



OFFSHORE
ENGINEERING
SERVICES

FUNCTIONAL
SPECIFICATION FOR
PRESSURE GAUGE

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Rev. No.	8
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FUNCTIONAL SPECIFICATION

FOR


PRESSURE GAUGE

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1.0 SCOPE OF THIS DOCUMENT:

- 1.1 This functional specification describes the essential design considerations for the selection of Pressure Gauge for the intended service.

2.0 CODES & STANDARDS:

2.1 Standards:

- a) ASME B 40 .100 – latest edition: Pressure gauges and gauge attachments
- b) EN - 837 - (Part 1, 2 & 3)- latest edition: Pressure gauges Dimensions, metrology, requirements and testing

2.2 Reference Documents:

- a) Instrumentation Design Criteria
- b) Basic Bid Work
- c) Project P & IDs
- d) Process Design Criteria / Instrument Process Data Sheets

3.0 SCOPE OF SUPPLY:


- 3.1 The quantity to be supplied and installed shall be as per the requirements indicated in the Basic Bid Work, Design Criteria and P & IDs.
- 3.2 The vendor shall be responsible for the selection of the Pressure gauge suitable for its intended application, its procurement, tagging, packing, testing & calibration, preparation for shipment, along with accessories, spares, and assistance where required for its installation & commissioning at site.

4.0 PRESSURE GAUGE:

4.1 General:

- 4.1.1 The pressure gauges shall be used for local indication. Pressure Gauge may be Field mounted or Panel mounted based on requirements.
- 4.1.2 Dial size of field mounted gauges shall not be less than 6" (150 mm). Process connection for these gauges shall be ½" NPTM with bottom entry.
- 4.1.3 Dial size of Panel Mounted Type Pressure gauges shall be of preferably 6" or 4". Process connection for these gauges shall be ½" NPTM with back entry.
- 4.1.4 For packaged items. In case of space constraints, 4" Dial size Gauge may be accepted
- 4.1.5 Instrument air/gas supply gauges for instruments like positioners, smart instruments etc, used as output gauge may have 2" (50 mm) dials.
- 4.1.6 Pressure gauges shall in general be heavy duty, weatherproof, with white colored dial with black numerals & markings and with black pointer.

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4.1.7 Position of blowout disc shall be preferably rear mounted where ever not possible, top mounted can be considered.

4.1.8 Gauges shall have external or internal zero micrometer adjustment .Gauge pointers shall be adjustable without removal from shaft.



4.1.9 Pressure gauge measuring element shall generally be Bourdon/Bellows/ Diaphragm type. Diaphragm seals shall be used for measurement of slurries, viscous and chemicals (effluent/ injection services etc.). Diaphragm seals with capillary shall in general be 1½" flanged. For corrosive fluids, in lieu of diaphragm seal, measuring element of suitable material can be considered for such services. For diaphragm seal with capillary, bleed-cum-calibration port shall be provided between the instrument-isolation valve and diaphragm seal.

4.1.10 Additionally, where damping is required for gauges, pressure gauge shall be liquid filled or any other proven (with PTR) advanced damping technology can be used (without liquid filled damping) to arrest the process fluctuations and vibrations due to installation. Glycerin / Silicone oil shall generally be used for liquid filling. Liquid filled gauges (considering both process and ambient temperature limits) shall have a small vapor space for thermal expansion of liquid fill.

4.1.11 Pressure gauge enclosure shall be weather proof to NEMA 4/ IP 65 or better. Pressure gauge shall be capable of withstanding 130% of maximum range without affecting its calibration/accuracy.

4.1.12 Gauges located on lines subjected to pulsating pressures (such as all pumps, compressors discharge service etc.) shall be provided with Snubber type pulsation dampeners.

4.1.13 Gauge savers shall be provided wherever specified to prevent the gauge when maximum working pressure exceeds 130% of range. Gauges in vacuum service shall have over range protection to full vacuum. A visible Stop Pin shall be used to restrict the upper limit of the pointer travel.



4.1.14 Mandatory spare instruments shall be provided as 10% minimum or 1 (one), whichever is more of each type and range.


4.1.15 Mandatory associated accessories (i.e., snubber, gauge saver, siphon etc.) shall be provided as 10% minimum or 1 (one), whichever is more for the total quantity installed.


4.2 Material:

4.2.1 Material requirements for pressure gauges shall in general be according to Annexure –II: Material selection chart and clause 3.6.4.5 of Instrumentation Design Criteria.

4.2.2 Process connections and ‘Material of construction’ of all wetted parts shall be compatible with the process fluid however it shall be SS 316 minimum.

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<p>4.2.3 Material for Pointer shall be SS 316 or Aluminium. Movement material for liquid filled gauges can be SS 316 or SS 304. For gauges with other proven technology (without liquid filled damping), movement material shall be SS 316.</p> <p>4.2.4 Case material for all pressure gauges shall be SS 316 with a screwed bezel / bayonet bezel retaining ring and weatherproof design.</p> <p>4.2.5 Window material shall be of Shatter-proof glass or ‘fully transparent’ acrylic plastic.</p> <p>4.2.6 Gauge saver, snubber (whenever used) and manifold shall be of the same material as that of the pressure element.</p> <p>4.3 Range:</p> <p>4.3.1 Range shall be selected such that the normal operating pressure lies approximately in the middle third of full scale.</p> <p>4.4 Accuracy:</p> <p>4.4.1 Accuracy shall be +/- 1 % of the span or better. However for 0-1 Kg/cm²g (pressure range) accuracy shall be ±1.6% of FSD or better.</p> <p>4.4.2 Change in process conditions shall not affect the accuracy of gauge.</p> <p>4.5 Testing & Inspection as per ASME B 40 .100:</p> <p>4.5.1 Test Requirement of Pressure Gauges according to EN 837-1 & 3: 1996:-</p> <ul style="list-style-type: none">1. Leak Test2. Accuracy and Hysteresis3. Influence of Mounting Position4. Temperature Effects5. Temperature in Service6. Storage Temperature7. Degree of Protection8. Endurance – Steady Pressure, over-pressure & cyclic pressure9. Effects of Mechanical Vibration10. Effects of Mechanical shock11. For safety pattern Gauges: Blowout test & Energy release test <p>4.5.2 Inspection /Acceptance Test at Factory / Manufacturer Premises for pressure Gauge:-</p> <ul style="list-style-type: none">1. Visual Inspection2. Dimensional Verification3. Accuracy4. Leak Test5. Degree of Protection <p>4.5.3 Tests indicated in (4.5.1) but not covered in Inspection/Acceptance Test (4.5.2) for Pressure Gauge are to be covered in Type Test. However, Accuracy & Hysteresis test shall be included in Type Tests. The type test requirement will be</p>				
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for each model and range. The type tests are to be witnessed by DNV/LLOYDS/BV/TUV/NABL/Govt. Laboratory etc. Valid type test certificate shall be provided along-with the supply.

4.5.4 Each type test certificate should indicate its validity period (Normally 5 years). The same has to be seen at the time of delivery/supply.

4.5.5 Inspection/Acceptance Test shall be as per company provided IRT.

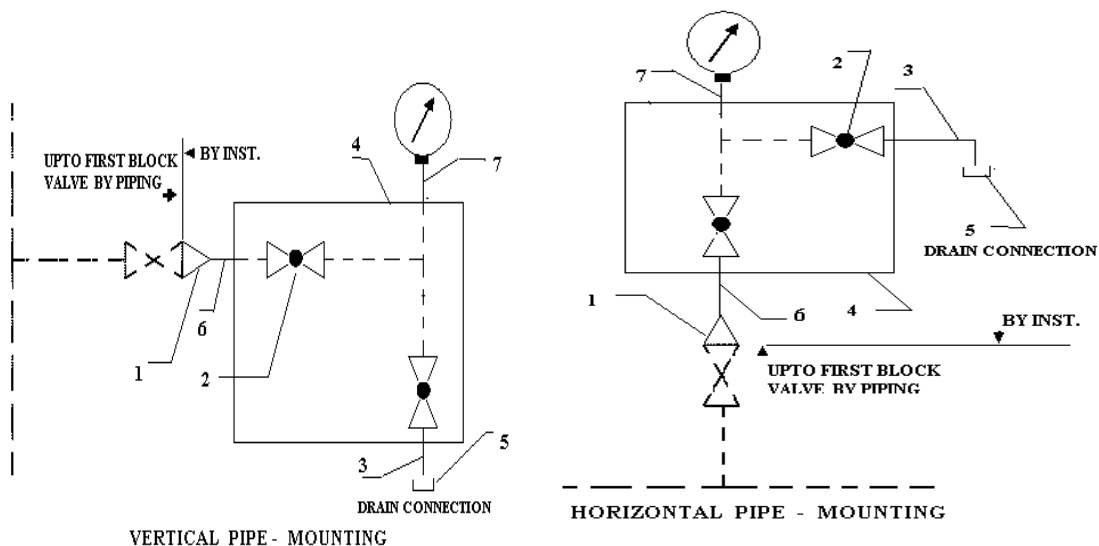
4.6 Reading Scales:

4.6.1 Indicating scale shall be direct reading type. Reading Scale used for 2" dial size gauges shall be 'PSI' and for other dial size gauges, it shall be Kg/cm²g unless otherwise specified in bid documents.

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ANNEXURE – I

(Hook Up Drawing)



Note: For Sour Gas service drain valve shall be ball valve and drain connection shall be connected to closed drain.

BILL OF MATERIAL

ITEM NO	QUANTITY	DESCRIPTION	SIZE
1	1	SWAGE NIPPLE , PL x TH	¾ " X ½ " NPTM
2	2	NEEDLE VALVE , SCRWD	½ " NPT
3	1	PIPE NIPPLE	½ " NPTM
4	1	3-WAY ,2-VALVE MANIFOLD	
5	1	CAP	½" NPTF
6 & 7	2	MALE CONNECTOR	½" NPT
		TUBINGS	½" NPTM


ANNEXURE – II
Material Selection Chart for Pressure Gauges



S. No.	Piping Class	Element Material
1.	A1, B1, D1, E1, F1, XF1, F1, PA1, PB1, PD1, PE1, PXF1, PF1, A2, B2, D2, E2, XG1, A1H, A3 (above 2"), B3 (above 2"), A4, A8	SS316/ SS PH17/4
2.	A3 (upto2"), B3(upto2"), D3 (upto2"), A6, A9, B9, D9, E9	SS316
3.	A5	MONEL
4.	A12	Titanium
5.	A1N, B1N, D1N, E1N, F1N, XF1N, PA1N, PB1N, PD1N, PF1N, XG1N	SS316/ SS316L (NACE)
6.	A10, B10, D10, E10, F10, A22	SS316L (NACE)
7.	A23, B23, D23, E23, F23, PA23, PB23, PD23, PE23, PF23	DUPLEX SS (UNS-32205)
8.	-----	Hastalloy-C

For Sour service applications, MOC shall be compliant to NACE MR-01 75 requirements.

ANNEXURE – III
TYPICAL DATA SHEET – PRESSURE GAUGE

PRESSURE GAUGES								
UNITS :- Flow Liquid – M3/HR Gas – NM3/HR Pressure – kg/cm2g Temperature – deg C Level/length -M								
1	Type			16	Diaphragm Seal (wherever required)			
2	Mounting			a)	Type			
3	Dial Size/Colour			b)	Wetted Parts			
4	Case Material			c)	Other Material			
5	Bezel Ring			d)	Process Connection			
6	Window Material			e)	Facing & Finish			
7	Enclosure Class			f)	Capillary Material			
8	Pressure Element			g)	Armour type			
9	Element Material			h)	Armour Material			
10	Socket Material			i)	Capillary Length			
11	Accuracy			j)	Flushing Filling Conn.			
12	Zero Adjustment			17	Over range protection			
13	Connection & Location			18	Blow out protection			
14	Movement			19	Options			
15	Manifold :			a)	Snubber			
a)	Make			b)	Siphon			
b)	Model			c)	Gauge saver			
c)	Material			d)	Liquid filled casing			
				e)	Vacuum protection			
				f)	Space ring			
				g)	Solid front			
				h)	SS tag plate			
				i)	2 valve manifold			
<div style="text-align: right;">  </div>								
TAG No.	RANGE	OPER. PRESSURE	MAX. SERVICE TEMP.	OPER. TEMP	MAX. SERVICE TEMP.	FLUID	SERVICE	OPTIONS
NOTE:-								
VENDOR SEAL AND SIGNATURE								