1. Specification of Smart Absolute Pressure Transmitter:

Sl. No.	Parameters	Specification
1	Type	SMART Absolute Pressure Transmitter
2	Measurement Range	As per Table 1.Max URL of transmitter should be <=8 times the span specified in table 1 for each transmitter
3	Service Medium	As per Table 1
4	Maximum Turndown Ratio (TD)	100:1
5	Output	Two wire 4–20 mA with superimposed Digital communication HART protocol.
6	Power Supply	12 to 30 V DC.
7	Local Indication	min 4½ digits LCD – Local Alpha Numeric Digital display in Engineering units.
8	Hazardous Area Certification	Both Intrinsically safe and Explosion proof suitable for use in Hydrogen atmosphere. (CENLEC / CSA / FM / ATEX or any equivalent approval).
9	Safety Integrity Level Standard (SIL)	Safety Instrumented System Certification as per IEC 61508 standard, SIL 2 and above.
10	Zero & Span Adjustments	Zero and Span are to be adjusted from the Handheld HART Communicator and provision for local adjustment to be set anywhere within the range limits.
11	Failure mode alarms	High alarm ≥ 21.0 mA
		Low Alarm ≤ 3.6 mA
12	Accuracy @ Selected	≤± 0.09 % of Calibrated span

	measurement range(Refer Table 1)	(including the effect of Terminal - Based linearity, hysteresis & repeatability).
13	Ambient Temperature Effect for 28°C variation @ Selected measurement range(Refer Table 1)	≤ ± 0.4 % of span
14	Stability	≤± 0.2 % of URL for 10 years
15	Power Supply Effect	≤± 0.005 % of Calibrated Span per Volt.
16	Nominal Operating Temperature	15 – 70°C
17	Total Response time	≤ 150 millisecond
18	Wetted Material	As per Table 2
19	Fill Fluid	As per Table 2
20	Transient/Lightening Protection	To be provided as per IEEE C62.41, category B – 3kA Crest (8/20microseconds) Applicable standards: IEC61000-4-4, IEC61000-4-5.
21	Electrical Connection	½ " – 14 NPT (F) with SS plug for dust proof.
22	Transmitter Process connection	½ " – 14 NPT (F) or suitable for the quoted manifold
23	Housing Material	Polyurethene covered aluminum with ½-14 NPT conduit entry.
24	External Grounding screw assembly on transmitter body	Required
25	Mounting Bracket	Stainless Steel Bracket with SS fasteners, bolts, nuts, washers and U- clamps suitable for 2 inch pipe mounting.
26	Calibration	Calibration shall be carried out at room

		temperature in 5 steps ascending and 5 steps descending. Calibration certificate is to be provided. Calibration shall be traceable to National Standards.
27	Manifold	2-way valve manifold to be provided; Make: Same Transmitter manufacturer's manifold or Parker/Swagelok/DKlok (Detailed Manifold specs is provided in the next sub-heading)
28	Over Pressure Limit	Over pressure limit of selected transmitters shall be 1.5 times of URL (Upper range Limit).

Table – 1 Range, Medium & Quantity for Absolute pressure transmitter

Sl.No.	Item	Range	Medium	Quantity
1	Absolute Pressure transmitter with 2 –way valve manifold	0 to 1.54 MPa	LH2/GH2 (Liquid or gas Hydrogen)	11
2		0 to 2.2 MPa	LOX(Liquid Oxygen)	3
3		0 to 34.1MPa	LH2/GH2 (Liquid or gas Hydrogen)	2
4		0 to 0.11MPa	LOX(Liquid Oxygen)	1
6		0 to 9.35MPa	LN2/GN2 (Liquid or gas Nitrogen)	1
7		0 to 4MPa	DM Water	6
		0 to 1.54MPa	LOX(Liquid Oxygen)	2
8		0 to 1.54 MPa	LN2/GN2 (Liquid or gas Nitrogen)	1
9		0 to 2.75MPa	LN2/GN2 (Liquid or gas Nitrogen)	2
			TOTAL	**29**

Table –2 wetted material & fill fluid

Sl. No.	Medium	Fill fluid	Diaphragm material	Flange & Adapter material	O-Ring Material	Special Cleaning	Electrical Housing	Calibration fluid
1	LOX / GO2	Inert Fill(Kryotx)	316L SS	316 SS	PTFE	Oxygen Cleaning required	Certified for EEx ia IIC , T6	GN2
2	GH2/LH2	Inert Fill(Kryotx)	Gold plated 316L SS	316 SS	PTFE	Oxygen Cleaning required	Certified for EEx ia IIC , T6	GN2
3	LN2/GN2	Inert Fill(Kryotx)	316L SS	316 SS	PTFE	Oxygen Cleaning required	Certified for EEx ia IIC , T6	GN2
4	Water/DM water/ Isrosene / hot gases	Silicone Oil	316L SS	316 SS	PTFE	Oxygen Cleaning required	Certified for EEx ia IIC , T6	GN2

2. Specification of 2 Valve Manifold:

Sl.No.	Parameters	Specification
1	Type	2 valve manifold
2	Material	LH2, LOX, GH2, GO2, GN2, GHe, Water, Kerosene : 316SS
3	Packing material	PTFE
4	Seat type	Integral
5	Instrument Connection	Suitable for quoted transmitter interface
6	Process connection	½ inch-14 NPTF
7	Maximum Operating Pressure	680 bar manifold for all Transmitters
8	Operating Temperature	15 to 50 Deg C
9	Hydro Testing	To be carried out at 1.5 times the maximum operating pressure for all the manifolds and certificate to be provided
10	Material Test certificate	To be provided
11	Mounting Bolts	To be supplied with SS material.
12	Oxygen cleaning	Required for all transmitters