

**2X660 MW SURATGARH STPS, STAGE-V / MISC PUMPS (VERTICAL)**

Ref No. : PE/PG/SG5/E-4264/13

Date: 15.01.2014

**CORRIGENDA / ADDENDA-3**

**Tender Enquiry no.: PE/PG/SG5/E-4264/13**

**Date: 16.12.2013**

All bidders are requested to note the following points regarding subject tender:

1. IE2 LT motors are acceptable, with starting current variation same as for IE3 LT motors.
2. With reference to Cl. No. 4.0 of Sec C1, Vol II B of technical specification, following was indicated:  
"For all HT Motor driven pumps, Pump bearing temperature measurement instruments shall be provided by purchaser. However, Provision for mounting/ Installation of these bearing measurement instruments on the pump shall be provided by the bidder. "

Above clause stands amended as under:

'For all HT Motor driven pumps, Pump bearing temperature measurement instruments (RTD) along with provision for mounting/ Installation of RTDs on the pump shall be in vendor scope.'" The Technical Specification for RTDs are attached.

**Bidders are requested to quote the subject tender accordingly.**

With Regards,  
For & on behalf of BHEL



Rohit Juneja  
ENGINEER/PG-II-1

Please reply to:

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SPEC.NO. TCE.5750A-H-500-001	<b>TATA CONSULTING ENGINEERS LIMITED</b>	VOLUME V SECTION : D5.4
Package: EPC	<b>RRVUNL, 2 x 660 MW, Super-Critical TPS, Stage-V, Unit # 7 &amp; 8 at Suratgarh, Rajasthan</b> <b>INSTRUMENTATION AND CONTROL EQUIPMENT</b> SPECIFICATION FOR INSTRUMENTATION & CONTROL EQUIPMENT	SHEET 2 OF 42

1.4 Thermometers

Bimetallic below 80 deg.C. and inert gas actuated for above 80 deg.C. of SS bulb and capillary. Body material-Die-cast aluminium. Dial size-150 mm with white dial and black numerals and process connection-1/2"NPT (F). Accuracy+/- 1% of span. IP 65 protection class. Accessories include nameplate, mounting brackets and SS Thermo well. Process connection- M33 x 2 thread /1" Socket welded/ 1" flanged.

1.5 Thermo wells

Pipe/equipment mounted temperature test wells of 316 SS with a process connection of M33x2 thread /1" socket welded/ 1" flanged. Accessories like name plate, plug with chain, etc. shall be provided. Material of accessories shall be SS. Thermowell shall be hex head of barstock assembly. In case flanged wells are required for any specific application, the same shall be supplied as required. The thermo well construction shall meet the ANSI 19.3 (latest) requirements. Thermo well shall be designed such that the resonant frequency is above the exciting frequencies generated by vortex shedding in the process fluid. All Test thermo well shall have the plug of SS316.

1.6 Thermocouple Assembly

Duplex, K – Type, 16 AWG or R type, 24 AWG with accuracy as per ANSI-C-96.1/IEC 60584, ungrounded type depending on operating temperature range. Response time of 2 to 6 sec, Spring loaded mineral insulated thermocouple assembly with 316 SS thermo well housed aluminium casing (epoxy coated) having a process connection of M33 x 2 thread / 1" Socket welded. Material of accessories (name plate, etc.) shall be SS. IP 65 or equivalent degree of protection for enclosure. Thermo well with hex head (with screwed cover & SS chain) bar stock assembly with ungrounded junction. For metal temperature measurement, thermocouple pads weldable to M.S pipes shall be provided with 15 m thermocouple extension wires. Element size shall be 18 AWG. Insulation resistance at 540 Deg C shall not be less than 5 M ohms. Temperature devices provided with thermo wells shall be calibrated with the associated thermo well as an assembly. The thermo well construction shall meet the ANSI 19.3 (latest) requirements. All pent house thermocouples shall be supplied with 15mts flexible extension length.

1.7 Resistance Temperature Detectors (RTD)

Duplex type, PT – 100, with accuracy of +/-0.5% of span as per IEC-60751, response time 1-2 seconds; Spring loaded mineral insulated three(3) wire RTD assembly with 316 SS Thermo well housed in aluminium casing (epoxy coated) having a process connection of M33 x 2 thread /1" Socket welded/ 1" flanged. IP 65 or equivalent degree of protection for enclosure. Material of accessories (name plate, etc.) shall be SS. Thermo well with hex head with screwed cover & SS chain, barstock assembly. Element lead size shall be 18 AWG. The insulation resistance at 540 Deg C shall not be less

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than 5M ohms. Repeatability over full range shall be better than 0.02%. RTDs shall be ungrounded. RTD shall be supplied as an assembly complete with thermo wells meeting ANSI 19.3 (latest) requirements.

#### 1.8 ~~Level Gauges~~

~~Tubular type level gauges for low pressure upto 7 kg /sq.cm & reflex type for high pressure water & steam services & vacuum services with automatic ball check valves, illuminator (240 AC), pyrex/ tempered toughened borosilicate glass, mica shield, brass guard rods & brass holders. Body material: Forged carbon steel/304SS. Accuracy- +/- 2% with vertical scale. Material of accessories (name plate, etc.) shall be SS. Tubular glass OD shall be 5/8". Vent & drain valves shall be provided. Connection shall be screwed or flanged (ANSI class 150 RF).~~

#### 1.9 ~~Level Switches~~

~~External cage magnetic float operated level switches for tanks and vessels and top mounted level switches for sumps and underground tanks. The top mounted level switches shall be supplied with still tubes to suit the requirement. Micro switch with 2 SPDT contacts rated for 0.2 A, 220 V DC. Material of float & float chord shall be 316 SS & cage material shall be fabricated steel and the material of accessories shall be SS. IP65 or equivalent degree of protection for enclosure.~~

~~Accessories like name plate, drain valve for external case type level switches, mating flange, gaskets (asbestos), fasteners, bolts & nuts, etc. shall be supplied.~~

~~Conductivity type electronic Probe type level switches shall be supplied for Drain pots. The required pressure vessel assembly for mounting probes are included in the scope.~~

#### 1.10 ~~Level Transmitter~~

~~Ultrasonic type level transmitters top mounted with integral local LCD indicator, IP-65 protection; 2 wire type transmitter with 4-20mA output with HART protocol; Accuracy  $\pm 0.25\%$ ; Resolution 1mm; Repeatability  $\pm 0.1\%$ ; Linearity  $\pm 1\%$ ; Response time 150ms; Beam angle  $< 12^\circ$ ; Auto false echo-suppression; Accessories like integral cable between sensor and transmitter unit with connectors on both side, gasket and cable gland, digital panel meter, name plate & metal tag; the material of accessories will be SS.~~

~~Radar type level transmitters top mounted with LCD indicator, IP-65 protection; 2 wire type transmitter with 4-20mA output with HART protocol; Accuracy  $\pm 1\%$ ; Resolution 1mm; Repeatability  $\pm 1$  mm; Linearity  $\pm 0.01\%$ ; Beam angle  $< 20^\circ$ ; Accessories like integral cable between sensor and transmitter unit with connectors on both side, gasket and cable gland, digital panel meter, name plate & metal tag; the material of accessories will be SS.~~

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SPEC.NO. TCE.5750A-H-500-001	<b>TATA CONSULTING ENGINEERS LIMITED</b>	VOLUME V SECTION : TABLE14
Package: EPC	<b>RRVUNL, 2 x 660 MW, Super-Critical TPS, Stage-V, Unit # 7 &amp; 8 at Suratgarh, Rajasthan</b> <b>INSTRUMENTATION AND CONTROL EQUIPMENT</b> <b>TESTS</b>	SHEET 1 OF 13

**PART-A: TESTS FOR I&C EQUIPMENT**

SL. NO	INSTRUMENT / EQUIPMENT	TESTS TO BE CONDUCTED
1.	Pressure indicators	Calibration Hydro test (1.5 times max. Pr.)
2.	Pressure switches	Calibration test /Hydro test/Contact rating test/ Accuracy test / Repeatability Test
3.	Pressure Transmitters	Calibration test /Hydro test/Leak test/Over range test / Accuracy test /Repeatability test.
4.	Differential Pressure Indicators	Calibration test /Hydro test/Leak test/Over range test / Accuracy test/Repeatability test.
5.	Differential Pressure Switches	Calibration test /Hydro test/Leak test/Over range test/ Accuracy test/Repeatability test.
6.	Differential Pressure Transmitters	Calibration test /Hydro test/Leak test/Over range test/ Accuracy test/Repeatability test.
7.	Thermometers	Calibration test /Material test//Accuracy test/Bore concentricity : $\pm 5\%$ of wall thick/Hydrostatic test for TW (1.5 times max. pr.).
8.	Temperature switch	Calibration test/Material test//Accuracy test/Bore concentricity : $1.5\%$ of wall thick/Hydrostatic test for TW (1.5 times max. pr.)/Contact rating test.
9.	Resistance temperature detector assembly	Calibration/Material test/Accuracy test/Bore concentricity test/Insulation test (<500 M at 500 V, DC) as per ISA, Hydro test for TW.(1.5 times max. pr.). Bore concentricity : $\pm 5\%$ of wall thick, Accuracy test
10.	Thermocouple assembly	Calibration/Material test/Insulation test (<500 at 500 V, DC) as per ISA, Hydro static test for TW.(1.5 times max. pr.) More concentricity $\pm 5\%$ of wall thick
11.	Temperature transmitters	Calibration test/Accuracy test/Ambient temperature error test
12.	Thermowells	Material test /Bore concentricity : $\pm 5\%$ of wall thick/ Hydrostatic test for TW (1.5 times max.pr)

ISSUE  
R1





**STANDARD QUALITY PLAN  
FOR  
RESISTANCE TEMPERATURE DETECTOR WITH THERMOWELL**

QUALITY PLAN NO.: <b>PE-QP-999-145-I025</b>	
VOLUME	IIB
SECTION	D
REV. NO.	01
DATE:	21.03.2012
SHEET	2 OF 2

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency <sup>§</sup>			Remarks		
									P	W	V			
<b>2.0</b>	<b>Final Inspection</b>													
2.1	RTD Assembly	1. Workmanship 2. Marking 3. Dimensions	MA MA MA	Visual Visual Measurement	100% 100% 100%	Approved drg. / data sheet	Approved drg. / data sheet	Inspection Report	2	----	1▲			
											2		----	1▲
											2		----	1▲
2.2	Routine Tests	1. Calibration (Resis Vs. Temp.) 2. Insulation Resistance 3. Thermal Response time	CR MA CR	Measurement Electrical Measurement	100% 100% One Sample from each type	IS:2848 IS:2848 IS:2848	IS:2848 IS:2848 IS:2848	Test Report Test Report Test Certificate	2 2 2	2 1 1	1 --- ---			
2.3	Type Test	Enclosure protection test	CR	Verification	Each type	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	3/2	----	1*		*Type Test Certificate (not more than 5 year old) to be verified	
3.0	Packing	Soundness of packing	MA	Visual	100%	Mfd std.	Mfd std.	Inspection Report	3/2	2	---		Visual	

<b>LEGEND:</b> * CR - Critical characteristics MA - Major characteristics MI - Minor characteristics; Mfd std - Manufacturers' standard	<sup>§</sup> P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.	1 - BHEL 2 - Vendor 3 - Sub-vendor
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