Dt: 18.06.2019

UDANGUDI STPP (2X660 MW)

TENDER SPECIFICATION FOR INSTRUMENTATION

- 2-valve manifold shall be provided for pressure gauge (PG) & Pressure transmitter (PT) (to block the process from instrument and vent/bleed trapped fluid pressure). 5-Valve manifold shall be provided for Differential pressure gauge (DPG), Differential pressure transmitter (DPT) & Flow transmitter (DP Based) (two block valve for isolating the instrument, one equalizing valve, two vent valve to vent trapped pressure or to connect to test pressure for calibration). The same shall be indicated in the P&ID submitted by vendor.
- Valve manifolds (integral type) shall be fully compatible with offered transmitters attaching directly to the transmitter, eliminating the need for a flange and allowing instrument isolation, controlled venting and added protection from leaking to ensure measurement integrity. Manifold material: SS-316
- Pressure snubber shall be provided for pressure gauges to suppress the effect of pressure pulses. Body material: stainless steel.
- Pressure gauges shall confine to accuracy class 1.0 or better as per EN 837-1. Hysteresis error, temperature effect & endurance shall be as per EN 837-1. Over pressure protection shall not be lesser than 125% of max. scale value.
- All transmitters shall be of the SMART-type. This applies also to field mounted temperature transmitters. 2-wire transmitters shall be used and shall have an impressed output signal of 4-20 mA corresponding to zero to full range input.
- All transmitters shall be fitted with a local analog indicator displaying appropriate physical units which may be read clearly from an easily accessible position.
- Every panel-mounted instrument requiring power supply shall be provided with easily replaceable glass cartridge fuses of suitable rating.
- Every instrument shall be provided with a grounding terminal and shall be suitably connected to the panel grounding bus.
- All transmitters shall be with protection class IP 67 suitable for field installation and shall have strong, moisture and dustproof cases.
- Lube oil pump shall be screw type unless otherwise specified.

- Gas actuated thermometers are to be used for local temperature measurement. Accuracy class 1 as per EN13190 to be considered. Material (Capillary, case & bulb): Stainless steel. Thermometers shall be fitted in protective wells and shall be provided with weatherproof terminal heads and shall be installed so as to totally prevent the ingress of foreign matter.
- All motors must be designed to meet IP 55 enclosure. Continuous duty LT motors upto 200 KW Output rating (at 50 deg.C ambient temperature), shall be Premium Efficiency class-IE3, conforming to IS 12615, or IEC:60034-30.
- All field equipment including local instruments, valves, actuators, junction boxes and cabinets shall have nameplates with the instrument tag number and descriptor in English language. The nameplates shall be fixed to the mounting plate, the mounting brackets or junction box. Loosely attached nameplates by wires are not acceptable. Label material and writing shall be selected to withstand the environmental conditions where they are mounted.

  Ex: Unit-1: Fan-A: **01HLB10 CT026**; Fan-B: **01HLB20CT026**

  Unit-2: Fan-A: **02HLB10 CT026**; Fan-B: **02HLB20CT026**
- All instrumentation shall be mounted inside the skid. If not vendor shall provide weather proof, ant-static, impact resistant, fire retardant instrument enclosure with protection class IP66 and corrosion resistant stainless steel fittings.
- Oil cooler & Oil filter shall be provided with air vent, drain line & valve operated equalization line between main & standby equipment.

SPECIFICATION FOR PRESSURE GAUGE, D.P GAUGE, TEMPERATURE AND LEVEL GAUGE

Sl. No.	Features	Essential minimum requirements		
		Pr. Gauge/DP Gauge/Draught gauges	**Temperature gauge**	**Level Gauge**
1	Sensing Element and Material	Bourdon for high pressure, Diaphragm/ Bellow for Low pr. Of SS 316	Inert gas filled expansion system	Tempered toughened Borosilicate gauge glass steel armoured reflex or transparent type.
2	Body Material	Die Cast aluminum with stoved enamel black finish/SS316	Die Cast aluminum with stoved enamel black finish/SS316	Forged carbon steel/SS 304
3	Dial Size	150 mm with toughened shatter proof glass	150 mm with toughened shatter proof glass	Tubular covering entire range
4	End Connection	½ inch NPT (M)	½ inch NPT (M)	Process connection as per ASME PTC and drain/vent 15 NB
5	Accuracy	+/- 1% span	+/- 1% span	+/- 2%
6	Scale	Black letters on white background, Linear, 270° arc graduated in metric units	Black letters on white background, Linear, 270° arc graduated in °C	Linear vertical
7	Range Selection	Cover 125% of max. of scale	Cover 125% of max. of scale	Cover 125% of max. of scale
8	Over range protection	150 % of FSD		
9	Housing	Weather and dust proof as per IP-65	Weather and dust proof as per IP-65	CS/304 SS leak proof.
10	Zero/span Adjustment	Provided	Provided	-
11	Identification	Engraved with service legend or laminated phenolic name plate		
12	Accessories	Snubber or pulsation dampener, glycerine filled, gauge isolation valve & manifold as mentioned before	SS316 Thermowell	Gasket for all KEL-F shield for transparent type vent and drain valves of steel/SS as per CS/ alloy process requirement.
13	Material of Bourdon/ movement	SS 316	SS 316	

SPECIFICATION FOR ELECTRONIC TRANSMITTER FOR PRESSURE, DIFF PRESS AND DP BASED FLOW MEASUREMENTS:

S.No	Features	Essential / Minimum Requirements
1	Type of Transmitter	Microprocessor based 2 wire type (loop powered), Hart protocol compatible
2	Accuracy	± 0.065% of calibrated span (or better)
3	Protection class	IP67
4	Output signal range	4-20 mA DC (Analog) along with superimposed digital signal (based on HART protocol)
5	Turn down ratio (minimum)	100:1
6	Repeatability	± 0.05% of calibrated span or better
7	Zero and span drift	+/- 0.015% per deg.C at max span +/-0.11% per deg.C at min. Span
8	Load impedance	750 ohm (minimum) at 24 volts D.C.
9	Housing, diaphragm & enclosure	Weather proof as per IP-67, metallic housing with durable corrosion resistant coating
10	Wetted part	SS316
11	Over Pressure	150% of max. Operating pressure
12	Connection (Elect)	Plug and socket type
13	Process connection	1/2 inch NPT (F)
14	Span and Zero	Continuous, tamper proof, Remote as well as manual adjustability from instrument with zero suppression and elevation facility.
15	Accessories	• Diaphragm seal, pulsation dampeners, syphon etc. as required by service and operating condition. • 2 valve manifold for absolute & Gauge pressure transmitters, 5 valve manifold for DP/Flow applications. The valve manifold shall be integral type. • Mounting: 2 inch pipe
16	Diagnostics & display	Self-Indicating feature and digital display on transmitter
17	Power supply	24V DC ± 10%.
18	Adjustment/ calibration/ maintenance	From hand held HART calibrator/ centralized PC based system (as applicable).

Guided Wave Radar Type Level Transmitter:

S.No	Features	Essential / Minimum Requirements
1	Type of Transmitter	Guided wave radar type, Probe: co-axial (SS-316), Microprocessor based 2 wire type (loop powered), HART protocol.
2	Output signal	4-20 mA DC (Analog) along with superimposed digital signal (based on HART protocol).
3	Accuracy	+/- 0.3% of calibrated span or min. 3 mm.
4	Temperature compensation	Automatic
5	Ingress Protection Class	IP67 or better
6	Power supply	24 V DC +/- 10%.
7	Housing	Weather proof as per IP-67, metallic housing (Aluminium) with durable corrosion resistance coating.
8	Adjustment/calibration/ maintenance	Using hand held HART calibrator
9	Zero and Span adjustment	Continuous, tamper proof, remote as well as manual adjustability from instrument. It should be possible to calibrate the instrument without any level in the tank/sump etc.
10	Sensor & Wetted part Material	corrosion resistant material to suit requirement (PVDF)
11	False signal tolerance	Transmitter shall be capable of ignoring false echoes from internal tank/sumps obstructions such as pipes, heating coils or agitator blades. Also transmitter shall have adjustable damping circuitry.
12	Range	Range of transmitter shall be capable of covering the complete level span of tank taking care of blocking distance, frequency attenuation due to surface, obstructions, vapors etc.
13	Display	Integral digital display
14	Accessories	All weather canopy shall be provided for protection from direct sunlight and direct rain for open locations.
15	Process connection	traditional flange with ¼" – 18 NPT on flange with process adapters (Flange & drain vent- 316SST)

Resistance Temperature Detector (RTD):

S.No	Features	Essential / Minimum Requirements
1	Type of RTD.	Four wire, Pt-100 (100 Ohms resistance at zero degree Centigrade)
2	No. of element/ Class	Duplex/ IP-66 (Min)
3	Housing/Head	SS. Head shall be spring loaded for positive contacts with the thermo well
4	Elements	Mineral insulation, SS316 sheath, hermetically sealed leads.
5	Calibration and accuracy	As per IEC-751/ DIN-43760 Class-A for RTD
6	Thermowell	Shall be one-piece solid bored type of 316 SS of step-less tapered design. (As per ASME PTC 19.3)
7	Accessories	Thermo well and associated fittings.
8	Standard	IEC-751/ DIN-43760 for RTD and ASME PTC-19.3 for Thermo-well.

SPECIFICATION OF INSTRUMENTATION CABLE:

S.No	Features	Essential / Minimum Requirements
1	Codes and standard	All instrumentation cables shall comply with VDE 0815, VDE 0207, Part 4, Part 5, Part 6, VDE 0816, VDE 0472, SEN 4241475, ANSI MC 96.1, IS-8784, IS-10810 (latest editions) and their amendments read along with this specification.
2	Colour code	As per VDE-815
3	Conductor Grade	Electrolytic
4	Conductor material	Annealed bare copper
5	Cross section area	0.5 sq. mm
6	No & dia of strands	7x0.3 mm (nom)
7	Insulation Material	Extruded PVC type YI 3
8	Type of shielding	Al-Mylar tape

INSTRUMENTATION CABLE INTERCONNECTION AND TERMINATION PHILOSOPHY:

Application		Type of Termination	
FROM (A)	**TO (B)**	**END A**	**END B**
RTD	Temperature transmitter	Plug in connector	Screwed, Cage clamp type
Field Mounted Instrument	Local JB	Plug in connector	Cage clamp (Rail mount type)

FIELD MOUNTED LOCAL JUNCTION BOXES

S.No	Features	Essential / Minimum Requirements
1	No. of ways	12/24/36/48/64/72/96/128 with 20% spares terminals
2	Material and Thickness	4mm thick Fiberglass Reinforced Polyester (FRP).
3	Type	Screwed at all four corners for door. Door gasket shall be of synthetic rubber.
4	Mounting clamps and accessories	Suitable for mounting on walls, columns, structures etc. The brackets, bolts, nuts, screws, glands required for erection shall be of SS, included in Bidders scope of supply.
5	Type of terminal blocks	Rail mounted cage-clamp type suitable for conductor size upto 2.5 mm2. A M6 earthing stud shall be provided
6	Protection Class	IP-65 (min)
7	Color	RAL 7035

OTHER REQUIREMENTS TO BE MET:

- Vendor shall consider the below parameters for cooler design:
  - Operating pressure (water): 3-5 bar
  - Design Pressure (water): 10 bar
  - Inlet temperature (water): 38 deg.C.
  - Operating pressure (oil): 5 bar
  - Oil inlet: 60 deg.C.
  - Oil outlet: 45 deg.C.
  - Oil Type: ISO VG 68 (Sp.gr = 0.87 kg/L) (Specific heat Cp = 0.5 kcal/kg^{o}C)
  - Oil flow rate: Refer throttle valve set point in bearing lubrication line in lube oil scheme.
  - Vendor shall consider flow margin more than 2 times if oil flow rate is < 10 lpm in bearing lubrication line and flow margin more than 1.5 times if oil flow rate is > 10 lpm in bearing lubrication line.

  Based on the above parameters vendor shall size the cooler and submit thermal calculation for Cooler including heat load, LMTD & heat transfer area along with water flow rate required.

- Vendor shall submit below mentioned data sheets for all LOS instrumentation & equipment, GA Drgs for instrumentation & equipment during order execution stage:
  1. Duplex Oil Cooler (including thermal calculation for heat load, LMTD & heat transfer area).
  2. Oil Filter.
  3. Oil Pump.
  4. Motor.
  5. Oil Tank heater.
  6. Level gauge.
  7. Level Transmitter.
  8. Pressure gauge.
  9. Pressure transmitter.
  10. Differential pressure gauge.
  11. Differential pressure transmitter.
  12. Temperature gauge.
  13. Temperature sensing element (RTD).
  14. Flow indicator cum transmitter.
  15. 2-Way valve manifold. (PG, PT)
  16. 5-way valve manifold (DPG, DPT, FT-DP based)

Note:

Vendor shall confirm all the above mentioned specification requirements. Any deviation from the above requirements shall be mentioned by the vendor during enquiry.