.5

$$\Delta=\frac{\left[1-\frac{0.4123}{(\alpha\cdot K)^{0.6}}\right]}{1.5}=\frac{\left[1-\frac{0.4123}{(0.3234\cdot 8.347)^{0.6}}\right]}{1.5}=0.5152$$

$$\sigma_{c,all}=\sigma_e\cdot\Delta=232\ \text{N/mm}^2\cdot 0.5152=119.5\ \text{N/mm}^2$$ (16.14-20)

(16.14-1)

$$F_t=\pi\cdot D\cdot e_a\cdot\frac{f}{1000}=\pi\cdot 2380\ \text{mm}\cdot 18.4\ \text{mm}\cdot\frac{154.7\ \text{N/mm}^2}{1000}=21279\ \text{kN}$$

(16.14-2)

$$F_c=\pi\cdot D\cdot e_a\cdot\frac{\sigma_{c,all}}{1000}=\pi\cdot 2380\ \text{mm}\cdot 18.4\ \text{mm}\cdot\frac{119.5\ \text{N/mm}^2}{1000}=16443\ \text{kN}$$

(16.14-3)

$$M_{max}=\pi\cdot D^2\cdot e_a\cdot\frac{\sigma_{c,all}}{4000000}=$$

$$\pi\cdot(2380\ \text{mm})^2\cdot 18.4\ \text{mm}\cdot\frac{119.5\ \text{N/mm}^2}{4000000}=9784\ \text{kNm}$$

Section 16.8.7

For

$$\frac{2\cdot L}{D}\le 8.7\cdot\sqrt{\frac{D}{2\cdot e_a}}$$

$$Q_{max}=\frac{\pi\cdot D}{4}\cdot e_a\cdot E\cdot\left[\frac{e_a}{0.5\cdot D}\right]^{1.25}\cdot\sqrt{\frac{D}{2\cdot L}\cdot\left[1+42\cdot\left[\frac{D}{2\cdot L}\right]^3\cdot\left[\frac{e_a}{0.5\cdot D}\right]^{1.5}\right]}$$

For

$$\frac{2\cdot L}{D}>8.7\cdot\sqrt{\frac{D}{2\cdot e_a}}$$

$$Q_{max}=\frac{\pi\cdot D}{3\cdot 4}\cdot e_a\cdot E\cdot\left[\frac{2\cdot e_a}{D}\right]^{1.5}$$

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6. Verification of the saddle

General design specifications

Load point №	1			
Existing load at the saddle support		F_i	86	kN
Thickness of the saddle web plate without allowances		e_s	20	mm
Length of saddle support plate		l_2	1696	mm
Width of saddle support		b_1	360	mm
Effective web plate height (Fig. 6)		b_e	650	mm
Section modulus in A-A of the saddle support		W_A	**4677512**	mm³
Enclosing angle of the web plate		δ_1	120	°
Enclosing angle of the saddle plate		δ_2	120	°
Partial enclosing angle according to Figure 8		ψ	60	°
Design temperature		T	100	°C
Vessel inside diameter		D	2360	mm

Web plate material

Material		1.0425		
Nominal design strength		K_s	232	N/mm²
Safety factor		S_s	1.5	
Allowable design stress		f_s	**154.7**	N/mm²
Modulus of elasticity		E_s	212000	N/mm²

Intermediate results

Quotient		b_e/l_2	**0.3833**	
Factor K13 from Figure 7		K_{13}	**1.168**	
Strain factor $\varepsilon_S = f_s \cdot 10^3/E_s$		ε_S	**0.7296**	
Stability factor for plate buckling		φ	**0.7107**	
$allF_4$	according to Equation 15	$allF_4$	**3728431**	N
$allF_5$	according to Equation 16	$allF_5$	**2123908**	N
$allF_6$	according to Equation 17	$allF_6$	**1928777**	N

Saddle strength verification (14) is **SATISFIED**

$$F_i \leq \min[allF_4; allF_5; allF_6]$$

$$86000 \leq \min[\ 3728431;\ 2123908;\ 1928777]$$

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Finite-Elemente LV - COMSOL

Select model	Zylinder mit Stutzen			
Boundary conditions				
Design temperature		T	100	°C
Design pressure		p	3.5	bar
Materials				
Shell				
Material	1.0425			
Nominal design strength		K	232	N/mm²
Safety factor		S	1.5	
Allowable stress shell		f	**154.7**	N/mm²
Allowable stress reinforcement		f	**154.7**	N/mm²
Allowable stress welding		f	**154.7**	N/mm²
Wall thickness manufacturing tolerance		c_1	0.6	mm
Corrosion allowance		c_2	1	mm
Modulus of elasticity at 20°C		E_{20}	212000	N/mm²
Nozzle				
Material	1.0425			
Nominal design strength		K	232	N/mm²
Safety factor		S	1.5	
Allowable stress		f	**154.7**	N/mm²
Wall thickness manufacturing tolerance		c_1	0.6	mm
Corrosion allowance		c_2	1	mm
Modulus of elasticity at 20°C		E_{20}	212000	N/mm²
Geometrical data				
Shell				
Outside diameter		D_a	2400	mm
Length of cylindrical shell		L	5550	mm
Nominal thickness		e_{nom}	20	mm
Calculation wall thickness		e	**18.4**	mm
Nozzle				
Type	Eingesteckter Stutzen			
Flanged nozzle	steif			
Type of intersection	Nicht ausgehalst			
Nominal Diameter		DN		
Outside diameter nozzle		d_a	1219	mm
Nozzle projection outside		l	350	mm
Nominal thickness		e_{nom}	20	mm
Calculation wall thickness		e	**18.4**	mm
Weld thickness		a		mm
Radial offset		a_r	0	mm
Tangential displacement		b	870	mm
Inclination of the nozzle to the shell radius		θ	0	°
Drehung Stutzen um Radius Schale		ϕ	0	°
Reinforcement				
Select reinforcement	Mit Verstärkung			
Diameter of reinforcement		d_a	1323	mm
Nominal thickness of reinforcement		e_{nom}	25	mm
Calculation thickness of reinforcement		e	**23.4**	mm
Weld thickness		a		mm
Mesh				
Mximum element size			50	mm
Minimum number of bolts			25	mm

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Additional loads at end of nozzle

Reference plane load application	Stutzenende
Reaction force at the opening due to internal pressure	berücksichtigen
Nozzle Specification	Freie Eingabe

		External Forces				External Moments
Force in X-axis direction	F_x	125 kN	Moment around X-axis	M_x	120 kN·m
Force in Y-axis direction	F_y	130 kN	Moment around Y-axis	M_y	90 kN·m
Force in Z-axis direction	F_z	65 kN	Moment around Z-axis	M_z	115 kN·m

Results

Stress Rating

Body		Stress	Allowable Stress	Utilization
Close to nozzle / reinforcement transition				
Local primary membrane stress	P_L	107.2 N/mm²	**232** N/mm²	**46.21** %
Local primary membrane stress plus secondary stress	P_L+Q	250.7 N/mm²	**464** N/mm²	**54.03** %
General				
General total primary membrane stress	P_m	60.5 N/mm²	**154.7** N/mm²	**39.12** %
General total primary stress	P_m+P_b	107.3 N/mm²	**232** N/mm²	**46.25** %
Maximum utilization			Φ_{Util}	**54.03** %

Nozzle		Stress	Allowable Stress	Utilization
Close to head / reinforcement				
Local primary membrane stress	P_L	154.7 N/mm²	**232** N/mm²	**66.67** %
Local primary membrane stress plus secondary stress	P_L+Q	439.4 N/mm²	**464** N/mm²	**94.7** %
General				
General total primary membrane stress	P_m	47.33 N/mm²	**154.7** N/mm²	**30.6** %
General total primary stress	P_m+P_b	101.6 N/mm²	**232** N/mm²	**43.81** %
Maximum utilization			Φ_{Util}	**94.7** %

Reinforcement		Stress	Allowable Stress	Utilization
Close to nozzle				
Local primary membrane stress	P_L	154.5 N/mm²	**232** N/mm²	**66.59** %
Local primary membrane stress plus secondary stress	P_L+Q	439.3 N/mm²	**464** N/mm²	**94.67** %
Close to head transition				
Local primary membrane stress	P_L	154.5 N/mm²	**232** N/mm²	**66.59** %
Local primary membrane stress plus secondary stress	P_L+Q	439.3 N/mm²	**464** N/mm²	**94.67** %
General				
General total primary membrane stress	P_m	0 N/mm²	**154.7** N/mm²	**0** %
General total primary stress	P_m+P_b	0 N/mm²	**232** N/mm²	**0** %
Maximum utilization			Φ_{Util}	**94.67** %
Maximum utilization total			max Φ_{Util}	**94.7** %

Nozzle Movement

Displacement at the end of the nozzle

Δx	0.3 mm	Δy	3.09 mm	Δz	3.09 mm

Rotation around axis

$\Delta\phi_x$	0.17 °	$\Delta\phi_y$	0 °	$\Delta\phi_z$	0.11 °

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Lifting lugs - DIN EN 13445-3/16.7: 2018-12

Longitudinal lifting lugs with reinforcing plate

Design case	Operation		
Type of shell	Cylinder		
Design temperature	Temp	100	°C
Design pressure	P	3.5	bar
Impact factor	γ	1	
Angle between the resulting lifting force and the normal to the shell wall	β	60	°
Angle between the resulting lifting force and the direction of the weight force	δ	30	°
Total vessel weight	W	142000	N
Number of lugs	N	2	
Resulting force at one lug	F_R	**81984**	N
Outside diameter of shell	D_e	2400	mm
Nominal wall thickness of shell	e_n	20	mm

Material of shell 1.0425

Strength	Testing	K'	255	N/mm²	Operation	K	232	N/mm²
Safety	Testing	S'	1.05		Operation	S	1.5	
Allowable design stress						f	**154.7**	N/mm²
Manufacturing allowance for shell						c_{1S}	0.6	mm
Corrosion allowance for shell						c_{2S}	1	mm
Coefficient						K_2	**1.25**	

Material of lug 1.0425

Strength	Testing	K_L'	265	N/mm²	Operation	K_L	241	N/mm²
Safety	Testing	S_L'	1.05		Operation	S_L	1.5	
Allowable design stress						f_L	**160.7**	N/mm²
Joint efficiency factor						V_N	0.7	
Thickness of fillet weld						V_{a1}	14	mm
Height of lug						h	180	mm
Thickness of lug						s_l	16	mm
Length of lug						b_1	210	mm
Width of lug at bolt hole						b_4	210	mm
Diameter of bolt hole						d_2	50	mm
Eccentricity of load						a_1	0	mm
Distance from load to shell						a_2	75	mm
Number of lugs						N	2	

Material of reinforcing plate 1.0425

Strength	Testing	K'	255	N/mm²	Operation	K	232	N/mm²
Safety	Testing	S'	1.05		Operation	S	1.5	
Allowable design stress						f	**154.7**	N/mm²
Width of reinforcing plate						b_2	160	mm
Length of reinforcing plate						b_3	315	mm
Thickness of reinforcing plate						e_2	20	mm

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Results

Analysis wall thickness of shell	e_a	18.4	mm
Equivalent diameter	D_{eq}	2363	mm
Range of validity		0.008463	
Local force at the shell	F_R	81984	N
Ratio of local membrane/bending stress	v_1	0.1208	
Ratio of global membrane/bending stress	v_2	0.05813	
Coefficient	λ_1	1.511	
Coefficient	K_1	1.421	
Coefficient	$K_{1,RKF}$	0.4245	
Global membrane stress	σ_m	11.24	N/mm²
Coefficient	K_{13}	0.7815	
Coefficient	K_{14}	1.612	
Coefficient	K_{15}	1.755	
Allowable bending stress of shell	$\sigma_{b,all}$	274.7	N/mm²
Maximum allowable local force at shell	$F_{R,max}$	201071	N
Allowable lug force	F_L	209772	N
Allowable weld force	F_V	200512	N

Strength

F_R =	81984 N	≤ $F_{R,max}$ =	201071 N	Conditions satisfied
F_R =	81984 N	≤ F_L =	209772 N	
F_R =	81984 N	≤ F_V =	200512 N	

Geometrical condition

0.001 ≤ e_n/D_{eq} =	0.008463	≤ 0.05		Condition satisfied
e_2 =	20 mm	> e_n =	20 mm	Condition satisfied
b_3 =	315 mm	≤ $1.5 \cdot b_1$ =	315 mm	Condition satisfied

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Equations

$$e_a = e_n - c_{1S} - c_{2S} = 20\ \text{mm} - 0.6\ \text{mm} - 1\ \text{mm} = 18.4\ \text{mm}$$

$$F_R = \frac{W}{N \cdot \cos(\delta)} \cdot \gamma = \frac{142000\ \text{N}}{2 \cdot \cos(30°)} \cdot 1 = 81984\ \text{N} \qquad (16.7\text{-}1)$$

$$\lambda_1 = \frac{b_3}{\sqrt{D_{eq} \cdot e_a}} = \frac{315\ \text{mm}}{\sqrt{2363\ \text{mm} \cdot 18.4\ \text{mm}}} = 1.511 \qquad (16.6\text{-}13)$$

$$v_2 = \frac{\sigma_m}{K_2 \cdot f} = \frac{11.24\ \text{N/mm}^2}{1.25 \cdot 154.7\ \text{N/mm}^2} = 0.05813 \qquad (16.6\text{-}8)$$

$$v_1 = Min\begin{cases} 0.08 \cdot \lambda_1 \\ 0.2 \end{cases} = Min\begin{cases} 0.08 \cdot 1.511 \\ 0.2 \end{cases} = 0.1208 \qquad (16.6\text{-}14)$$

For cylindrical shell

$$\sigma_m = \frac{P \cdot D_{eq}}{4 \cdot e_a} = \frac{0.35\ \text{MPa} \cdot 2363\ \text{mm}}{4 \cdot 18.4\ \text{mm}} = 11.24\ \text{N/mm}^2 \qquad (16.6\text{-}9)$$

$$K_{13} = \frac{1}{1.2 \cdot \sqrt{1 + 0.06 \cdot \lambda 1^2}} = \frac{1}{1.2 \cdot \sqrt{1 + 0.06 \cdot (1.511)^2}} = 0.7815 \qquad (16.6\text{-}15)$$

$$K_{14} = \frac{1}{0.6 \cdot \sqrt{1 + 0.03 \cdot \lambda 1^2}} = \frac{1}{0.6 \cdot \sqrt{1 + 0.03 \cdot (1.511)^2}} = 1.612 \qquad (16.6\text{-}16)$$

$$K_{15} = Min\begin{cases} 2 \\ 1 + 2.6 \cdot \left(\frac{D_{eq}}{e_a}\right)^{0.3} \cdot \frac{b_2}{D_{eq}} = \end{cases} \qquad (16.7\text{-}2)$$

$$Min\begin{cases} 2 \\ 1 + 2.6 \cdot \left(\frac{2363\ \text{mm}}{18.4\ \text{mm}}\right)^{0.3} \cdot \frac{160\ \text{mm}}{2363\ \text{mm}} = 1.755 \end{cases}$$

$$K_1 = \frac{(1 - v2^2)}{v_3 + \sqrt{v3^2 + (1 - v2^2) \cdot v1^2}} = \qquad (16.6\text{-}7)$$

$$\frac{(1 - (0.05813)^2)}{0.3404 + \sqrt{(0.3404)^2 + (1 - (0.05813)^2) \cdot (0.1208)^2}} = 1.421$$

$$v_3 = \frac{1}{3} + v_1 \cdot v_2 = \frac{1}{3} + 0.1208 \cdot 0.05813 = 0.3404$$

$$\sigma_{b,all} = K_1 \cdot K_2 \cdot f = 1.421 \cdot 1.25 \cdot 154.7\ \text{N/mm}^2 = 274.7\ \text{N/mm}^2 \qquad (16.6\text{-}6)$$

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(16.7-5)

$$F_{R,max} = \frac{K_{15} \cdot \sigma_{b,all} \cdot ea^2}{K_{13} \cdot |\cos\beta| + \frac{K_{14} |\cdot (a_2 + e_2) \cdot \sin\beta - a_1 \cdot \cos\beta|}{b_3}} =$$

$$\frac{1.755 \cdot 274.7\ \text{N/mm}^2 \cdot (18.4\ \text{mm})^2}{0.7815 \cdot |\cos 60°| + \frac{1.612 |\cdot (75\ \text{mm} + 20\ \text{mm}) \cdot \sin 60° - 0\ \text{mm} \cdot \cos 60°|}{315\ \text{mm}}} = 201071\ \text{N}$$

F_R = **81984** ≤ $F_{R,max}$ = **201071** Conditions satisfied

Proof of lug

(RKF BR - A 62 2)

$$F_L = \frac{1.5 \cdot f_L \cdot s_1 \cdot (b_4 - d_2)}{\left\{\sqrt{3 + \left(\frac{b_4 + d_2}{b_4 - d_2} \cdot 0.207\right)^2} + 0.207 \cdot \frac{b_4 + d_2}{b_4 - d_2}\right\} \cdot (1 + 0.4)} =$$

$$\frac{1.5 \cdot 160.7\ \text{N/mm}^2 \cdot 16\ \text{mm} \cdot (210\ \text{mm} - 50\ \text{mm})}{\left\{\sqrt{3 + \left(\frac{210\ \text{mm} + 50\ \text{mm}}{210\ \text{mm} - 50\ \text{mm}} \cdot 0.207\right)^2} + 0.207 \cdot \frac{210\ \text{mm} + 50\ \text{mm}}{210\ \text{mm} - 50\ \text{mm}}\right\} \cdot (1 + 0.4)} = 209772\ \text{N}$$

(RKF BR - A 62 3)

$$F_V = \frac{2 \cdot f_L \cdot V_N \cdot V_{a1} \cdot b_1 \cdot K_{1,RKF}}{(1 + 0.4)} =$$

$$\frac{2 \cdot 160.7\ \text{N/mm}^2 \cdot 0.7 \cdot 14\ \text{mm} \cdot 210\ \text{mm} \cdot 0.4245}{(1 + 0.4)} = 200512\ \text{N}$$

EMMERTHAL	**2000064641_cooling gas _berechnung**	

Appendix: Material documentation

Section 3: AD-B1/SHELL
Section 4: AD-B3/Head
Section 5: Schale/Nozzle I + II
Section 5: Stutzen1/Nozzle I + II
Section 5: Verstärkung1/Nozzle I + II
Section 6: Schale/Nozzle III + IV
Section 6: Stutzen1/Nozzle III + IV
Section 7: Schale/Nozzle V + VI
Section 7: Stutzen1/Nozzle V + VI
Section 11: Druckbehälter/11 S32
Section 13: Druckbehälter/13 S32
Section 14: Schale/14 EN16.14
Section 15: Versteifungsring/15 S32
Section 16: Schale/16 FELV
Section 16: Stutzen/16 FELV
Section 17: Schale/17 EN16.07
Section 17: verstärkung/17 EN16.07
Section 17: Öse/17 EN16.07

Material specification:		
Material code: 1.0425	Regulation: AD W 1:2020-04	Spec. No.: EN 10028-2:2017-10
Short name: P265GH	Product: Plate	
Delivery condition: +N		

Design conditions and dimensions:	
Temperature [°C]: 100	Thickness [mm]: 20
Pressure [bar]: 3.5	Outside diameter [mm]: 2400

Material values for test and design conditions:		
	Test condition	Operating condition
Nominal design strength [N/mm²]:	255	232
Safety factor:	1.05	1.5
Allowable stress [N/mm²]:	242.9	154.7
Modulus of elasticity [kN/mm²]:	212	207

Wall thickness tolerance [mm]: 0.6 acc. to EN 10029 Class A

Strength values at 20°C						
Notch impact work	Thermal conductivity	R_{eH}	density	Tensile strength	Tensile strength	ultimate strain
KV	.	.	.	$R_{m,\ min}$	$R_{m,\ max}$	A
.	W/(m K)	N/mm²	kg/dm³	N/mm²	N/mm²	%
16<t≤40	.	16<t≤40	.	16<t≤40	16<t≤40	16<t≤40
40	51	255	7.85	410	530	22

Strength values as a function of temperature										
T	°C	condition	50	100	150	200	250	300	350	400
$R_{P0.2}$	N/mm²	16<t≤40	247	232	215	197	181	166	154	145

Strength values as a function of temperature with design lifetime of 100000 h													
T	°C	condition	380	390	400	410	420	430	440	450	460	470	480
$R_{P1.0}$	N/mm²	100.000h	118	106	95	84	73	65	57	49	42	35	30

$R_{m, min}$	N/mm²	100.000h	165	148	132	118	103	91	79	69	59	50	42

Young's modulus-values in dependence of the temperature

T	°C	-100	0	20	100	200	300	400	500	600
E	kN/mm²	217	213	212	207	199	192	184	175	164

Mean coefficient of thermal expansion-values in dependence of the temperature

T	°C	-100	0	20	100	200	300	400	500	600
α_m	1e-6/K	10.8	11.7	11.9	12.5	13.0	13.6	14.1	14.5	14.9

Differential coefficient of thermal expansion-values in dependence of the temperature

T	°C	-100	0	20	100	200	300	400	500	600
α_{diff}	1e-6/K	9.3	11.6	11.9	13.0	14.0	15.0	15.9	16.6	16.4

Design conditions and dimensions:

Temperature [°C]: 100	Thickness [mm]: 20
Pressure [bar]: 3.5	Outside diameter [mm]: 1219

Design conditions and dimensions:

Temperature [°C]: 100	Thickness [mm]: 25
Pressure [bar]: 3.5	Outside diameter [mm]:

Wall thickness tolerance [mm]: 0.7 acc. to EN 10029 Class A

Design conditions and dimensions:

Temperature [°C]: 100	Thickness [mm]: 50
Pressure [bar]: 3.5	Outside diameter [mm]: 285

Material values for test and design conditions:

	Test condition	Operating condition
Nominal design strength [N/mm²]:	245	223
Safety factor:	1.05	1.5
Allowable stress [N/mm²]:	233.3	148.7
Modulus of elasticity [kN/mm²]:	212	207

Wall thickness tolerance [mm]: 0.9 acc. to EN 10029 Class A

Strength values at 20°C

Notch impact work	Thermal conductivity	R_{eH}	density	Tensile strength	Tensile strength	ultimate strain
KV	.	.	.	$R_{m, min}$	$R_{m, max}$	A
.	W/(m K)	N/mm²	kg/dm³	N/mm²	N/mm²	%
40<t≤60	.	40<t≤60	.	40<t≤60	40<t≤60	40<t≤60
40	51	245	7.85	410	530	22

Strength values as a function of temperature

T	°C	condition	50	100	150	200	250	300	350	400
$R_{P0.2}$	N/mm²	40<t≤60	237	223	206	190	174	160	148	139

Design conditions and dimensions:

Temperature [°C]: 100	Thickness [mm]: 16
Pressure [bar]: 3.5	Outside diameter [mm]:

EMMERTHAL	**2000064641_cooling gas _berechnung**	

Material values for test and design conditions:		
	Test condition	Operating condition
Nominal design strength [N/mm²]:	265	241
Safety factor:	1.05	1.5
Allowable stress [N/mm²]:	252.4	160.7
Modulus of elasticity [kN/mm²]:	212	207

Strength values at 20°C						
Notch impact work	Thermal conductivity	R_{eH}	density	Tensile strength	Tensile strength	ultimate strain
KV	.	.	.	$R_{m, min}$	$R_{m, max}$	A
.	W/(m K)	N/mm²	kg/dm³	N/mm²	N/mm²	%
t≤16	.	t≤16	.	t≤16	t≤16	t≤16
40	51	265	7.85	410	530	22

Strength values as a function of temperature										
T	°C	condition	50	100	150	200	250	300	350	400
$R_{P0.2}$	N/mm²	t≤16	256	241	223	205	188	173	160	150

G.3 Starting strainer

Name	Data
Designation	Starting strainer All stages
Type	
Number	
Type of manual	*Technical documentation*
Manufacturer	Emmerthaler Apparatebau GmbH

G.3.1 All stages

G.3.1.1 Quality documentation

Form No.: FR-P072-005.03EN Rev. Date: 2022-07-13	**Inspection Report**	PAYESH GOSTARAN PISHRO CO. INSPECTION SERVICES

Request No.:	024	**Report No.:**	PGP-1409-GISDCO-024-IVR-024-00
Request Date:	07.07.2022	**Date/Inspection Qty.:**	14.07.2022 1 Day

1. Inspection Information

Project Name:	Tooba Gisd Mega Module Project	Inspection Contract no.:	300/1409	**Client Consultant:**	Barsoo Co.
Client:	Gol-Gohar Iron & Steel	P.O No.:	---	Supplier's Representative:	---
Main Contractor:	MMTE	Supplier/ Manufacturer:	Aerzen	Other beneficiaries:	---

2. Inspection Location

Site☒ Laboratory ☐ Port ☐ Storage Yard ☐ Factory ☐ Supplier's Yard ☐

Contact Info. Mr. Martin Hill/ +491606911723-Exportverpackung Sehnde GmbH - Borsigring 21 - 31319 Sehnde

3. Scope of inspection

☐ PSI	☐ Raw Material Check	☐ Sampling	☐DT
☒ Quantity Check	☒ Visual inspection	☐ Dimensional Check	☒Doc. Review
☐ Hydrostatic Pressure Test	☐ Performance Test	☐ Functional Test	☐ Electrical Test
☒ Coating & paint Check	☒ Packaging And Marking	☐Loading & Shipment	☐NDT
☐Other			

4. Goods Specification

Row	Description	Identify Code)Heat Number ، Batch Number ، lot Number	Quantity		Unit	Result (Accept/ Conditional/ Reject)
			Client's Request	Inspected		
1	starting strainer	200042396	12	12	---	Conditional

Scope of inspection Acc. To ☐ ITP ☒ Client's Request ☐Standard ☐QCP ☐ SPEC
Document No.: NOI No. 024

Row	Description	Inspector responsibility
1	Visual and dimensional checking	W
2	Document review	W

Inspected By:		Checked By:		Approved By	
First & Surname:	Mohammad Nobari	**First & Surname:**	R.Bakhtom	**First & Surname:**	Amirhasan Rezania
Date:	14.07.2022	**Date:**	15.07.2022	**Date:**	15.07.2022
Signature	Nobari	**Signature**		**Signature**	

Page 1 of 8

Form No.: FR-P072-005.03EN Rev. Date: 2022-07-13	**Inspection Report**	PAYESH GOSTARAN PISHRO CO. INSPECTION SERVICES

Request No.:	024	**Report No.:**	PGP-1409-GISDCO-024-IVR-024-00
Request Date:	07.07.2022	**Date/Inspection Qty.:**	14.07.2022 1 Day

3	Packing & Marking check	W

5. Inspection Description

1) Present person:

- Mohammad Nobari Inspector
- Martin Hill Project Manager

2) Subject of inspection

starting strainer

3) Applicable documents

According To Packing List packing lists 37-42 - 6 page (NOI024 File).

4) Inspection performed.

According to the received Notification of Inspection No. 024, inspection have been performed on 14.07.2022 at AERZEN factory in Germany.

Observation and results concluded as bellow:

5) Visual test:

For visual inspection, all items are checked accordingly. The quality of the inspected items was found to be brand new and ready to use. During the inspection, no defect, corrosion or damage was observed. The paintwork of the components was without damage and in a uniform and high-quality manner. The result of visual inspection and quality is acceptable.

All items are numbered and identical according to the respective packing list. No deviation was observed in terms of checking the quantity of packages during the inspection.

6) Dimensional check:

- No document or plan was provided by the supplier to check the dimensions.

7) Document review:

Inspected By:		Checked By:		Approved By	
First & Surname:	Mohammad Nobari	**First & Surname:**	R.Bakhtom	**First & Surname:**	Amirhasan Rezania
Date:	14.07.2022	**Date:**	15.07.2022	**Date:**	15.07.2022
Signature	Nobari	**Signature**		**Signature**	

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Form No.: FR-P072-005.03EN Rev. Date: 2022-07-13	**Inspection Report**	PAYESH GOSTARAN PISHRO CO. INSPECTION SERVICES

Request No.:	024	**Report No.:**	PGP-1409-GISDCO-024-IVR-024-00
Request Date:	07.07.2022	**Date/Inspection Qty.:**	14.07.2022 1 Day

- Not any documents were provided by the supplier.

8) Packing & Marking:
After being placed in a moisture-proof silicate package, the components were vacuumed and packed in a wooden frame. Signs, labels and nameplates of all items are controlled accordingly. The packing mark and shipping mark were checked. The result of checking the marking is acceptable

6. References (procedures , Standards, Drawing, Etc.)

Row	Document Title	Document No./ revision
1	NOI	024
2	Packing List	37~42

7. Inspection tools:

Row	Tools	Serial no.:	Calibration No.:	Expiry Date:
1	---	---	---	---

8. Document and reviewed Annexes

Row	Document Title	Document No./ revision	Remark
1	NOI	024	---
2	Packing List	37~42	---

9. Remark

- No document or plan was provided by the supplier to check the dimensions.
- Not any documents were provided by the supplier.

10. Objection

---

11. Result

Inspected By:		Checked By:		Approved By	
First & Surname:	Mohammad Nobari	**First & Surname:**	R.Bakhtom	**First & Surname:**	Amirhasan Rezania
Date:	14.07.2022	**Date:**	15.07.2022	**Date:**	15.07.2022
Signature	Nobari	**Signature**		**Signature**	

Page **3** of **8**

Form No.: FR-P072-005.03EN Rev. Date: 2022-07-13	**Inspection Report**	PAYESH GOSTARAN PISHRO CO. INSPECTION SERVICES

Request No.:	024	**Report No.:**	PGP-1409-GISDCO-024-IVR-024-00
Request Date:	07.07.2022	**Date/Inspection Qty.:**	14.07.2022 1 Day

☐ Accept	☒ Conditional(Blue Mark)	☐ Reject(Red Mark)
Next Inspection:	Yes ☒ No ☐	

12. Images:

Visual Check	Visual Check

Inspected By:		Checked By:		Approved By	
First & Surname:	Mohammad Nobari	**First & Surname:**	R.Bakhtom	**First & Surname:**	Amirhasan Rezania
Date:	14.07.2022	**Date:**	15.07.2022	**Date:**	15.07.2022
Signature	Nobari	**Signature**		**Signature**	

Form No.: FR-P072-005.03EN Rev. Date: 2022-07-13	**Inspection Report**	PAYESH GOSTARAN PISHRO CO. INSPECTION SERVICES

Request No.:	024	**Report No.:**	PGP-1409-GISDCO-024-IVR-024-00
Request Date:	07.07.2022	**Date/Inspection Qty.:**	14.07.2022 1 Day

Visual Check

Visual Check

Visual Check

Visual Check

Inspected By:		Checked By:		Approved By	
First & Surname:	Mohammad Nobari	**First & Surname:**	R.Bakhtom	**First & Surname:**	Amirhasan Rezania
Date:	14.07.2022	**Date:**	15.07.2022	**Date:**	15.07.2022
Signature	Nobari	**Signature**		**Signature**	

Form No.: FR-P072-005.03EN Rev. Date: 2022-07-13	**Inspection Report**	PAYESH GOSTARAN PISHRO CO. INSPECTION SERVICES

Request No.:	024	**Report No.:**	PGP-1409-GISDCO-024-IVR-024-00
Request Date:	07.07.2022	**Date/Inspection Qty.:**	14.07.2022 1 Day

Identification Check

Identification Check

Identification Check

Identification Check

Inspected By:		Checked By:		Approved By	
First & Surname:	Mohammad Nobari	**First & Surname:**	R.Bakhtom	**First & Surname:**	Amirhasan Rezania
Date:	14.07.2022	**Date:**	15.07.2022	**Date:**	15.07.2022
Signature	Nobari	**Signature**		**Signature**	

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Form No.: FR-P072-005.03EN Rev. Date: 2022-07-13	**Inspection Report**	PAYESH GOSTARAN PISHRO CO. INSPECTION SERVICES

Request No.:	024	**Report No.:**	PGP-1409-GISDCO-024-IVR-024-00
Request Date:	07.07.2022	**Date/Inspection Qty.:**	14.07.2022 1 Day

Packing and Marking Check

Packing and Marking Check

Packing and Marking Check

Packing and Marking Check

Inspected By:		Checked By:		Approved By	
First & Surname:	Mohammad Nobari	**First & Surname:**	R.Bakhtom	**First & Surname:**	Amirhasan Rezania
Date:	14.07.2022	**Date:**	15.07.2022	**Date:**	15.07.2022
Signature	Nobari	**Signature**		**Signature**	

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Form No.: FR-P072-005.03EN Rev. Date: 2022-07-13	**Inspection Report**	PAYESH GOSTARAN PISHRO CO. INSPECTION SERVICES

Request No.:	024	**Report No.:**	PGP-1409-GISDCO-024-IVR-024-00
Request Date:	07.07.2022	**Date/Inspection Qty.:**	14.07.2022 1 Day

Packing and Marking Check	Packing and Marking Check

Inspected By:		Checked By:		Approved By	
First & Surname:	Mohammad Nobari	**First & Surname:**	R.Bakhtom	**First & Surname:**	Amirhasan Rezania
Date:	14.07.2022	**Date:**	15.07.2022	**Date:**	15.07.2022
Signature	Nobari	**Signature**		**Signature**	

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Detailed Packing List 37

AERZEN

Project:	Glauch
AM-Order-No.:	4000369
Delivery-No.:	80329135
Description:	Starting strainer
Benennung:	Anfahrsieb
	Blower Stage 1_A

Length:	318 cm
Width:	228 cm
Height:	186 cm
Net Weight:	1.100,000 kgs
Gross Weight:	1.600 kgs

Pos.	Quantity	Benennung	Description	Dimension	Drawing No.	Serial No.	Material No.	Single Net Weight (kgs)	Total Net Weight (kgs)
8010	1	Diffusoreinsatz	Pipe connection				2000065300	850,000	850,000
8015	1	Anfahrsieb	Starting strainer	DN1200			2000042396	250,000	250,000
Total:	2							Total:	1.100,000

PAYESH GOSTARAN PISHRO Co. INSPECTION SERVICES

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Detailed Packing List 38

AERZEN

Project:	Glauch
AM-Order-No.:	4000369
Delivery-No.:	80329135
Description:	Starting strainer
Benennung:	Anfahrsieb
	Blower Stage 1_B

Length:	318 cm
Width:	228 cm
Height:	186 cm
Net Weight:	1.100,000 kgs
Gross Weight:	1.600 kgs

Pos.	Quantity	Benennung	Description	Dimension	Drawing No.	Serial No.	Material No.	Single Net Weight (kgs)	Total Net Weight (kgs)
8010	1	Diffusoreinsatz	Pipe connection				2000065300	850,000	850,000
8015	1	Anfahrsieb	Starting strainer	DN1200			2000042396	250,000	250,000
Total:	2							Total:	1.100,000

PAYESH GOSTARAN ASHRO Co. INSPECTION SERVICES

Nobari

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Detailed Packing List 39

AERZEN

Project:	Glauch	Length:	318 cm
AM-Order-No.:	4000369	Width:	228 cm
Delivery-No.:	80329135	Height:	186 cm
Description:	Starting strainer	Net Weight:	1.100,000 kgs
Benennung:	Anfahrsieb	Gross Weight:	1.600 kgs
	Blower Stage 1_C		

Pos.	Quantity	Benennung	Description	Dimension	Drawing No.	Serial No.	Material No.	Single Net Weight (kgs)	Total Net Weight (kgs)
8010	1	Diffusoreinsatz	Pipe connection				2000065300	850,000	850,000
8015	1	Anfahrsieb	Starting strainer	DN1200			2000042396	250,000	250,000
Total:	2							Total:	1.100,000

PAYESH GOSTARESH PISHRO Co. INSPECTION SERVICES

Nobari

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Detailed Packing List 40

AERZEN

Project:	Glauch	Length:	318 cm
AM-Order-No.:	4000369	Width:	228 cm
Delivery-No.:	80329135	Height:	186 cm
Description:	Starting strainer	Net Weight:	1.100,000 kgs
Benennung:	Anfahrsieb	Gross Weight:	1.600 kgs
	Blower Stage 2_A		

Pos.	Quantity	Benennung	Description	Dimension	Drawing No.	Serial No.	Material No.	Single Net Weight (kgs)	Total Net Weight (kgs)
8010	1	Diffusoreinsatz	Pipe connection				2000065300	850,000	850,000
8015	1	Anfahrsieb	Starting strainer	DN1200			2000042396	250,000	250,000
Total:	2							Total:	1.100,000

PAYEAH GOSTARAN PARSIAN Co. INSPECTION SERVICES

Nabari

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Detailed Packing List 41

AERZEN

Project:	Glauch	Length:	318 cm
AM-Order-No.:	4000369	Width:	228 cm
Delivery-No.:	80329135	Height:	186 cm
Description:	Starting strainer	Net Weight:	1.100,000 kgs
Benennung:	Anfahrsieb	Gross Weight:	1.600 kgs
	Blower Stage 2_B		

Pos.	Quantity	Benennung	Description	Dimension	Drawing No.	Serial No.	Material No.	Single Net Weight (kgs)	Total Net Weight (kgs)
8010	1	Diffusoreinsatz	Pipe connection				2000065300	850,000	850,000
8015	1	Anfahrsieb	Starting strainer	DN1200			2000042396	250,000	250,000
Total:	2							Total:	L 100,000

PAYESH GOSTARAN POUYAN Co. INSPECTION SERVICES

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Detailed Packing List 42

AERZEN

Project:	Glauch
AM-Order-No.:	4000369
Delivery-No.:	80329135
Description:	Starting strainer
Benennung:	Anfahrsieb Blower Cooling Gas

Length:	318 cm
Width:	228 cm
Height:	186 cm
Net Weight:	1.100,000 kgs
Gross Weight:	1.600 kgs

Pos.	Quantity	Benennung	Description	Dimension	Drawing No.	Serial No.	Material No.	Single Net Weight (kgs)	Total Net Weight (kgs)
8010	1	Diffusoreinsatz	Pipe connection				2000065300	850,000	850,000
8015	1	Anfahrsieb	Starting strainer	DN1200			2000042396	250,000	250,000
Total:	2							Total:	1.100,000

PAYESH KOSTARAN PISARO Co.
INSPECTION SERVICES

Nobari

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G.3.1.2 Test documentation

Emmerthaler Apparatebau GmbH
Langes Feld 4
31860
Emmerthal

Aufstellung der drucktragenden Teile des Druckbehälters gemäß TRB 512 Pkt. 4 (4)
List of all pressure loaded parts according to TRB 512 pkt.4 (4)/DIN EN 10204/3.1 AD 2000 W1-W9

Seite / page 1 / 1

Anfahrsieb/ starting strainer

EAV-Nr. / order-no. **EAV2101662**

Zeichnungsnummer: / drawing no.: **4000568870**

FA-Nr. / com.no. **FA2200676**

Gesamtmenge / total qty. **2**

Fabrik-Nr.: / serial-no.:

Pos. pos.	Stck. qty.	Einheit unit	Artikelnr. Art.-No.	Werkstoffbez. und DIN material, abbreviation without/ mat. no.acc. to DIN	Werkstoffhersteller material manufacturer	Art/Nr./Datum der Bescheinigung type/no./date of material test certificate	vorhandene Kennzeichnung am Stück existant marking on specimen	umgestempelt mit re-marking
1	2	STCK	4000656953	1.4541 10029-A	sij acroni	EN 10204 3.1	1.4541	
				Flansch/flange		Nr.: 10149840-20027942-155691	315058	
				d= 1455/1180/38 DIN 10029-A		vom: 06.10.20		

Die Maßprüfung gemäß TRB 512 Pkt. 5 (12) wurde durchgeführt.
Die Messergebnisse liegen im Bereich der zulässigen Werte.
The dimension tests were carried out according to TRB 512 Pkt.5 (12)
The measuring values are within the admissible limits.

Für die Richtigkeit
For correctness
Emmerthal, den 02.06.2022

Abnahmebeauftragter gem. EN 10204
Inspection representant
Emmerthaler Apparatebau GmbH

sij acroni

Izdajatelj Certifikata:
Originator of Inspection Document:
Aussteller der Bescheinigung:

10149840-20027942-155691

SIJ ACRONI, d.o.o.
KRT-KAKOVOST
Cesta Borisa Kidriča 44
SI – 4270 Jesenice
Slovenia, EU

Tel.: +386 4 584 10 16
Fax: +386 4 584 10 71
E-Mail: gorazd.kosec@acroni.si
W: http://www.acroni.si

Prevzemni certifikat 3.2 / Inspection certificate 3.2 / Abnahmeprüfzeugnis 3.2 EN 10204:2004 Št. dokumenta / Document No. / Bescheinigungs Nr. **10149840-20027942-155691** z / dated / vom **06.10.2020**	Plačnik / Payer / Zahler HW-INOX GMBH KAISERSWERTHER STR 113 D-40880 RATINGEN GERMANY
Kupčeva št. naročila / Purchaser's order No. / Kundenbestell Nr. **6464**	Proizvajalčeva št. naročila / Manufacturer's works order No. / Werksauftrag Nr. **20027942** z / dated / vom **03.08.2020**
Št. Dobavnega lista / Packing list No. / Lieferschein Nr. **10149840** z / dated / vom **06.10.2020**	Kupčeva št. izdelka / Purchaser Article No. / Artikel Nr. des Kunden
Št. Računa / Account No. / Kontonummer **2020101018946**	Datum izdaje / Date of issue / Ausgabedatum **06.10.2020**

Izdelek / Product / Erzeugnis **DEBELA PLOČEVINA / HOT ROLLED PLATE / WARMGEWALZTES GROBBLECH**		**SINOXX 4541**
Zahteve / Requirements / Anforderungen	Oznaka jekla / Steel designation / Stahlbezeichnung	
EN 10028-7:2016	**1.4541**	**X6CrNiTi18-10**
EN 10088-2:2014	**1.4541**	**X6CrNiTi18-10**
EN 10088-4:2009	**1.4541**	**X6CrNiTi18-10**
EN 10095:1999/AC:2001	**1.4878**	**X8CrNiTi18-10**
SEW 470:1976	**1.4878.**	
AD 2000-Merkblatt W 0:2016		
AD 2000-Merkblatt W 10:2016		
AD 2000-Merkblatt W 2:2016		
ASME SA-240/SA-240M; BPVC.II.A-2019		**321**
ASTM A 240/A 240M-19		**321**
PED-2014/68/EU		
Customer Grade		**WARMGEWALZTE ROSTFREIEBLECHE W.NR. 1.4541**
Specifikacija kupca / Customer specification No. / Kundenspezifikation		
Dodatne zahteve / Suplementary requirements / Zusätzliche anforderung		
Dobavno stanje / Product delivery condition / Lieferzustand des Erzeugnisses **TOPILNO ŽARJENO, LUŽENO / SOLUTION ANNEALED, PICKLED / LÖSUNGSGEGLÜHT, GEBEIZT**		
Stanje površine / Surface finish / Oberflächenbehandlung **ASME Finish:No. 1 - on both sides** **ASTM Finish:No. 1 - on both sides** **EN Surface:1D - on both sides** **EN10163:B3**		

Žig in podpis neodvisnega inšpektorja
Stamp and signature of the independent inspector
Stempel und Unterschrift des unabhängige Sachverständigen

TÜV SÜD Industrie Service GmbH 00 36 Notified Body

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Izdajatelj Certifikata:
Originator of Inspection Document:
Aussteller der Bescheinigung:

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Oznake izdelka / Marking of the product / Kenzeichnung des Erzeunisses

Znak proizvajalca Manufacturer's mark Zeichen des Herstellers	Oznaka jekla Steel designation Stahlbezeichnung	Št. plošče Plate No. Tafel Nr	Št. sarže Heat No. Schmelzen Nr.	Dimenzije izdelka Product dimensions Abmessungen des Erzegniss	Žig kontrolorja Stamp of the works inspector Stempel des Werkssachverständigen	Žig prevzemalca Stamp of the inspection representative Stempel des Abnahmebeauftragten
SIJ I ACRONI					KK 4	00 36

Dodatne Oznake / Other marks / Andere Kennzeichen

Obseg dobave / Extent of material delivery / Umfang der Lieferung

Poz. Item. Pos.	Št. Sarže Heat No. Schmelzen Nr.	Št. plošče Plate No. Tafel Nr.	Teoretična teža Mass Masse (kg)	Teža neto Actual mass Ist Masse (kg)	Dimenzije izdelka Product dimension Maße des Erzeugnises (mm)	Št. kosov No. of pieces Stückzahl	Št. vzorca Sample No. Probe Nr.
50	315058	2032394101	9600,00	9600,00	50,000 /2000 /12000	1	2032394101

Način izdelave jekla / Steelmaking process / Stahlherstellungsverfahren **E + VOD**

Pogoji toplotne obdelave / Heat treatment details / Wärmebehandlung Details
HEAT TREATMENT: SOLUTION ANNEALED AT 1050°C, HOLDING TIME 110 minutes, WATER QUENCHED
TOPLOTNA OBDELAVA: TOPILNO ŽARJENO PRI 1050°C, ČAS OGREVANJA 110 minut, GAŠENO VODA
WARMBEHANDLUNG: LOSUNGSGLUHEN BEI 1050°C, HALTEDAUER 110 Minuten, WASSER ABGESCHRECKT
Lot Numbers : 2032394101

Mehanske lastnosti pri sobni temperaturi / Mechanical properties at room temperature / Mechanische Eigneschaften bei Raumtemperatur

Št. sarže Heat No. Schmelzen Nr.	Št.vzorca Sample No. Probe Nr.	Smer vzorca Sample orientation Proben lage			Meja plastičnosti Yield or proof strength Streck- oder Dehngrenze (MPa)		Nat. trdnost Tensile str. Zugfestigkeit (MPa)	Zg. meja plastičnosti Upper Yield strenght Obere Streckgrenze (MPa)	Kontrakcija Reduction of area Brucheinschnürung (%)	Raztezek Elongation Bruchdehnung (%)			Razmerje Ratio Beziehung	Trdota Hardness Härte
		T/L	T/B	1/2; 1/3; 1/4; S2	Rp0,2	Rp1,0	Rm	Reh	Z	A5	A50	A80	Rp/Rm	HBW
Zahteve Requirements Anforderung	MIN				210,0	240,0	515,0			40,0	40,0			
	MAX						700,0							192
315058	2032394101	T	T	S2	271,0	316,0	548,0			51,5	54,0			149

T- Prečno / Transverse / Quer L- Vzdolžno / Longitudinal / Langs T- Glava / Top / Kopf B- Noga / Bottom / Fuss
1/2 - Odvzem vzorca na sredini / Taking the sample at the center of product / Unter der Probe in der Mitte des Produkt
1/3 - Odvzem vzorca po deb 1/3 pod površino / Thickness 1/3 under the surface / Dicke 1/3 unter der Oberfläche
1/4 - Odvzem vzorca po deb 1/4 pod površino / Thickness 1/4 under the surface / Dicke 1/4 unter der Oberfläche
S2- Odvzem vzorca po deb 2 mm pod površino / Thickness 2 mm under the surface / Dicke 2 mm unter der Oberfläche

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Preskus udarne žilavosti / Charpy impact test / Kerbsclagbiegeversuch (J)

Št. sarže Heat No. Schmelzen Nr.		Št. vzorca Sample No. Probe Nr.	Test temperature Temperature Prüftemperature (°C)	Smer vzorca Sample orientation Proben lage			Posamezne vrednosti Individual values Einzelwerte (J)			Povprečje Mean value Mittelwert (J)
			T	T/L	T/B	1/2; 1/3; 1/4; S2	1	2	3	
Zahteve Requirements Anforderung	MIN						60	60	60	60
	MAX		20							
315058		2032394101	20	T	T	S2	273	226	244	248

T- Prečno / Transverse / Quer L- Vzdolžno / Longitudinal / Langs T- Glava / Top / Kopf B- Noga / Bottom / Fuss
1/2 - Odvzem vzorca na sredini / Taking the sample at the center of product / Unter der Probe in der Mitte des Produkt
1/3 - Odvzem vzorca po deb 1/3 pod površino / Thickness 1/3 under the surface / Dicke 1/3 unter der Oberfläche
1/4 - Odvzem vzorca po deb 1/4 pod površino / Thickness 1/4 under the surface / Dicke 1/4 unter der Oberfläche
S2- Odvzem vzorca po deb 2 mm pod površino / Thickness 2 mm under the surface / Dicke 2 mm unter der Oberfläche

Kemična Analiza / Chemical Composition / Chemische Zusammensetzung

Št. Sarže/ Heat No./ Schmelzen Nr. 315058

%C	%Si	%Mn	%P	%S	%Cr	%Ni	%Cu	%Al	%Mo	%V	%Ti
0,042	0,353	1,740	0,035	0,0004	17,31	9,05	0,417	0,014	0,419	0,07	0,417

%Nb	%N	%Co
0,008	0,0170	0,106

Dodatne zahteve: / Additional requirements: / Zusätzliche Anforderungen :
Št. sarže / Heat No. / Schmelzen Nr. : 315058

Feritno število / Ferrite no. / Ferrit nr. 5,76

Kontrola oznak, identifikacije, površine, oblike in dimenzij / Control of marking and identification, surface appearance, shape and dimensional properties/ Prüfung von Kennzeichnung, Identifizierung, Oberfläche, Form und Maße :
ASME SA 480 Ed.2019 OK
ASTM A480/A480M-19 OK
EN ISO 18286:2010 Flatness Class N OK
EN ISO 18286:2010 Thickness: OK OK
EN ISO 18286:2010 Width/Length Class B OK
EN 10029:1991 Flatness Class N OK
EN 10029:1991 Thickness Class B OK
EN 10029:1991 Width/Lenght : OK OK

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Preizkus odpornosti na korozijo / Corrosion test / Korrosion test
Št. vzorca / Sample No. / Probe Nr. : **2032394101**
Cracking resistance v skladu z ANSI/ NACE MR0175/ISO 15156-3: OK
Interkristalna korozija po A262-E: OK / Intergranular corrosion test acc.A262-E: OK / Interkristalline Korrosion nach A262-E: OK
Interkristalna korozija po ISO-3651-2-A: OK / Intergranular corrosion test acc.ISO-3651-2-A: OK / Interkristalline Korrosion nach ISO-3651-2-A: OK
Sulfide Stress Cracking Resistance in accordance with ANSI/NACE MR0103/ISO 17945: OK

Opombe / Remarks / Bemerkungen

Potrjujemo da dobavljeni izdelki ustrezajo zahtevam naročila / We confirm herewith that the delivered products comply with the purchase order / Es wird bestätigt, daß die Erzeugnisse den Bestellanforderungen entsprechen
Država porekla = Država izdelave taline = Država izdelave slaba - SLOVENIJA – EU / Country of Origin = Country of melt = Country of slab: SLOVENIA – EU / Herkunftsland = Land der schmelze = Land der Bramme – SLOVENIA – EG
Material ni kontaminiran z Živim srebrom. / Free from Known Contamination with Mercury. / Keine kontamination mit Quecksilbe.
Material je skladen z RoHS direktivo. Podrobnosti na: https://sij.acroni.si/assets/magazine-files/RoHS-declaration-April-2020.pdf / Material fully comply with RoHS directive, Details on: https://sij.acroni.si/assets/magazine-files/RoHS-declaration-April-2020.pdf / Material ausgestattet mit RoHS-Richtlinien, Einzelheiten auf: https://sij.acroni.si/assets/magazine-files/RoHS-declaration-April-2020.pdf

Sistem vodenja kakovosti je certificiran po ISO 9001. Št. Certifikata: 12 100 6200 TMS. Izdajatelj: TÜV SÜD Management Service GmbH. / Quality Management System is certified according to ISO 9001. Certificate no. 12 100 6200 TMS, issued by TÜV SÜD Management Service GmbH. / Qualitätsmanagementsystem zertifiziert nach ISO 9001. Zertifikat Nr. 12 100 6200 TMS der TÜV SÜD Management Service GmbH.

Izdano v soglasju s TÜV Bayern e.V. (08/1965) / Issued in agreementwith TÜV Bayern e.V. (08/1965) / AusgestelltimEinvernehmen mit dem TÜV Bayern e.V. (08/1965)/ В порядке, согласованном с TÜV Bayern e. V. (08/1965).

Potrjen sistem kakovosti v skladu s PED, priloga I, točka 4.3 s strani priglašenega organa 0036 (oktober 2002) (certifikat št. DGR-0036-QS-W 22-A/2002/MUC). / QS approved acc. to PED, Annex I, Para. 4.3 by Notified Body 0036 (October 2002) (Certification No. DGR-0036-QS-W 22-A/2002/MUC). / QS entsprechend DGRL, Anhang I, Absatz 4.3 von NotifiedBody 0036 überprüft (Oktober 2002) (Zertifizierungs-Nr. DGR-0036-QS-W 22-A/2002/MUC).

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Testiranje mehanskih lastnosti in nadzor označevanja ob polni prisotnosti TUV inšpektorja. Kontrola površine, oblike in dimenzijskih lastnosti ob delni prisotnosti TUV inšpektorja. / Mechanische Prüfungen und Prüfung von Kennzeichnung durchgeführt im Beisein des TUV-Prüfers. Oberfläche, Form und Maße stichprobenweise im Beisein des TUV-Prüfers durchgeführt. / Testing of mechanical properties and control of marking and identification witnessed by TUV inspector. Control of surface appearance, shape and dimensional properties partly witnessed by TUV inspector.

Meritve sevanja: NI RADIOAKTIVNEGA ONESNAŽENJA / Measuring Radiation: NO RADIOACTIVE CONTAMINATION / messen: KEINE ERHÖHTE RADIOAKTIVITÄT

Spektrometerska analiza PMI v skladu API RP 578: OK / Spectrometer Sorting Test PMI according API RP 578: OK / Spektrometer Sortiertest PMI nach API RP 578: OHNE BEANSTANDUNG

Vizualni pregled: OK / Visual inspection: OK / Sichtprüfung: OHNE BEANSTANDUNG

Priloga / Annex / Anbau :
Priloga / Annex / Anbau: 1: CE znak / CE marking / CE-Kennzeichnung

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Priloga/ Annex/ Anbau: 1

CE

0036

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12

ACR-4541-P_CPR_06-13

EN 10088-4:2009

Vroče valjana pločevina X6CrNiTi18-10 / 1.4541
Warmgewalztes Blech X6CrNiTi18-10 / 1.4541
Hot rolled plate X6CrNiTi18-10 / 1.4541

Predvidena uporaba: Kovinske konstrukcije ali sovprežne konstrukcije iz jekla in betona
Metallbauwerke oder in Metall-/ Betonverbundbauwerken
Metal structures or in composite metal and concrete structures.

Tolerance dimenzij in oblike
Grenzabmaße und Formtoleranzen
Tolerances on Dimensions and shape

EN 18286, razred / Klasse / class : B/N

Raztezek / Dehnung / Elongation Natezna trdnost / Zugfestigkeit / Tensile strength Napetost tečenja / Streckgrenze / Yield strength Udarno delo / Kerbschlagarbeit / Impact strength Varivost CEV / Schweißeignung CEV / Weldability CEV Trajnost / Dauerhaftigkeit / Durability	Izraženo, kot je navedeno v izjavi o lastnostih Ausgedrückt als in der Leistungserklärung angegeben Expressed as indicated in the DoP

Regulirana snov: Ni preverjeno. / Regulierter Stoff: Keine Leistung festgestellt./ Regulated Substance: No performance determined