

	GOLGOHAR STEEL PROJECT		
	Technical Specification For Lighting Distribution Panel		
	Barsoo Document No.: 157TEGU5010103		
REV: 00	Document No.: S-GR02-B-DSR-GEN-SPC-EL-003		Page 1 of 22

Technical Specification For Lighting Distribution Panel

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1.0 GENERAL

1.1 Scope

This specification has been prepared to provide minimum requirement for design, fabrication and supply of lighting distribution panels.

In case of discrepancy between documents and this specification, the stringent shall be applied.

No deviation from this specification is allowed unless specificity agreed among OWNER and VENDOR.

1.2 Document Priority

In case of conflict between documents, the order of precedence shall be:

- This Specification and Datasheet,
- Drawings and other documents,
- I.E.C. standards,
- Other standard and codes when I.E.C. publications have not yet been issued.

2.0 SITE CONDITIONS

- Plant Location

The Site is located at Gol-E-Gohar Iron Ore Complex, situated in Sirjan, Province of Kerman in southern part of Islamic Republic of IRAN, approximately 285 km southwest of Kerman city and 335 km north of Bandar Abbas port, in a semi-desertic high plateau terrain, 1750 m above sea level, and flanked by mountains over 2500 m high trending northwest to southwest.

- Meteorological

Ambient Temperature

Max. Temperature:	+40 deg. C (Recorded)
	+50 deg. C (Design)
Min. temperature:	-12 deg. C (Recorded)
	-10 deg. C (Design)

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Average temperature: +15.9 deg. C
(Design)

Wet bulb design temperature +25 deg C
(summer):

Relative Humidity: Max. 70%

Wind Velocity

According to National Iranian Code (6th revision):

Basic speed data: 130 Km/h

Basic pressure data: 0.845 KN/m²

Correction factor:

0 - 10 m: 2

10 - 20 m: 2.2

20 - 100 m: 2.4

Rainfall

Yearly 120 mm (average)

Monthly rainfall 260mm (Max)

Barometric Pressure

820 milliards

Geological Conditions

This data is belongs to the existing palletizing plant location. For the engineering the contractor shall be study geotechnical conditions for the essential location according to the project plan.

Altitude: About 1,750 m above mean sea level

Soil bearing: approx. 20t/m²

Ground water level: approx. 60 m below ground level

Earthquake Load

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Equipment in plant will be dimensioned including a safety calculation against earthquake according to the “Iranian Code for Seismic Resistant Design of Buildings

– Publication No. S253-2nd edition, autumn 1999” (“Iranian Regulations 2800”) and “Minimum

Design Loads for Building and Structures” (Iranian Regulations 519).

- Design base acceleration: 0.3·g
- Classification of Buildings: Group 2
- Soil classification: soil type III-b

3.0 STANDARDS AND CODES

The panels shall be constructed wired and tested in accordance with all applicable sections of the latest below listed standards and codes.

For equipment manufactured in Europe

- IEC International Electro technical Commission.
 - IEC 60144 Degrees of Protection of Enclosures for Low Voltage Switchgear and Control Gear.
 - IEC 60439 Low Voltage Switchgear and Control Gear Assemblies.
 - IEC 60529 Classification of Degree of Protection Provided by Enclosures.

For equipment manufactured in the USA

- NEMA National Electrical Manufacturer’s Association.
- NEC National Electrical codes.

The panels may conform with the national standards of the country of manufacturer, provided these standards are based on IEC recommendations. Vendor shall state in the quotation the standard to which the panel conforms. If these are the national standards, then vendor shall state in the quotation the deviation, if any, from the relevant IEC recommendations.

4.0 TECHNICAL REQUIREMENTS

The panel and individual equipment and components shall be suitable for the expected short time currents. The values of the short circuit and earth fault currents and duration, shall be as what will be indicated on the single line diagram. If not otherwise indicated, the duration times of the currents mentioned above shall not be less than 1 S.

Space heater and lighting shall be considered for all panels.

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When no information is given regarding earth fault currents, the value shall be assumed as being equal to the phase to phase fault current. The circuits downstream of the circuit breakers shall be suitable for the relevant tripping characteristics (current/time)

The panel and the individual components shall be sized assuming that:

- All the equipment, including the spare equipment, is rated as indicated on the single line diagram.
- The bus bars are at their rated current.
- The site conditions are taken into account with the ambient temperature at its maximum value.

The distribution boards shall be of the free standing or rack or wall mounted and fixed type. It shall be metal enclosed type.

The panels shall be able to withstand the mechanical, electrical and thermal stresses and the corrosive phenomena.

The panels and the covers forming the enclosure shall be fastened with screws.

The opening of doors and the removal of covers mechanically fastened, shall only be possible by means of groove keys or tools.

The types of keys and tools mentioned above shall be reduced to a minimum consistent with the safety requirements.

Panels shall be operated from the front.

It shall be possible for specialized and authorized personnel to carry out the following operations, with the switchboard alive:

- Visual inspection of equipment.
- Operation of disconnecting switches.
- Replacement of circuit breakers, etc.
- Connection of incoming cables.

To permit these operations, barriers shall be provided between adjacent circuits that might accidentally be touched.

Equipment and components located within the enclosure shall not be mounted directly on the walls of enclosure.

Equipment subject to adjustment or replacement, i.e. circuit breakers, etc., shall be positioned so that they are easily accessible from the front of the panel.

All equipment inside panels shall have suitable nameplates.

The panel shall have a minimum thickness of 2 mm with reinforcements where panels may be weakened due to large punchings being removed. An exception may be made for internal sheets

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as they are not part of the load bearing structure and of to external frame, i.e. partitions. These sheets may have a thickness of 1.5 mm.

The doors shall be hinged. Equipment mounted on hinged doors shall be connected with extra flexible conductors.

Panels shall be completely closed with sheets to prevent insects and dust from entering. The entry of cables to the panel can be from the bottom or top as will be specified in the requisition.

On three-phase systems with a neutral, the neutral bus bar shall extend for the whole length of the phase bus bars and shall be half the size of main phase bus bars.

On three-phase systems with neutral, fed by-three-pole circuit breakers, the neutral bar shall have a bolted link near the outgoing terminals.

The bus bars shall be PVC sleeved. All joints and tappings of bus bars shall be shrouded.

Unless otherwise indicated, the bus bars shall be of electrical grade copper.

The bus bar supports may be insulated, molded or layered insulating supports; they shall be of non hydroscopic and dust deposits or condensation.

The bus bar supports shall take into consideration thermal expansion and vibration, if any.

The bus boars and power insulation conductors shall be marker L₁.L₂-L₃-N₁ PE or in colors.

Circuit breakers shall be manually actuated and be provided with a visual indicator mechanically actuated, showing the following positions:

- a) Open.
- b) Closed.

Actuating of circuit breaker shall be possible after opening of front door or cover.

Tripping characteristic shall be as what will be indicated on the one line diagrams.

Contactors, e.g. for lighting control, shall be of the compact air break. Other contactors may be taken into consideration on an individual basis.

Contactor drop out voltage shall be between 45% to 65% of rated voltage and maximum contact pressure shall be with 80% of rated voltage.

Signal lamps, if applicable, shall be of the LED type.

On-load switches shall be air break, sized for opening on-load and closing under short circuit conditions, operable from the front panel where an indicator shall show the position (closed/open).

A minimum of 20% spare circuit breakers or minimum one per each size shall be provided and completely wired to terminal blocks.

Unless specifically indicated in the single line diagram, the protection of installations against indirect contact shall be made by an earthing system with protective circuits.

According to the following diagram (IEC Standard) the earthing system is TN-CS system.

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So, the panels bus No., are as follows:

Lighting Distribution Panel	3Ph+N+PE
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The interconnecting cables are as follows:

Lighting Distribution Panel and Power Socket Box to lightings and sockets	Ph+N+PE, 3-wire cable, 3Ph+N+PE, 5-wire cable.
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For this reason, a protective bar (PE) shall be installed in all panels including those with special insulation.

In double insulated panels, this bar shall connect the armoring of cables of outgoing circuits to the earthing system of the incoming circuits.

The protective bar (PE) shall cover the whole length of the panel and provided with connecting bolts at the two ends and anywhere that the connection of a cable is provided.

This shall be of copper and with a cross section suitable for the short circuit current duration time provided.

In panels the protective bar (PE) shall be installed inside, in the most suitable position to connect the cable armoring.

In panels, with vertical equipment, a vertical protective bar shall be provided for connection of cables and equipment.

In panels, except when double insulated the non current carrying parts of each section or box shall be individually connected to the PE bar with a 10 mm² copper.

Conductor shall be calculated on the basis of the prospective current of earth failure.

The continuity of all metallic parts through equipotential bonding or structure joint shall be guaranteed.

PE bar inside metal enclosed panels shall be connected to one external earthing terminal. This earthing terminal shall be suitable as minimum:

a) Lug on 16 mm² single, stranded conductor (for lighting panels).

b) Lug on 35 mm² single, stranded conductor (for power socket boxes).

Bolted connections shall be made using bolts, nuts and washer of stainless steel or approved equivalent.

Cable gland shall be suitable for to type of cable as what will be specified in the requisition. Glands shall be located on the bottom of panel.

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All wiring shall be continuous from outgoing circuit breakers to terminals without splicing. Wires shall be stranded copper conductor PVC insulated with minimum cross section of 2.5 mm² for control, 4 mm² for power, and 6 mm² for current transformers. Wires shall be protected against mechanical damages.

The conductor ends shall be fitted with crimped type lugs and numbered ferrules.

The ferrules shall be arranged so that the numbers are easily read.

Outgoing conductors shall be connected to terminals located in the bottom part of the panel.

Links shall be used to jumper adjacent terminals together where required, avoiding the use of wire links as much as possible.

The terminals shall be suitable for the type and the material of conductors being connected.

For conductors less than 10 mm², clip-on type terminals are acceptable. For conductors of 10 mm² and above, bolted terminals shall be used.

The insulating material of terminals shall be melamine or other high density plastic. The molding mass shall be filled with mineral or inorganic compounds.

Terminal blocks shall be tagged with the phase number and neutral. They shall be mounted such that to give easy access and sufficient space for execution of cable terminations, their fastening and to enable ferrule number and labels to be read without difficulty. Barriers shall be provided between terminals belonging to different branch circuits. branch circuit number shall be provided between the barriers.

Non detachable nameplate (s) of black-white-black shall be installed on top of panel. These nameplates shall at least contain the following information:

- a) Panel tag number.
- b) Manufacturer's name and type.
- c) Supply voltage.
- d) Degree of protection.

5.0 ADDITIONAL REQUIREMENTS FOR PANELS LOCATED OUTDOORS

Panels shall be industrial type and have minimum protection class as per IEC 144 as follows:

- a) Indoor : IP 42
- b) Outdoor : IP 55

Ventilation or drainage openings, if any, shall be at least IP 3X.

Unused holes shall be plugged off instead of installed cable glands.

An ample sized rain canopy shall be mounted over the panel.

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6.0 MATERIAL

6.1 General

The material applied for the various parts shall be in accordance with the parameters as what will be specified in requisition.

Unless the coil of the contactor shall be suitable for operation on 230 V, 1 PH, AC supply and shall work satisfactorily between +10% and -15% of the rated voltage.

The contactor drop off voltage shall be between 15% to 65% of the rated coil voltage.

6.2 Thermal overload relay

Thermal overload relays shall be three element, positive acting, ambient temperature compensated type with adjustable setting range.

Thermal overload relays shall be manually reset type with the reset push-button brought out on the front of the panel. The reset push-button shall be capable of being operated without opening the compartment door.

Thermal overload relays shall be provided with minimum 2 NO + 2 NC contacts with a rating of 5 A at 230 V, 1 PH, 50 Hz, AC and 1.3 A at 110 V DC (Inductive load).

6.3 Moulded case circuit breakers (MCCBs)

MCCBs shall be provided with spring assisted quick make/break manually operated trip free mechanism. Wherever specified, MCCB shall be suitable for remote tripping operation and the tripping device shall be suitable for the specified control supply voltage.

MCCBs shall be provided with tripping device with inverse time characteristics for overload protection and instantaneous characteristics for short circuit protection.

MCCB operating handle “ON” and “OFF” positions shall be displayed and the operating handle shall be mounted on the door of the compartment housing MCCB.

MCCB shall be provided with minimum 2 NO + 2 NC auxiliary contacts rated for 5 A at 230 V, 1 PH, 50 Hz, AC or 1.3 A at 110 V DC (Inductive load).

If specified in the requisition, the MCCBs shall be provided with solenoid closing mechanism to make them suitable for remote closing operation. The closing solenoid shall be suitable for specified control supply voltage.

6.4 Measuring instruments

All measuring instruments shall be of 96x96 mm square pattern, flush mounting type.

All AC ammeters and voltmeters shall be of moving Iron type for AC and permanent magnet type for DC. Accuracy class shall be 1.5.

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6.5 Control switches

All control switches shall be rotary, back connected type, having cam operated contact mechanism. The selector switch shall also have 4 positions for reading 3 phase currents and fourth position for OFF. The voltmeter selector switch shall also have 4 positions. Three shall be used to measure phase to phase voltage and fourth shall be OFF position.

Remote/trip/off selector switch for the motor feeders shall be lockable in OFF position.

6.6 Push-buttons

Push-button colors shall be as follows:

Stop/open/emergency	:	Red
Start/close	:	Green
Reset/test	:	Black

6.7 Indicating Lamps

The indicating lamps shall be low wattage and long life type with following lens colors:

On	:	Green
Stop	:	Red
Trouble	:	Yellow, amber

Failure of an indicating light shall not cause circuit breaker miss-operation so suitable protection shall be foreseen for this propose.

7.0 SHOP TESTS

Testing shall take place in manufacturer's shop.

The following inspection/tests are required as a minimum:

- a) Insulation test.
- b) Functional test.
- c) Check of equipment against requisition specifications, vendor prints.

The equipment shall be tested in the presence of the purchaser or his nominated representatives and the acceptance of the equipment will depend on the successful completion of such inspection and tests.

To permit the purchaser or his nominated representatives to be present for inspection and tests, vendor shall give adequate notice of his intention to carry out tests, or of equipment being available for inspection.

This notice shall not be less than two week before start date of inspection. In the case of tests for long duration, the actual date of commencement shall be the subject of agreement between vendor and purchaser.

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Vendor is deemed to be responsible for all subcontracted equipment and component parts.

8.0 PAINTING

The equipment shall be painted in accordance with vendor suitable preparation and application painting cycle.

Painting shall be suitable for the site conditions which will be specified in the material requisition.

One liter of paint taken from the same batch as the factory paint shall be included for touching up after installation.

Finish color shall be as what will be specified in the requisition.

9.0 SPARE PARTS, SPECIAL TOOLS AND MANUALS

All special tools and spare parts required for commissioning, start-up, and two years operation shall be provided, as well as relevant documents such as drawing, maintenance, operating and installation manuals.

The VENDOR shall submit in its offer lists of recommended spare parts for the following categories:

- Commissioning spare parts: For the commissioning of the equipment, the VENDOR shall provide a complete set of spare parts, which in his opinion and experience are necessary during this period:

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ITEM	EQUIPMENT	QUANTITIES
1	CB 2Ph & 3Ph	5%
2	bulb for Signal Lamps	50%
3	terminal	5%
4	aux. Relays & Time Relays	2%

-Two years operation spare parts: These are spares, which the VENDOR recommends shall be held in stock in order to maintain the equipment in operation for a period of 2 years normal operation after setting to work. These spares will not be available for use by the VENDOR during commissioning of the PLANT. Below table is minimum list of 2 years spare parts that should be supplied by VENDOR:

ITEM	EQUIPMENT	QUANTITIES
1	CCB	10% (Min 1 for each type/ size)
2	T	One for each type and size
3	T	1 Set
4	CB 2Ph & 3Ph	10%
5	contactor	10%
6	signal Lamp	10%
7	bulb for Signal Lamp & Alarm Windows	10%
8	terminal	10%
9	aux. Relays & Time Relays	5%
10	Main Protective Relays	One for each type
11	heater & Thermostat	1 Set
12	mmeter	One for each type and size
13	oltmeter & Selector Switch	1 Set
14	stronomical Clock	1 Set

The vendor should recommend other necessary spare parts for 2 years of Operation in his offer.

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10.0 SHIPPING

Manufacturer shall be solely responsible for the adequacy of the preparation for shipping provisions employed, with respect to materials and their application to ensure that the equipment reaches its destination in perfect working conditions when handled by commercial carrier systems.

11.0 GUARANTEES

Manufacturer of the equipment under this standard, shall certify that such equipment meet all the requirement of this standard and is of first class material and workmanship throughout.

Vendor must guaranty all the system for 2 years.

10 years after sale services shall be provided by Vendor.

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12.0 DATASHEET

Description	Requirements	Vendor Data
1. Manufacturer/Country	By Vendor	
2. Type	Metal Enclosed, Free Standing or Surface Wall Mounted (Acc. To SLD)	
3. Installation:	Indoor or Outdoor (Acc. To SLD)	
4. Execution	Fix	
5. Rated Short Current Of Busbars	According to SLD	
6. Mode of Operation	Heavy Duty	
7. Cooling	Natural	
8. Degree of Protection:	Indoor: IP42 Outdoor: IP55	
9. Access	Front	
10. Nominal Voltage	400V $\pm$ 10%	
11. Phase No.	3Ph+N+PE	
12. Rated Frequency	50Hz $\pm$ 5%	
13. Rated Voltage	1KV	
14. Power Freq. Withstand Volt. (1min)	2.5KV	
15. Impulse Withstand Voltage	8KV	
16. Rated Current	According to SLD	
17. Short Circuit Withstand Current	According to SLD	
18. Control Voltage	230V AC, Internal	
19. Control Wire Size	1.5mm ² min.	
20. Frame Material	Rigid Sheet Steel	
21. Steel Sheet Thickness:		
▪ Frame	2.5mm	

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▪ Enclosure	2mm	
22. Paint:		
▪ Type	Epoxy Powder	
▪ Thickness	60-80μm	
▪ RAL No.	RAL 7035	
23. Cable Entry:		
➤ Incoming	Bottom	
➤ Outgoing	Bottom	
24. Earth Connection Bar:		
▪ Panel	Yes	
▪ Door	Yes	
25. Cable Gland	Nickel Plated Brass, Based on SLD Requirements	
26. Earthing System	TNCS	
27. Gland Plate	Yes	
28. Cable Holder	Yes	
29. Cable Type	NY-Y-J	
30. Spare	20%	
31. Space	20%	
32. Spare Terminal	20%	
33. Door Type	With Spring-Loaded Lock	
34. Nameplates	Engraved Stainless Steel	
35. Heights of Cubicles:	1000mm, max.	
36. Overall Dimension (LxWxH mm):	By Vendor	
37. Weight of Panel (Kg):	By Vendor	
Busbar		
1. Manufacturer/Country	By Vendor	

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2. Conductors	Copper, 99.9%	
3. Coating	Tin Plated	
4. Insulation	Bare	
5. Busbar Size (mm):		
▪ Phases (3Ph)	By Vendor	
▪ Neutral (N)	Equal to Phases	
▪ Earth (PE)	By Vendor	
6. Busbar Color:		
▪ Phases (3Ph)	By Vendor	
▪ Neutral (N)	Blue	
▪ Earth (PE)	Yellow-Green	
MCCB		
1. Manufacturer/Country	By Vendor	
2. Type	By Vendor	
3. Nominal Voltage	400V	
4. Phase No.	3Ph+N	
5. Rated Current	Refer to SLD	
6. Rated Short Circuit Breaking Capacity	According to SLD	
7. Other Specifications	By Vendor	
Miniature Circuit Breaker (MCB)		
1. Manufacturer/Country	By Vendor	
2. Type	C-Curve	
3. Nominal Voltage	400V	
4. Short Circuit Breaking Capacity	According to SLD	
5. Other Specifications	By Vendor	
Contactor		

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1. Manufacturer/Country	By Vendor	
2. Type	AC1	
3. Nominal Voltage	400V	
4. Phase No.	3Ph	
5. Rated Current	Refer to SLD	
6. Coil Operating Voltage	230V AC	
7. Auxiliary Contact No.	Based on SLD Requirements	
8. Other Specifications	By Vendor	
Impulse Relay		
1. Manufacturer/Country	BY Vendor	
2. Type	By Vendor	
3. Operating Voltage	400V	
4. Coil Operating Voltage	230V AC	
5. Rated of Contact Current	16A	
6. Contacts No.	Based on SLD Requirements	
7. Other Specifications	By Vendor	
Auxiliary Relay		
1. Manufacturer/Country	BY Vendor	
2. Type	By Vendor	
3. Nominal Voltage	230V	
4. Coil Operating Voltage	230V AC	
5. Auxiliary Contacts No.	Based on SLD Requirements	
6. Other Specifications	By Vendor	
Voltmeter		
1. Manufacturer/Country	By Vendor	
2. Type	By Vendor	
3. Size	Square Case, 96x96mm	

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4. Accuracy Class	1	
5. Voltmeter Full Scale	Refer to SLD	
6. Other Specifications	By Vendor	
Ammeter		
1. Manufacturer/Country	By Vendor	
2. Type	By Vendor	
3. Size	Square Case, 96x96mm	
4. Accuracy Class	1	
5. Ammeter Full Scale:	2In Refer to SLD	
6. Other Specifications	By Vendor	
Selector Switch		
1. Manufacture/Country	By Vendor	
2. Type	By Vendor	
3. Other Specifications	By Vendor	
Fuse		
1. Manufacture/Country	By Vendor	
2. Type	By Vendor	
3. Other Specifications	By Vendor	
Push Button		
1. Manufacturer/Country	BY Vendor	
2. Type	By Vendor	
3. Nominal Voltage	230V	
4. Other Specifications	By Vendor	
Signal Lamp		
1. Manufacturer/Country	BY Vendor	
2. Type	LED	

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3. Nominal Voltage	230V	
4. Other Specifications	By Vendor	
Terminal		
1. Manufacture/Country	By Vendor	
2. Type	By Vendor	
3. Other Specifications	By Vendor	
Other Accessories		
1. Manufacture/Country	By Vendor	
2. Type	By Vendor	
3. Other Specifications	By Vendor	
Socket Outlet		
1. Manufacturer/Country	BY Vendor	
2. Type	Coverd Type	
3. Nominal Voltage	400/230V	
Earth Leakage Relay		
1. Manufacturer/Count	BY Vendor	
2. Type	BY Vendor	
3. Nominal Voltage	400/230V	
4. CT (toroidal transformer)	BY Vendor	
- Type	BY Vendor	
- Ratios	BY Vendor	
- Dimensions	BY Vendor	
5. Other Specifications	Based on SLD	
CTs requirements (Metering)		
1. Manufacturer/Country	BY Vendor	
2. Type	BY Vendor	

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3. Minimum cross section for wiring	4mm ²	
4. Burden	BY Vendor	
5. Accuracy	BY Vendor (Suggestion: Class 0.5)	
6. According to SLD	According to SLD	
7. Dimensions	BY Vendor	