

	 <b>AERZEN</b>	
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## Hydraulic Pressure Test Procedure Acc. To AM Standard 4000526981

F	00	05.01.2022	For Information	R. Steinbrenner	C. Schmidt	O. Tanner
Status	Issue	Date	Description	Prepared by	Checked by	Approved by



**AERZEN**

## Testprozedur Test Procedure

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

### Kurzbeschreibung

Ziel des Tests ist das Material auf seine Festigkeit zu prüfen. Der Prüfdruck wird so gewählt dass das Bauteil diesen sowie im Normalbetrieb als auch im Störfall nicht übersteigt.

### Versuchspläne

Die Sicherheitsbestimmungen der QP00191 müssen eingehalten werden.  
Alle Öffnungen werden mit für den Druck geeigneten Deckeln verschlossen. Der Prüfling wird komplett mit der Prüfflüssigkeit gefüllt. Die Flüssigkeit kann je nach Anwendung Öl oder sauberes Wasser mit anti korrosiv wirkenden Zusätzen sein. Der Druck wird mit einer Pumpe konstant bis zum Prüfdruck angehoben. Der Prüfdruck wird für die geforderte Zeitspanne gehalten (Standard: 5 Minuten). Die relevanten Daten werden im Prüfprotokoll erfasst. Anschließend werden alle erfolgreich geprüften Bauteile gestempelt.

Die Prüfung ist erfolgreich beendet wenn an keiner Stelle Materialverformungen oder feuchte Stellen am Gehäuse erkennbar sind. Durchlässigkeiten sind an Teilfugen oder Verschraubungen zulässig, es muss jedoch trotzdem der Prüfdruck aufrechterhalten werden.

Nach dem Test wird die Maschine innerhalb von 24h zerlegt und gesäubert.

### Druckprüfbeleg

Der Druckprüfbeleg wird vom Prüfer ausgefüllt. Das folgende Dokument ist ein Muster und wird am Tag der Prüfung in der aktuellen Version aus dem System genommen. Es können Änderungen zum Muster auftreten. Die DIS Nummer des Dokuments lautet 4000277547

### Short description

Target of this test is to check the strength of the material. The test pressure is set to a point that the product will never exceed in standard- or error operation cases.

### Test layouts

The safety regulations of the QP00191 have to be observed.  
All orifices are sealed with means designed for test pressure. The item to be tested is filled with test liquid consisting of clean water with anti-corrosive agents or oil. Via a pump the pressure is continuously increased until the stipulated test pressure is reached. The item to be tested is purged with this pressure for the required time (standard: 5 minutes). The test results are listed in the pressure test report. If the test result is positive, all pressure rated parts are provided with test stamps.

The test is completed successfully if after testing no signs of seepage or distortions at the housing can be detected. Permeabilities are permissible at parting lines or glands, nevertheless the test pressure must not sink under the target pressure.

After the test and during the following 24h the housing parts will be disassembled and cleaned .

### Pressure test report

The pressure test report will be filled by the examiner. The following document is a template and will be taken out of the system on the test day in its actual version. There can be differences between the template and the actual version. The DIS number of the document is 4000277547.

**Festigkeitsprüfung  
Hydrostatic test**

Ersteller: Steinbrenner  
Datum: 24.02.2017  
Verantwortlich: Q-TB

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**AERZEN**

**Testprozedur  
Test Procedure**

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

Qualitätswesen und Prüfstand Aerzener Maschinenfabrik GmbH



**Qualitätssicherung**  
*Quality management*  
**Druckprüfbeleg**  
*Pressure test report*

Erzeugnis Typ *Type*      TSNR *Part no.*      Fabrik- Nr. *Serial no.*      ggf. Kundenauftrags- Nr. *Order no.*

Erzeugnis Typ <i>Type</i>	TSNR <i>Part no.</i>	Medium						Prüfumfang <i>Scope of testing</i>		
		Luft <i>Air</i>	Wasser <i>Water</i>	Öl <i>Oil</i>	Helium	N <sub>2</sub>	Förder- raum <i>chamber</i>	Erzeugn.-Stage komplett <i>complete</i>	Aggregat <i>Unit</i>	Sonstiges <i>Other</i>
Dichtheitsprüfung <i>Leak test</i> Nekaltest Stempel Stamp „D“										
Dichtheitsprüfung <i>Leak test</i> Stempel Stamp „D“										
Festigkeitsprüfung <i>Hydrostatic test</i> Stempel Stamp „F“										

Bemerkungen *Remarks*: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Stempel Stamp „D“			
.....	.....	.....	.....
Datum <i>Date</i>	Stempel- Nr. <i>Stamp no.</i>	Name	Unterschrift <i>Signature</i>
Stempel Stamp „F“			
.....	.....	.....	.....
Datum <i>Date</i>	Stempel- Nr. <i>Stamp no.</i>	Name	Unterschrift <i>Signature</i>

DPB\_Allg

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**Festigkeitsprüfung  
Hydrostatic test**

Ersteller: Steinbrenner  
Datum: 24.02.2017  
Verantwortlich: Q-TB      Seite 2 / 2  
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## Final Inspection Test Procedure 4000526983

F	00	05.01.2022	For Information	R. Steinbrenner	C. Schmidt	O. Tanner
Status	Issue	Date	Description	Prepared by	Checked by	Approved by



AERZEN

**Testprozedur  
Test Procedure**Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190**Short description**

Target of the final inspection is to determine the factual correctness of all components of the product. In this process the nominal state that is given by internal documents and customer requirements will be compared with the actual state.

**Standard tests**

- Control of numbers
- Protection earth
- Paintwork
- Completeness
- Anticorrosion
- General state
- Documentation
- Dimensional inspection

**Optional tests**

Some of the tests are nonstandard and have to be requested during the order process.

- Photo documentation
- Coating thickness measurement

**Test layouts****Control of numbers**

Control of machine plate, ITEM plate (if requested), TAG number (if requested), motor-, valve-, base support- and machine number. Basics are the technical data of the order and the ITP.

**Protection earth**

Protection earth connection point is available, uncoated and marked.

**Paintwork**

Control of the final painting of all components. Parts that are delivered by the customer are excluded.

**Anticorrosion**

Blank spaces are coated or preserved.

**General state**

No visible damages at growing parts, at the machine or the acoustic hood.

**Documentation**

All requested documents are available.

**Dimensional inspection**

Check of the connection- and outside dimensions.

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**Endabnahme  
Final inspection**Ersteller: Steinbrenner  
Datum: 24.02.2017  
Verantwortlich: Q-TB      Seite 3 / 4



**AERZEN**

## Testprozedur Test Procedure

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

### Test layouts - optional tests

Photo documentation

The state at the final inspection will be recorded on photos

Coating thickness measurement

The coating thickness of the complete painting will be measured at different locations. The locations can be required by the customer.

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**Endabnahme  
Final inspection**

Ersteller: Steinbrenner  
Datum: 24.02.2017  
Verantwortlich: Q-TB

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## Leak Test Procedure 4000526987

F	00	05.01.2022	For Information	R. Steinbrenner	C. Schmidt	O. Tanner
Status	Issue	Date	Description	Prepared by	Checked by	Approved by



**AERZEN**

### Testprozedur Test Procedure

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

#### Short description

The objective of the leak tightness test is to verify the observance of specified leak tightness requirements. By default there are four different tests carried out in AERZEN. The selection depends on the machine type. Further information about the AERZENER Leak tightness tests can be found in the internal regulation QP00191.

#### Test methods

Method	Detection limit Global leak rate [mbar·l/s ]	Blower					Gas meter	Compressor			
		GM/ GL	GR	GQ	V	HV	Z	VM	VMX	VMY	VR/ VK
6.1 Nekal	1*10 <sup>-2</sup>	X	X	X				X	X		X
6.2 Helium Overpressure	5*10 <sup>-5</sup>						X			X	X
6.5 Helium Vac	1*10 <sup>-8</sup>				X	X					
6.6 Special	-										

\*Numbering from QP00191 for easier use

**Dichtheitsprüfung  
Leak tightness test**

Originator: Steinbrenner  
Date: 23.02.2017  
Responsible dept.: Q-TB

4000526987 | ZTD | 00



AERZEN

## Testprozedur Test Procedure

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

### Test layouts

#### 6.1 Leak tightness test as “Nekal” test with foaming fluid

##### 6.1.1 General remarks

- Proof of global leakage rate  $\geq 1 \cdot 10^{-2}$  mbar<sup>l</sup>/s
- Proof of single leakage rate  $\geq 1 \cdot 10^{-3}$  mbar<sup>l</sup>/s
- The global leakage rate cannot be measured directly
- Test period: After applying the fluid approx. 10 minutes
- Acceptance criteria: No foam moulding during the test period
- Test basics: DIN EN 1593, DIN EN 1779, Wutz – Handbook Vakuumtechnik

##### 6.1.2 Procedure

- If the test pressure is over 1100 mbar(g), before the LT test a hydrostatic test has to be carried out. Exceptions are products that are made by AERZEN and were subject to a periodically type examination. Before the test it has to be sure that the product is clean, dry, blowhole- and rust free. The test pressure will be fixed by the project engineer, the responsible technical supervisor or in special cases by the quality department.
- The safety requirements of QP00191, annex 2 must be observed
- If possible, the product should not be coated because leaks could be closed.
- The LT test takes place in two steps, at a pressure of 0,5 bar(g) and afterwards at the fixed Test pressure. The lower measuring point is to detect greater leaks. This is only to save test gas and can be excluded at small products. The upper point considers leakages because of opening of flange connections or micro cracks. The test pressure will be raised slowly in 1 bar steps (max. 1 bar per minute).
- The overpressure inside the product will be raised with oil free air or Nitrogen.
- The leak detection takes place by applying the non-corrosive test fluid (f.e. GUEPO test fluid) on the product.
- The test period depends on the size of the product and the to be verifying leakage rate. The waiting time for every individual section will be determined to 10 minutes, to detect even the smallest leaks. If a section dried out, it is important not to destroy already moulded foam while applying new fluid. At the test location should be enough light of approx. 400 – 500 lux. The use of a torch is permissible.

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**Dichtheitsprüfung  
Leak tightness test**

Originator: Steinbrenner  
Date: 23.02.2017  
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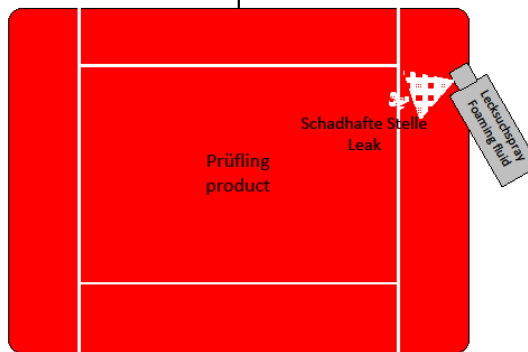
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# Testprozedur Test Procedure

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

## Method 6.1 (C2) – Leak tightness test as “Nekal” test with foaming fluid (local)

Druckmessgerät  
Pressure gauge



QP / Steinbrenner  
08.08.2014

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**Dichtheitsprüfung  
Leak tightness test**

Originator: Steinbrenner  
Date: 23.02.2017  
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## Testprozedur Test Procedure

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

### 6.2 Leak tightness test with inner overpressure and Testgas (He or He/N2-mix)

#### 6.2.1 General Remarks

- Proof of global leakage rate  $\geq 5 \cdot 10^{-5}$  mbar<sup>l</sup>/s
- Proof of single leakage rate  $\geq 5 \cdot 10^{-6}$  mbar<sup>l</sup>/s
- The global leakage rate cannot be measured directly
- Test period: Depends on size and texture of the product and operating time of the He detector
- Acceptance criteria: no raise of the helium concentration
- Test basics: DIN EN 1593, DIN EN 1779, Wutz – Handbook Vakuumtechnik

#### 6.2.2 Procedure

- If the test pressure is over 500 mbar(g), before the LT test a hydrostatic test had to be carried out. Exceptions are products that are made by AERZEN and were subject to a periodically type examination. Before the test it has to be sure that the product is clean, dry, blowhole- and rust free. The test pressure will be fixed by the project engineer, the responsible technical supervisor or in special cases by the quality department.
- The safety requirements of QP00191, annex 2 must be observed
- The LT test takes place in two steps, at a pressure of 0,5 bar(g) and afterwards at the fixed Test pressure. The filling will be stopped at 0,5 bar(g). The Pressure will be observed for at least 5 minutes. If there is a massive pressure drop that cannot be attributed to a temperature change, the leak must be located and marked.
- If it can be assumed that the test criteria will be satisfied, the test pressure can be raised slowly in 1 bar steps (max. 1 bar per minute) to the fixed test pressure. The upper point considers leakages because of an opening of flange connections or micro cracks).
- Between filling and sniffing should be possibly low time because of permeation effects at the sealing in the flange connections.
- The test direction should be from down to up and with the air current of the room.
- The product will now be tested at the parting lines and leak suspicious areas by the sniffing tool.
- If the Display of the Helium concentration rises, the exact location of the leak has to be found and marked for a refinishing operation. A leakage rate is not calculateable because of the undefined test gas concentration und the limited suction power of the sniffing tool.

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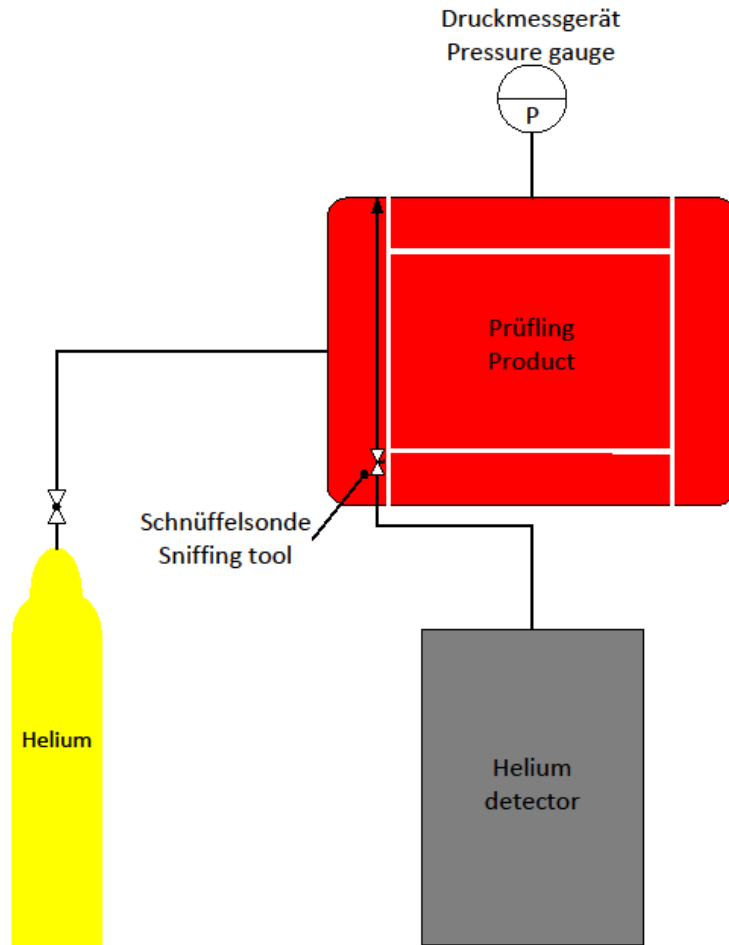
**Dichtheitsprüfung**  
**Leak tightness test**

Originator: Steinbrenner  
Date: 23.02.2017  
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Method 6.2 (B4) – Sniffing method (local)

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QP / Steinbrenner  
08.08.2014

Dichtheitsprüfung  
Leak tightness test

Originator: Steinbrenner  
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AERZEN

## Testprozedur Test Procedure

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

### 6.5 Leak tightness test with inner under pressure with testgas (He)

#### 6.5.1 General remarks

- Proof of global leakage rate  $\geq 1 \cdot 10^{-8}$  mbar<sup>l</sup>/s
- Proof of single leakage rate  $\geq 1 \cdot 10^{-8}$  mbar<sup>l</sup>/s
- Test period: Depends on size and texture of the product and operating time of the He detector
- Acceptance criteria: Single leakage rate < guaranteed global leakage rate / 10
- Acceptance criteria with extra pump:  
Single leakage rate < guaranteed global leakage rate / 10 / partial flow ratio
- Test basics: DIN EN 1593, DIN EN 1779, Wutz – Handbook Vakuumtechnik

#### 6.5.2 Procedure

- Before evacuating it must be sure that the product is suitable for vacuum, clean, dry, blowhole- and rust free.
- The safety requirements of QP00191, annex 2 must be observed
- The product will be connected to a Helium detector and, if necessary, to an extra pump. After that it will be evacuated until the pressure is commuted in a pressure under 1 mbar(a). Now the detector will be set to measurement mode. When the Display of the Helium concentration is commuted in, the Helium from a test gas bottle will be applied in a fine beam slowly over the whole product. The test speed depends on the operating time of the He detector. If the Display of the Helium concentration raises and the leakage rate exceed the maximum allowed rate, the exact location of the leak has to be found and marked for a refinishing operation.

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**Dichtheitsprüfung  
Leak tightness test**

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Date: 23.02.2017  
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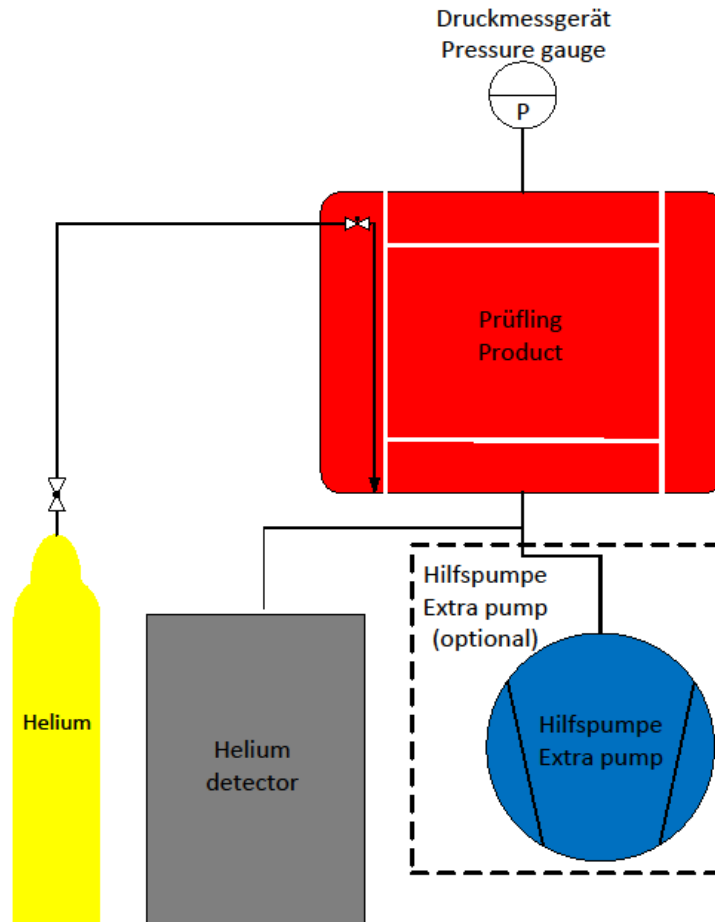
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Testprozedur  
Test Procedure

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

Method 6.5 (A3) – Vacuum (local)

4000526987 | ZTD | 00



QP / Steinbrenner  
08.08.2014

Dichtheitsprüfung  
Leak tightness test

Originator: Steinbrenner  
Date: 23.02.2017  
Responsible dept.: Q-TB Page 7 / 9



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## Testprozedur Test Procedure

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

### 6.6 Special tests

Quality department has to agree with special tests that are not included in the QP00191.  
For the execution of special tests quality department will create an order-related test procedure.  
Basics for any special test is the DIN EN 1779:1999-10

#### Pressure test report

The pressure test report will be filled by the examiner. The following document is a template and will be taken out of the system on the test day in its actual version. There can be differences between the template and the actual version. The DIS number of the document is 4000277547.

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**Dichtheitsprüfung  
Leak tightness test**

Originator: Steinbrenner  
Date: 23.02.2017  
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AERZEN

# Testprozedur Test Procedure

Reherweg 28  
31855 Aerzen  
Telefon: +495154/8190

Qualitätswesen und Prüfstand Aerzener Maschinenfabrik GmbH



AERZEN

## Qualitätssicherung

Quality management

### Druckprüfbeleg

Pressure test report

Erzeugnis Typ      TSNR      Fabrik-Nr.      ggf. Kundenauftrags-Nr.  
Type      Part no.      Serial no.      Order no.

	Prüfdruck Test pressure [bar(g)]	Medium						Prüfumfang Scope of testing		
		Luft Air	Wasser Water	Öl Oil	Helium	N <sub>2</sub>	Förder- raum raum chamber	Erzeugnis- komplet komplete	Aggregat Unit	Sonstiges Other
Dichtheitsprüfung Leak test Nekaltest Stempel Stamp „D“										
Dichtheitsprüfung Leak test Stempel Stamp „D“										
Festigkeitsprüfung Hydrostatic test Stempel Stamp „F“										

Bemerkungen Remark: \_\_\_\_\_

Stempel Stamp „D“			
Datum Date	Stempel-Nr. Stamp no.	Name	Unterschrift Signature
Stempel Stamp „F“			
Datum Date	Stempel-Nr. Stamp no.	Name	Unterschrift Signature

DPB\_Allg

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**Dichtheitsprüfung  
Leak tightness test**

Originator:Steinbrenner  
Date: 23.02.2017  
Responsible dept.: Q-TB Page 9 / 9

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