

**1 x 525 MW TUTICORN TPS, STAGE-IV (UNIT-1)
THOOTHUKUDI, TAMILNADU**

**TECHNICAL SPECIFICATION
FOR
AUXILIARY STEAM PRESSURE REDUCING
AND DESUPERHEATING STATION
ALONGWITH ACCESSORIES**

SPECIFICATION No: PE-TS -422-142-N101



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA, INDIA**

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-422-142-N101	
		SECTION	CONTENTS (I & II)
		REV. NO.	00
		DATE	27.12.16

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SCOPE OF ENQUIRY



**TECHNICAL SPECIFICATION FOR
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- 1.1 This enquiry covers the Design, Manufacture, Assembly, Inspection and Testing at Vendor's and/or his sub-vendors works, painting and delivery to site of Auxiliary Steam Pressure Reducing & Desuperheating Stations, as mentioned in different sections of this specification .
- 1.2 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to the Engineer/Owner who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgment is not in full accordance herewith.
- 1.3 The bidder may quote for his standard, proven design of equipment and shall submit stamped compliance certificate (enclosed in Section II) conforming all the specification requirements.
- 1.4 The bids shall be in English language and MKS Units.
- 1.5 The omission of specific reference to any component / accessory necessary for the proper performance of the equipments shall not relieve the supplier of the responsibility of providing such facilities to complete the supply within the quoted prices.
- 1.6 BHEL's / CUSTOMER'S representatives shall be given access to the shop in which the equipments are being manufactured or tested and all test records shall be made available to him.
- 1.7 The Equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and Material Dispatch Clearance Certificate (MDCC) is issued by BHEL / CUSTOMER.

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PROJECT INFORMATION



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PROJECT INFORMATION

1 JOB NO. 422

2 Project 1x525 MW TUTICORN TPS, STAGE-IV (UNIT-1)

3 Customer MEGHA ENGINEERING & INFRASTRUCTURE LTD.

4 Consultant TPSC (INDIA) PRIVATE LIMITED.

5 Location The proposed site is located in town of Thoothukudi district. This site is approachable by road & rail. Thoothukudi is well connected by both State Highways and National Highways and has direct broad gauge link with major cities. It also has major sea port (VOCPT) within a distance of about 4kms.

6 Land Approximately 90 acres of land is available for Plant.

7 Salient Design Data Meteorological data of site is given below:
Site Elevation: Proposed FFL is +2.3m above sea level.

Ambient air temperature :

Max Dry Bulb temperature :40 ° C

Min Dry Bulb temperature :21 ° C

Annual average temperature :28 ° C

Rainfall

Multiyear annual mean rain fall : 808.5 mm

Annual rainfall (min) : 450.5 mm

Multiyear annual daily max rain fall : 166.6 mm

Seismic Zone : Zone- II

Relative Humidity

Mean Max Humidity (Summer): 94%

Mean Min Humidity (Summer): 60%

Max Humidity (Mansoon) : 100%

Min Humidity (Mansoon) : 62%

Mean Relative Humidity : 73%



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SPECIFIC TECHNICAL REQUIREMENTS



**TECHNICAL SPECIFICATION FOR
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BRIEF SYSTEM DESCRIPTION

1.1 Auxiliary steam system is designed to provide steam for the turbine auxiliaries and boiler auxiliaries and fuel oil heating system during start-up, low loads and normal running of unit.

1.2 The system comprises of two auxiliary steam pressure reducing and desuperheating System (PRDS).

These two stations will reduce the pressure and temperature of the steam tapped off from CRH and main steam line to 16 kg/cm² (abs) & 310 °C at the high temperature auxiliary steam header and subsequently to 16 kg/cm² (abs) & 210 °C at the low temperature auxiliary steam header through a suitable desuperheater between the high temperature and low temperature auxiliary steam headers.

1.3 APRDS system Comprises of:

S No	Description	Quantity (Per unit)
1	High Capacity Pressure Reducing Valve (On MS line)	1
2	Low Capacity PRV (on CRH Line)	1
3	Spray Control Valve for High Temp-DESH-1	1
4	Spray Control Valve for Low Temp-DESH-2	1
5	High Temperature Desuperheater (DESH-1)	1
6	Low Temperature Desuperheater (DESH-2)	1

1.4 The smart positioner provided with Control Valves shall be compatible with Universal Hart Calibrator. In order to interface with METSO system, The smart positioner of Control Valves has to be HART Compatible. Bidder to provide diagnostic software (for all tags) to be installed on HMS PC for communicating with the smart positioner and accessing the diagnostic features of the smart positioner. Bidder to offer latest version of calibration and diagnostic software which should be compatible with latest operating system at the time of commissioning of valve/positioner without any additional cost to BHEL. The offered software shall be compatible with the HART MANAGEMENT SYSTEM hardware of reputed makes like MTL, P & F etc. Additionally Vendor to provide DTM (device type manager) / DTD (device type description) files for engineering.

1.5 Limit switch shall be designed for 1,00,000 operations.

1.6 Spares, consumable and specified tools & tackles:

- i) Start-up, Commissioning spares and consumables shall be part of main package supply; however bidder to indicate prices separately. All such items shall be strictly interchangeable with the parts for which they are intended for replacements.



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- ii) The bidder shall supply one complete set of special tools & tackles (if any) required for the erection, assembly, disassembly & maintenance of the equipment. A list of such tools & tackles to be supplied shall be submitted along with the bid.
- iii) Bidder to indicate the service life expectancy period for the spare parts under normal working conditions. The spares shall be treated and packed for long storage under climatic conditions prevailing at site. Small items shall be packed in sealed transparent plastic bags with desiccators' packs as necessary.
- iv) Commissioning Spares: As applicable for the project
(For Minimum requirement refer section II)

Stat-up & Commissioning spares:

- i) Start-up and Commissioning spares are those spares, which may be required during the start-up and commissioning of the Control Valves. All start-up spares, which are supplied under this contract, shall be strictly interchangeable with the parts for which they are intended for replacements.
- ii) The Start-up and commissioning spares indicated by the bidder shall be a part of the main Control valves supply. However bidder to indicate prices separately. The list of these spares required to be supplied shall be submitted along with the bid.



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SIZING DATA SHEET- A-1

AUXILIARY STEAM PRDS & SPRAY CONTROL VALVE

S.No.	Parameters	Cond.-1	Cond.-2	Cond.-3	Cond.-4	Cond.-5	Mech. Design
1.0	Inlet of AUX. PRDS (ASV-22)						
1.1	Pressure (kg/cm ² (a))	41	65	85	96	170	189.5
1.2	Temp. (°C)	340	350	465	488	537	545
1.3	Flow (T/Hr)	Bidder To Calculate					
2.0	Outlet of AUX. PRDS-ASV-22 (AFTER DESH-1)						
2.1	Pressure (kg/cm ² (a))	16	16	16	16	16	21
2.2	Temp. (°C)	315	300	310	310	310	320
2.3	Flow (T/Hr)	79.4	45.8	99.8	45.5	49.1	-
3.0	Inlet of Spray Control Valve (CDV-87)						
3.1	Pressure (kg/cm ² (a))	-	-	21	21	21	40
3.2	Temp. (°C)	-	-	46.5	46.5	46.5	60
3.3	Flow (T/Hr)	BIDDER TO CALCULATE					

Notes:

1. CV of ASV-22 valve shall be selected in such a way that at VWO condition it should not pass more than 450 TPH steam when u/s parameters are 189.5 kg/ cm²a & 537 deg C and d/s pressure is 21 kg/cm²a
2. Bidder shall inform the flow at VWO condition also when u/s parameters are 170 kg/ cm²a & 537 deg C and d/s pressure is 21 kg/cm²a.
3. High capacity steam pressure reducing valve min. flow at 10% valve lift shall correspond to the passing capability of low capacity steam pressure reducing valve at 95% valve lift.



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SIZING DATA SHEET- A-2

AUXILIARY STEAM PRV (ASV-65)

S.No.	Parameters	Cond.-1	Cond.-2	Mech. Design
1.0	Inlet of PRV (ASV-65)			
1.1	Pressure (kg/cm ² (a))	18	47.06	55
1.2	Temp. (°C)	305	337.7	360
1.3	Flow (T/Hr)	8	8	-
2.0	Outlet of PRV (ASV-65)			
2.1	Pressure (kg/cm ² (a))	16	16	-
2.2	Temp. (°C)	Bidder To Calculate		
2.3	Flow (T/Hr)	8	8	-

Notes:

1. Valve shall be suitable for passing 15 T/Hr at parameters OF CONDITION-2.
2. High capacity steam pressure reducing valve min. flow at (ASV-22)10% valve lift shall correspond to the passing capability of low capacity steam pressure reducing valve (ASV-65) at 95% valve lift.



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**DATA SHEET- A-3
SIZING DATA FOR DESUPERHEATER (DESH-2) & SPRAY CONTROL VALVE (CDV-90)**

S.No.	Parameters	Cond.-1	Cond.-2	Cond.-3	Cond.-4	Cond.-5	Cond.-6	Mech. Design
1.0	PARAMETERS AT DESUPERHEATER INLET (DESH-2)							
1.1	Pressure (kg/cm ² (a))	16	16	16	16	16	16	21
1.2	Temp. (°C)	315	300	310	310	302	310	320
1.3	Flow (T/Hr)	Bidder To Calculate						
2.0	PARAMETERS AT DESUPERHEATER OUTLET (DESH-2)							
2.1	Pressure (kg/cm ² (a))	16	16	16	16	16	21	21
2.2	Temp. (°C)	210	210	210	210	210	210	220
2.3	Flow (T/Hr)	66.7	40.4	78.4	40.4	8.4	23.4	-
3.0	INLET OF SPRAY CONTROL VALVE (CDV-90)							
3.1	Pressure (kg/cm ² (a))	30	30	30	30	30	30	40
3.2	Temp. (°C)	46.5	46.5	46.5	46.5	46.5	46.5	60
3.3	Flow (T/Hr)	Bidder To Calculate						



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DATA SHEETS- A

AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION

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DESUPERHEATER DATA SHEET D-1

DATA SHEET FOR DESUPERHEATER DESH-1

S.NO.	DESCRIPTION	UNITS	DATA FOR HC PRV DESUPERHEATER
1.0	TAG NO.		DESH-1
2.0	STEAM PARAMETERS		(INLET OF DESUPERHEATER)
2.1	FLOW	T/HR	REFER SIZING DATA FOR HIGH CAPACITY AUX PRDS
2.2	PRESSURE	Kg/cm ² (a)	BIDDER TO DECIDE BASED ON SIZING DATA
2.3	TEMPERATURE	°C	BIDDER TO DECIDE BASED ON SIZING DATA
3.0	STEAM PARAMETERS (OUTLET OF DESUPERHEATER)		REFER SIZING DATA FOR HIGH CAPACITY AUX PRDS
4.0	SPRAY WATER PARAMETERS		(INLET OF DESUPERHEATER)
4.1	FLOW	T/HR	REFER SIZING DATA FOR HIGH CAPACITY AUX PRDS
4.2	PRESSURE	Kg/cm ² (a)	BIDDER TO DECIDE BASED ON SIZING DATA
4.3	TEMPERATURE	°C	REFER SIZING DATA FOR HIGH CAPACITY AUX PRDS
5.0	END DETAILS		(STEAM INLET / OUTLET)
5.1	TYPE / MATCHING PIPE	mm x mm	BW / 355.6 x 9.53
6.0	END DETAILS		(SPRAY WATER INLET)
6.1	TYPE / MATCHING PIPE		SW/ 48.3 x 5.08
7.0	MATERIALS OF CONSTRUCTION		
7.1	BODY		A217 WC9
7.2	PIPE		SA 335 P22
7.3	SPRAY NOZZLE WITH ASSEMBLY		SS 316
8.0	DESIGN PARAMETERS OF DESUPERHEATER (DESH-1)		
8.1	DESIGN PRESSURE	Kg/cm ² (g)	20
8.2	DESIGN TEMPERATURE	°C	320

Note: The desuperheater shall be complete with pipe, spray nozzle along with necessary attachment as per above data sheets. **INSERTION TYPE DESUPERHEATERS** are not acceptable.

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DESUPERHEATER DATA SHEET D-2
DATA SHEET FOR DESUPERHEATER DESH-2

S.NO.	DESCRIPTION	UNITS	DATA FOR HIGH CAP. PRDS DESUPERHEATER
1.0	TAG NO.		DESH-2
2.0	TYPE		VARIABLE ORIFICE / VENTURI TYPE
3.0	STEAM PARAMETERS		(INLET OF DESUPERHEATER)
3.1	FLOW	T/HR	REFER SIZING DATA SHEET A-3
3.2	PRESSURE	Kg/cm ² (a)	BIDDER TO DECIDE BASED ON SIZING DATA
3.3	TEMPERATURE	°C	BIDDER TO DECIDE BASED ON SIZING DATA
4.0	STEAM PARAMETERS (OUTLET OF DESUPERHEATER)		REFER SIZING DATA SHEET A-3
5.0	SPRAY WATER PARAMETERS		(INLET OF DESUPERHEATER)
5.1	FLOW	T/HR	REFER SIZING DATA SHEET A-3
5.2	PRESSURE	Kg/cm ² (a)	BIDDER TO DECIDE BASED ON SIZING DATA
5.3	TEMPERATURE	°C	REFER SIZING DATA SHEET A-3
6.0	END DETAILS		(STEAM INLET / OUTLET)
6.1	TYPE / MATCHING PIPE	mm x mm	BW / 323.9 x 9.53
7.0	END DETAILS		(SPRAY WATER INLET)
7.1	TYPE / MATCHING PIPE		SW/ 48.3 x 5.06
8.0	MATERIALS OF CONSTRUCTION		
8.1	BODY		A216 WCB
8.2	PIPE		SA 106GRB
8.3	SPRAY NOZZLE WITH ASSEMBLY		SS 316 (Spray Nozzle design pressure shall be equal to Design Spray Water Pressure)
9.0	DESIGN PARAMETERS		
9.1	DESIGN PRESSURE	Kg/cm ² (g)	20
9.2	DESIGN TEMPERATURE	°C	320

Note: The desuperheater shall be complete with pipe, spray nozzle along with necessary attachment as per above data sheets. **INSERTION TYPE DESUPERHEATERS** are not acceptable.

	Technical specification for Control Valves with Accessories (Pneumatically Operated)		SPECIFICATION NO. PE-TS-422-145-1104	
			SECTION I	
			REV. NO. 00	DATE: 27.12.16
			SHEET	

Tag No..... Quantity.....

APPLICABLE FOR TAG Nos.WHEREVER STATEMENT "REQUIRED" INDICATED IN THE INDIVIDUAL CV DATA SHEETS

DATA SHEET – A & B for ACCESSORIES

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED-UP BY BIDDER)	
POSITIONER	MFR. & MODEL NUMBER				
	BYPASS	GAUGES	ENCL. CLASS	☒ YES ☐ NO ☒ THREE ☐ TWO ☒ IP 66	
	INPUT SIGNAL (Kg / Cm ²)			☒ 0.2 – 1.0 4-20 mA HART COMPATIBLE	
	OUTPUT SIGNAL (Kg / Cm ²)			TO SUIT ACTUATOR	
AIR FILTER REGULATOR TWO (2) Nos. PER CV (Auto drain feature is required)	MFR. & MODEL NUMBER				
	AIR SUPPLY PRESS (Kg / Cm ² g)			☒ 5.0-8.0 ☐	
	OUTPUT PRESS (Kg / Cm ² g)			TO SUIT ACTUATOR	
	FILTER SIZE OUTPUT GAUGE			5 MICRON ☒ REQUIRED ☐ NOT REQUIRED	
AIR LOCK	MFR. & MODEL NUMBER				
	SET PRESS (Kg / Cm ²)				
	SUPPLY PRESS (Kg / Cm ²)			☒ 5.0-8.0 ☐	
	RESET TYPE			AUTO	
	VENT PLUG			REQUIRED	
LIMIT SWITCH	MFR. & MODEL NUMBER				
	OPEN posn	INT posn	CLOSE posn	1 NO. --- 1 NO.	
	CONTACT TYPE			SPDT 2 NO + 2 NC	
	RATING (AC / DC)			5A 250V AC AND 0.2A 220V DC	
	ENCLOSURE CLASS			☒ IP 65 ☐	
POSITION TRANSMITTER	MFR. & MODEL NUMBER			PART OF POSITIONER	
	TYPE				
	SUPPLY				
	OUTPUT RATING				
	ACCURACY				
	ENCLOSURE CLASS				
SOLENOID VALVE	MFR. & MODEL NUMBER				
	RATING			☒ 24V DC ☐ 220V DC ☐ 240V AC ☐	
	TYPE			3-WAY (UNIVERSAL OPERATION TYPE)	
	OPERATION	QUANTITY		☐ Stay put ☐ Interlock ☐ 1 ☐ 2	
	COIL INSULATION CLASS			CLASS - H	
	ENCLOSURE CLASS			☒ IP 65 ☐ NEMA 4 ☐	
HANDWHEEL	ORIENTATION			☐ TOP MOUNTED ☒ SIDE MOUNTED	
JUNCTION BOX (FRP type body material)	NO. OF WAYS			☐ 24-WAYS ☐ AS REQUIRED ☒ 36-Ways	
	SIZE			AS REQUIRED	
	CABLE GLANDS (Size / Quantity)			AS REQUIRED (Double Compression Type).	
	ENCLOSURE CLASS			☒ IP 65 ☐	
I/P CONVERTER	INPUT SIGNAL	POWER SUPPLY		PART OF POSITIONER	
	SPLIT RANGE				
	ENCLOSURE CLASS				
	LINEARITY				
	HYSTERISIS				
Tubing & Fittings / per CV	This is in addition to cu. Tubing and fittings which are integral part of CV			15 Meters of 1/4" SS TUBING, with 1 set of Fittings for each CV for connection to IA Header on one end and accessories on another end of CV.	
PAINTING	COLOUR SHADE :			RED/GREEN/OTHER	
	THICKNESS				
	TYPE			EPOXY	
			COMPANY SEAL		
			NAME		
			SIGNATURE		
			DATE		



	TITLE	AUXILIARY PR. REDUCING AND DESUPERHEATING STATION
	CAD RE	
	DRAWING NO.	PB-DC-629-148-NI01
	SHEET OF OF REV.	00
	DATE	
	DEPT SCALE	
	SIGNATURE	(Signature)
	REV.	
	ZONE	5
	ZONE	4
	7	
	6	
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	11	



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CUSTOMER SPECIFICATION

7.00.00 CONTROL VALVES, ACTUATORS & ACCESSORIES

General Technical Guidelines for the Control Valves shall be as follows:

- a) Bidder shall exercise extreme caution in selecting severe service control valves like ~~BFP recirculation valves, HP & LP bypass valves, superheater & Reheater attenuator valves~~, PRDS valves for Boiler & Turbine, ~~Soot blower steam pressure control valve~~ etc. For such critical applications, Bidder shall offer valves which are proven for similar application for not less than 2 years of continuous service in power plant environment. All the above valves shall have leakage class equal or better than class-V with metal-to-metal seating.
- b) Wherever, steam conditioning calls for Pressure reducing & desuperheating as well, ~~combined~~ PRDS type valves shall be offered.

7.01.00 GENERAL

Control valves for regulating service shall normally be globe body, preferably cage guided; metal-to-metal seated, pneumatically operated and shall be provided with characterized plugs having ANSI leakage class-IV or better.

The leakage class of control valves shall be dictated by the process and shall be approved by client / consultant.

7.02.00 VALVE BODY / END CONNECTIONS

Valve end to end dimension and flange connection shall be according to ANSI standard, straight through pattern. However, Bidder may offer angle body valve for high pressure drop applications. For high pressure drop applications, construction of the valve shall be such that the gland is not exposed to full line pressure.

- 7.02.01 Control valves of 40 mm. size and above with line pressure up to 50 Kg / Sq. cm may have flanged end connections.
- 7.02.02 Control valves, used in high pressure services, shall have butt welded end connections for size 65mm and above and socket weld end connection for size 50 mm or below.
- 7.02.03 Control valve body shall be cast and machined for pressure rating up to 1500 lbs rating. Above 1500 lbs, valve body shall be of forged steel. For Demineralized Water application valve body shall be Stainless Steel.



7.02.04 The direction of flow shall be clearly marked/engraved on the body.

7.03.00 VALVE SIZE

The control valve sizing (C_v / K_v) shall be based on following guidelines:

- a) The valves shall pass normal rate of flow (MCR condition) with 65 to 75 percent opening for linear characterised valves and between 75 to 85 percent opening for equal percentage characterised valves.
- b) The valves shall have adequate rangeability to pass the minimum and maximum flows between 10% to 90% opening of the valves, unless cage trim valves having wide rangeability are chosen.
- c) The valve shall have design C_v so as to pass the maximum specified rate of flow at 90 to 95 percent opening of the valve.
- d) The valve selection shall be based on the highest size dictated by the above considerations unless noise, flashing or other factors dictate the final selection.
- e) The sizing procedure followed shall be as per latest edition of ANSI/ISA or equivalent standard.

7.04.00 VALVE TOPWORK

7.04.01 Top work shall be sized so that the valve shall operate properly when upstream pressure is 10 percent above maximum inlet pressure and downstream pressure is atmospheric.

7.04.02 Extended bonnet/Finned bonnet and high temperature packing shall be used for high temperature application.

7.04.03 The gland material shall be chosen to suit the operating temperature. PTFE may be chosen for low temperature application and for high temperature application graphited asbestos glands are to be provided. For vacuum services, the glands shall be dry seal type.

7.05.00 VALVE TRIM

7.05.01 Valve trim for most applications up to leakage class-V shall be stainless steel 316 SS for pressure drop up to 7 Kg/ Sq. cm. For pressure drops above 7 Kg/Sq. cm hard trim (stellite or equivalent) shall be used. Other alloys shall be substituted if required for corrosion and other fluid conditions.

7.05.02 Balanced trim valves shall be offered for high shut-off pressure or high pressure drop condition to reduce the size of the actuators. For flashing services and two stage mixtures, the trim material shall be 17-4 PH or equivalent. If cavitating condition is foreseen, Bidder shall offer multistage or labyrinth trim valves. Trim of severe service valves shall be of multistage and multipath design with sufficient no. of discrete pressure drop stages to eliminate the chances of erosion, cavitation, noise and vibration throughout the control range of the valve.

7.05.03 Quick replacement type trim shall be considered for easy maintenance.

7.06.00 NOISE LEVEL

The equivalent sound level measured at 1.5M above nearest floor level in elevation and 1 M horizontally from the control valve expressed in decibels to a reference of 0.0002 microbar shall not exceed 85 dBA. If the calculated



noise is more than the above limit, even with low noise trim design, diffusers shall be included. Diffusers shall be made of stainless steel and shall be integrally connected to the control valve with necessary spool piece. The spool piece shall be in conformity with the main line piping specification.

7.07.00 VALVE ACTUATORS

7.07.01 Spring-diaphragm type valve actuators shall be used. Piston type actuators shall be offered in case of exceedingly high shut-off pressure & quick response requirement. Bidder shall consider piston type actuators for the following services as a minimum requirement.

- a) Auxiliary Pressure reducing & De-super heating stations.
- b) Feed control valves (both 100% & 30%).
- c) Superheat and Reheat Spray Control Valves.
- d) Condensate extraction pump minimum recirculation valve.

7.07.02 The actuator shall be designed for 150% thrust required for the valve (at shut-off pressure) at an air line supply pressure of 5.5 Kg/Sq. cm or as per manufacturers recommendation.

7.07.03 All the actuators shall be supplied mounted on the valve with all the accessories (limit switches, position feedback etc.,) integrally mounted. The diaphragms shall be designed for 200% maximum operating pressure.

7.07.04 Nylon reinforced neoprene shall be used as diaphragm material.

7.07.05 Valve actuators shall be capable of operating at 70 °C ambient, continuously.

7.07.06 Entire actuator assembly shall be painted with corrosion inhibiting paint.

7.07.07 All actuators shall be of fail safe design signifying that the spring direction will tend to move the valve (open or close) in a direction safe for the process. "Failure to Open" or "Failure to Close" shall be marked on the actuator.

Air restrictors or regulators if required shall be provided for varying the time of travel from 0 – 100 %.

7.07.08 **Space heaters for actuators are not necessary.**

7.07.09 Non-Contact type sensor shall be preferred for position feed back of actuators, limit switches, proximity non-contact type.

7.08.00 VALVE POSITIONERS

7.08.01 All regulating service valves shall be offered with intelligent integrated easily configurable **Smart Electro pneumatic actuators / digital positioners with auto calibration facility and compatible with HART communication.**

7.08.02 Positioners shall be three gauge type with equalizing lever for bypass.

7.08.03 Positioner casings shall be dust tight, corrosion resistant and weatherproof.

7.08.04 In general, positioner shall operate at signal range 4 – 20 mA DC for the full travel of the valve. Split range operation in few cases may be required.



Remote calibration from control room shall be possible through HART protocol.

7.09.00 VALVE ACCESSORIES

The accessories of the valves shall include hand wheels, limit switches, junction boxes, airlock relays, LVDT type position transmitter with 4 – 20mA DC output etc. Resistive type position transmitter is not acceptable.



7.01.23 AIR FILTER REGULATOR

- | | | |
|-----------------------|---|--|
| 01. Filter Element | : | Sintered Bronze |
| 02. Filter Size | : | 5 microns |
| 03. Input Air | : | 10.0 Kg/Sq. cm (maximum) |
| 05. Effect of Supply | : | Maximum 0.02 Kg/Sq. cm for a change pressure variation in supply pressure of 4 Kg/Sq. cm |
| 06. Bowl Material | : | Metallic cover around high temperature area/clear transparent polycarbonate with metallic cover for ordinary applications. |
| 07. Accessories | : | 2" dial size output pressure gauge |
| 08. Desirable Feature | : | No perceptible drop of pressure on opening the drain port. |



7.01.25 SMART VALVE POSITIONER :

- 01. Type : Smart
- 02. Input level : 4-20 mA DC (HART)
- 03. Output range : to match valve stroke
- 04. Body Material : Cast Aluminum
- 05. Enclosure Protection : IP 66
- 06. Max. air supply pressure : 7 Kg/ sq.cm.
- 07. Response Time : 5 Seconds for 0 to 90% output pressure
- 08. Accuracy : $\pm 1.0\%$ of Full Scale.
- 09. Turning Range : 50° to 90°
- 10. Output Characteristics : Linear / Equal % / Quick Opening and provision for user customization of output.

SEPC - 1 x 525 MW Tuticorin Thermal Power Project Stage-IV at Thoothukudi, Tamil Nadu	VOL-VI-SCH-D - 45	DCPL-12Z05
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- 11. Lighting Protection : a) Peak Value of Voltage surge: 12kV
b) Peak Value of Current Surge: 1000A
- 12. Pressure gauges : To be provided on positioner
- 13. CE Conformity : a) Electromagnetic compatibility
b) EN 61326: 1997 (CE Marking)
- 14. Air connection : 1/4NPT internal thread.
- 15. Electrical Connection : 1/2NPT.

7.01.26 SOLENOID VALVE

- 01. Operating Principle : Electromagnetic (noiseless)
- 02. Coil voltage rating : 240 V AC / 220VDC (as required. Any other voltage, if necessary, to be arranged by bidder.)
- 03. Ways : 3 ways (normally open + normally closed) [general], other depending on requirement
- 04. Port size : 1/2" NPT / As per site requirement
- 05. Body : SS Bar Stock
- 06. Trim : AISI SS-316
- 07. Manual Operator : In built
- 08. Duty : Suitable for continuous energization
- 09. Sealing : Airtight and leak proof
- 10. Ambient Temperature : 0 - 50 ° C
- 11. Fluid Temperature : 0-150 ° C or as per application
- 12. Coil Enclosure : Stainless Steel
- 13. Insulation : Class-H
- 14. Coil Casing : IP-65 (Explosion proof for NEC Class-1, Division-1 area)
- 15. Mounting : On pipe or on panel
- 16. Cable Connection : 3/4" ET Compression gland
- 17. Accessories : Mounting brackets, nuts and bolts
- 18. Special feature : i) Temperature operated fuse at Explosion proof enclosure.

SEPC - 1 x 525 MW Tuticorin Thermal Power Project Stage-IV at Thoothukudi, Tamil Nadu	VOL-VI-SCH-D - 46	DCPL-12Z05
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- ii) Solenoid valve directly integral to actuator body shall have NAMOOR interface.

19. Pressure Rating : As per application

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SPECIFICATION FOR CONTROL VALVES

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1.0

SCOPE

1.1

This specification covers the Design, Manufacture, Inspection and Testing at the manufacturer’s works, proper packing for transportation and delivery to site of AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION (with Pneumatic Actuator) for use in Utility/Captive Power Station.

1.2

Expander/Reducer between valve body & pipe shall be in BHEL’s scope of supply. However, any other expander/reducer required shall be in bidder’s scope of supply.

2.0

CODES AND STANDARDS

2.1

As a minimum requirement, the latest revision/version of the following or equivalent standards shall be complied as a minimum requirement :-

Indian Boiler Regulation

:

IBR

ASME

:

B31.1/BPVC

Allowable Seat leakage

:

FCI-70.2

Pressure & Temperature ratings

:

ANSI-B16.34

Enclosure class

:

IEC-144 / NEMA / IS-13947

Control Valves Sizing

:

ISA S-75

3.0

TECHNICAL REQUIREMENTS

The Control valve, Actuator and the accessories shall be suitable for continuous operation under an ambient temperature of 0-60°C and Relative Humidity of 0-95% unless specified otherwise in volume IIB Section-B or Section-C.

3.1

Control Valve

The control valve shall be suitably designed for the process operating conditions and system characteristics as specified in the Data Sheet-A.

3.1.1

The control valve shall be of globe/angle body design, as per datasheet, with single port. Valve trim shall be cage guided balanced type for valve sizes ≥ 3” and above. The valve trim shall be suitable for quick replacement without any cutting or welding. Anti-cavitation trims shall be provided for valves with cavitation service and hardened trims for flashing services.

3.1.2

Bidder to note that High Capacity PRDS is a steam conditioning valve with single valve body design. Bidder to offer body and trim materials as per the datasheet-A. Wherever there is a deviation from the datasheets, bidder to furnish the documentary proof for confirming superior trim material/body material selection along with their offer. BHEL/Customer reserves the right to accept/reject any variation in the specification.

3.1.3

Asbestos shall not be used for the packing or any other component.

3.1.4

The valve bonnet and packing shall be suitable for the service conditions as in Data Sheet-A. Gland sealed type bonnets are not acceptable. Bonnets having Teflon packing shall have valve stem finished to

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2-4 micro inches RMS. Packing material requiring lubrication will not be acceptable.

Type of bonnet shall be according to the service condition. Extension bonnets shall be provided when the maximum temperature of the flowing fluid is greater than 280 or unless otherwise specified.

- 3.1.5 The valve end connection as specified in Data Sheet-A shall conform to ANSI B16.25 for Butt Weld connection and ANSI B16.11 for socket weld connection. Tolerances on end to end, center to center, center to face shall be in accordance with ASME B16.10. The end connections shall be Socket Welded for sizes below 50NB and Butt Welded for sizes 50NB and above.
- 3.1.6 The valve seat leakage shall be as per FCI-70.2. The leakage class shall be as per Data Sheet-A.
- 3.1.7 The valve body shall have the direction of flow embossed on all valves.
- 3.1.8 The sizing shall conform to the requirements of ISA S75.01. Valve shall be capable of handling 120% of required maximum flow with meeting below mentioned requirements:
- | | | | | |
|--|---|---|---|--------------------|
| Valve with Linear characteristic. | - | Normal Flow (Design Point) | : | 70-75% valve lift. |
| | - | Max. Flow | : | 90% valve lift. |
| | - | Min. Flow | : | >10% valve lift. |
| Valve with Equipercentage Characteristic | - | Normal Flow (Design Point) | : | 75-85% valve lift. |
| | - | Max. Flow | : | 90% valve lift. |
| | - | Min. Flow | : | >10% valve lift. |
| ON/OFF Quick open Characteristic | - | 1.2 times the CV calculated on the basis of maximum flow condition. | | |
- 3.1.9 Calculation for valve sizing, velocity and noise shall be subject to purchaser's approval during contract stage. However responsibility of proper selection and design for the duties specified lies with the vendor. Any modifications required to be done on the valves or actuators & accessories to achieve satisfactory performance of the control system shall be done without any commercial & delivery implication.
- 3.1.10 The valve outlet velocities shall be limited to the following values, unless otherwise specified in the Data sheet-A.
- | | | | |
|-----|----------------|----|-----------------|
| i) | Liquid service | <= | 8 Meters/Sec. |
| ii) | Steam service | <= | 150 Meters/Sec. |
- 3.1.11 For cavitation service, the trim design shall be of multistage pressure drop type, so as to avoid cavitation altogether, instead of keeping cavitation away from valve parts
- 3.1.12 The equivalent weighted sound level measured at 1.5 metre above floor level in elevation and 1 metre horizontally from the control valve expressed in decibels to a reference of 0.0002 microbar shall not

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exceed 85 dBA (without pipe insulation). The offer shall include noise prediction calculations for each valve.

3.1.13 In case of predicted noise level above 85 dBA, same shall be brought down to acceptable noise level i.e. below 85dBA through Source treatment (proper valve trim & valve body selection). Path treatment (LNP/ Diffuser/ Cartridge/ Silencer etc.), if any shall be subject to Customer’s/Owner’s approval.

3.1.14 In case of wrong selection/mal operation of valve and for associated actuator during guarantee period, the vendor shall replace the valve suitably with a modified/new valve of design as approved by purchaser and all the expenses for replacement, rectification/modification including transportation both ways will be at vendor’s expenses.

3.2 **ACTUATORS-** The control valves shall be operated with pneumatic actuator

3.2.1 **Pneumatic Actuator**

The actuator shall be designed for a thrust of 120% of valve’s shut-off pressure at an air line supply pressure of 5-8 Kg/Sq. cm.

The pneumatic actuators shall be employed for modulating or open/close duty, as specified in Data Sheet-A. The bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drops, shut off pressure and valve travel.

The pneumatic spring opposed diaphragm actuator or piston actuator as the case may be for modulating duty shall be capable of positioning the associated valve at desired opening for all the operating conditions specified.

3.2.2 The pneumatic actuator for open/close duty shall be suitable for fast opening/closing of the associated valve.

3.2.3 The actuator design shall allow valve assembly to be mounted at 45° inclination on either side in the vertical plane.

3.2.4 The actuators shall be suitably sized to ensure that the associated valve travel time from full open to full closed position and vice versa is less than 10 seconds or as specified in the datasheet under the most stringent service conditions.

3.3 **Accessories for Control valve with Pneumatic Actuator**

The bidder shall offer all the accessories as specified in the Data Sheet - A for the Pneumatic Actuators under modulating or OPEN/CLOSE duty. The accessories specified shall be supplied duly mounted on the valve actuator and piped with PVC covered copper/ SS tube and flare less brass/ SS fittings etc. as per the hook up diagram (Refer drawing no. PES-145-06B).

3.3.1 **Handwheel**

Handwheel shall have OPEN & CLOSE direction marking and clockwise rotation as viewed from front shall close the valve. The handwheel shall have a circular stainless steel plate with Tag number and service.

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3.3.2 Local Position Indicator

Each actuator shall be provided with a mechanical pointer attached to stem, moving over a graduated scale with markings, for OPEN, 25%, 50%, 75%, CLOSE positions.

3.3.3 Position Transmitter

The position transmitter shall be integral part of the smart positioner.

3.3.4 Air Filter Regulator

Instrument quality air at suitable pressure of 5 Kg/Cm2(g) to 8 Kg/Cm2(g) shall be supplied to each valve through air filter regulator. The filter regulator shall include an inbuilt blow-down valve (auto drain feature), 5 micron size filter. The bowl material for the AFR shall be sintered bronze. The Air filter regulator shall be selected to meet the requirements of positioner/actuator, E/P convertor and air-lock. The flow capacity of the Air filter regulator shall be variable with a knob. Output gauge shall be provided wherever pneumatic positioner is not specified for the valve.

3.3.5 Air Lock Relay

Air lock relay shall retain the valve position stayput, in case of air supply failure and shall reset automatically on resumption of air supply. Air lock shall have a threaded plug for evacuating diaphragm air if required for local manual operation.

3.3.6 Solenoid Valves

Solenoid valves are meant for interlock & protection purposes overriding the controller signal, and/or to result stayput action on controller signal failure. The Solenoid valve shall be 3-way Universal type and the valve internals and valve body shall be of stainless steel. The coil shall have class-H insulation and rated for continuous AC/DC duty as specified in Data sheet-A. The enclosure shall be to IP-65. Cable gland shall be provided for cable entry. The solenoid shall in general conform to IS-8935. The solenoid shall be provided with manual overriding facility. The solenoid shall be suitable for 24V DC supply, unless specified otherwise in Data Sheet-A.

3.3.7 Limit Switch Assembly

Limit switch assembly are required as specified in the data sheet-A. Each limit switch shall have 2NO+2NC contacts with contact rating of 5A at 240V AC/0.2A at 220V DC unless otherwise specified. The switch enclosure shall conform to IP-65. Each limit switch shall be supplied with cable glands.

3.3.8 I/P Converter

I/P Converter shall be integral part of the smart positioner.



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3.3.9 Smart positioner

Microprocessor based Electronic (Smart)Positioner

1	Electrical	a) Input Demand Signal	4-20 mA
		b) Power Supply	Loop Powered from the output card of Control System (12-30 V DC)
		c) HART Protocol	Compatibility for Remote Calibration & Diagnostics (Superimposed HART signal on input Signal (4-20 mA)
		d. Valve position sensing	Position sensing, 4-20 mA output signal to be provided for control system.
2	Environment	a) Operating temp.	(-)30 To 80 Deg. C
		b) Humidity	0-95 %
		c) Protection class	IP-66 Minimum
3	Software for Configuration and Diagnostics	Software	Windows based software. Software shall meet the requirements for Configuration, Diagnostics, Calibration and Testing of the actuator. It shall be easily upgradable with some hardware and compatible with any HART management system/AMS. Valve positioning timing, actuator leakage, and valve wear and tear, fault alarm to be offered as a minimum.
		Diagnostic/Test features	Advanced diagnostic features like Stroke counter or Travel counter, Leakage in actuators, Valve Signature analysis, Step Response test, Valve friction /Jamming detection etc. to be provided.
4	Test reports/ Certificates	Factory Valve Signature Tests Reports (Pressure versus Valve travel and Travel versus I/P signal) are to be provided.	
		Test certificates as per manufacture standard/Relevant standard are to be submitted.	
5	Configuration/ Calibration	Remote & Local Calibration, Auto & Manual Calibration shall be possible.	
6	Operating Range	Full range/ Split range.	
7	Modes	Valve Action	Direct / Reverse Valve Action
		Flow Characterization	Possible to fit Valve Characteristic Curves- Linear , Equal percentage etc.
8	Fail Safe/Fail Freeze	Fail Safe/Fail Freeze feature is to be provided as per datasheet. (In case the fail freeze feature is not intrinsic to the positioner, Bidder shall achieve the	

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		same externally through solenoid valve Connected in the pneumatic circuit).	
9	Pneumatic	Air capacity	Sufficient to handle the valves & actuators selected/ Boosters to be supplied, if required.
		Air pressure	To suit the air supply pressure/quality available.
		Process connection	1/4" NPT
10	Performance	characteristic deviation	<=0.75 % of span.
		ambient temp effect	<=0.01 %/ deg c or better.
		dead band	adjustable to 0.1to 10%
		scan time	10ms
		resolution	<=0.05%
		sensitivity/linearity	0.3-0.4% of FS
		repeatability	0.32% of FS
		auto tune	yes
11	EMC & CE compliance	Required to International Standard like EN/IEC.	EN50081-2 & EN50082 or equivalent.
12	Accessories	In-built Operator Panel	Display with push buttons for configuration and display on the positioner itself (Password protected/Hardware lock).
		Pressure Gauge Block & Position Indicators.	For supply & output pressures, Air Filter Regulator, integral type position transmitter, in built mechanical position indicator and other accessories shall be provided on as required basis for making system complete.
		Electrical Cable Entry	1/2" NPT, side or bottom entry to avoid water ingress.
		Valves Mounting Assembly	For Sliding Stem/Rotary/Single acting/Double acting actuators on as required basis.

3.3.10 Junction Box

Integral junction box with all electrical accessories conduited up to JB shall be supplied. The junction box shall have two (2) cable glands for outgoing cables. Junction box shall have enclosure class of IP-65.

3.4 **Painting** of the control valve assembly shall be as per the Painting Specification attached elsewhere in this technical specification. In the absence of specification for painting, vendor to submit their standard painting procedure for painting for BHEL's approval. Epoxy based paint (corrosion-resistant) to be provided for control valves for coastal environment.

3.5 **Sub-vendors** shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.



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4.0 TESTING AND INSPECTION

- 4.1 The testing and inspection of the equipment/items shall be in line with the approved QAP
- 4.2 The cost of all tests as per the approved QAP will be deemed to have been included in the bid.
- 4.3 In case, the bidder is supplying the valve from outside India, the third party inspection shall be arranged and considered by the bidder in their offer.

5.0 SPARES AND CONSUMABLES

5.1 Start-up/Commissioning Spares

The bidder shall supply all the start-up/commissioning spares as per the BOQ given in the technical specification.

S.No.	ITEM DESCRIPTION	QUANTITY REQUIRED (per unit)
1	Gaskets	One (1) set with each control valve Tag
2	Gland Packings	One (1) set with each control valve Tag
3	SS Tubing (as applicable)	15 Meters of ¼ “ SS Tubing, with 1 set of Fittings for each CV

5.2 Mandatory Spares

The bidder shall supply all the mandatory spares as per the BOQ given in the technical specification.

6.0 DRAWINGS AND DOCUMENTS

- 6.1 The bidder shall furnish the following documents (4sets) along with the bid

- Compliance certificate as enclosed in Section II.
- Schedule of deviations if any.
- Sizing Calculations.
- General Assembly (GA) drawings indicating all important details for layout.
- Quality Plan duly signed & stamped.
- Relevant Catalogs with detailed technical information.
- Un-price schedule of prices & unit prices as per NIT.

- 6.2 The successful bidder shall furnish the following documents to BHEL during the contract stage viz. after the award of contract:



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6.2.1 2 sets of the following CONTROL VALVE DOCUMENTS for approval + 1 sets of CD/soft copy:

- All Sizing Calculations (CV, Noise Level, Valve Outlet Velocity, Actuator sizing etc.)
- General Assembly (GA) drawings indicating all important details (edge preparation details, dimensions, weight etc) for layout.
- Data sheet-B completely filled-up.
- Hook-up diagram of Control Valve with Actuator & Accessories.
- Quality Plan duly signed & stamped.
- Relevant Catalogs with detailed technical information.

6.3 Final documentation:

Final Documents / drawings to be furnished by the successful bidder shall be as follows:
12 sets with 5 CD-ROMS/Soft Copy of:-

- Category I & IV approved CONTROL VALVE DOCUMENTS
- Test certificates
- Operation & maintenance manuals for Control Valve, Actuator and all accessories

7.0 MARKING AND PACKING

7.1 Marking

A stainless steel metal nameplate should be permanently fixed on each equipment giving its tag number and technical specifications. The Following Details are to be marked on the Packing Cases

- ✓ Address of consignee
- ✓ Purchase order no.
- ✓ Description of items or title of packing list
- ✓ Weight
- ✓ Dimension of the Box
- ✓ Marking showing upright position
- ✓ Marking showing sling position
- ✓ Marking showing umbrella (i.e. for machines/components to be stored under covered storage)





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7.2 Packing

All equipment / materials shall be suitably packed and protected for the entire period of dispatch, storage and erection against impact, abrasion, corrosion, incidental damage due to vermin, sunlight, high temperature, rain, moisture, humidity, dust, sea water spray (where applicable) as well as rough handling and delays in transit and storage in open. Guidelines for packing are as follows:

- ✓ *After inspection of control valves assembly, smart Positioner along with Pressure Gauge shall be disassembled & packed separately.*
- ✓ *Threaded connection of Smart Positioner & Pressure Gauge shall be shipped with the end caps fitted to avoid any damage.*
- ✓ *Instructions with sketch for mounting the Smart Positioner & Pressure Gauge shall be sent along with the aforesaid accessories.*
- ✓ *Packing of the control valves and Smart Positioner along with Pressure Gauge shall be done in separate wooden boxes/cases in order to avoid damage during transit and also during storage at site in tropical climatic conditions for a period of 18-24 months.*
- ✓ *All valves & smart positioner along with pressure gauges shall be packed properly with quality wooden planks with proper wooden frame support. Moreover the valves are internally covered with polythene sheets to protect from the water and moisture entry.*
- ✓ *Stronger shock absorbing cover material like expanded Polyurethane which can take any direct impact on it shall be used for packing.*
- ✓ *Proper reaper support to be provided in the packing and Valve assembly to be aligned properly to avoid the damage of accessories during transit due to vibration effect.*
- ✓ *Marking for Fragile & Condensing environment shall be done on the packing box.*



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SPECIFICATION FOR DESUPERHEATER

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1.0.0 GENERAL

This standard specification covers the design, materials, construction features, manufacturing process, assembly, inspection and testing requirements, painting and packing requirements of Steam Desuperheater along with spray nozzle.

2.0.0 CODES AND STANDARDS

2.1.0 The design, manufacture, inspection and testing of the equipment shall comply with the requirements of the latest national and international codes and standards wherever applicable. Wherever the specific code requirements are specified herein, the same shall be adhered to.

In particular, the equipment shall be designed to comply with latest editions of the following standards

- (i) Indian Boiler Regulations (IBR).
- (ii) ASME Section - VIII / Div. - 1.
- (iii) Material specifications as per ASTM, AISI.

3.0.0 DESIGN AND CONSTRUCTIONAL FEATURES

3.1.0 The desuperheater shall be of direct mixing mechanical spray type. The assembly shall consist of desuperheater pipe with steam inlet and outlet & spray water connection along with spray nozzle. The spray nozzle shall direct the spray in the direction of steam flow for proper mixing and arranged in such position that direct impingement of spray water on desuperheater walls is avoided.

3.2.0 The spray nozzle shall be accurately sized for best results in total range as stipulated in the data sheet.

3.3.0 The desuperheater shall be complete with matching counter flanges including bolts, nuts, gaskets, necessary reducers / expanders to suit purchaser's pipe line and supporting legs / pads & holding down bolts as required.

3.4.0 The material of construction shall be as indicated in Data Sheet – D1 & D2.

4.0.0 SHOP INSPECTION AND TEST

4.1.0 The bidder shall submit along with the offer the Quality Plans in the enclosed format together with all reference documents/standards etc. as applicable.

4.2.0 Indicative Quality Plans, specifying minimum checks and tests as considered necessary are enclosed along with this specification for compliance. These however are not intended to exhibit the total comprehensive testing programmes, which are the responsibility of the bidder.

4.3.0 Detailed Quality Plans to be submitted by the bidders should also include all the checks/tests carried out by the suppliers as part of their normal practice. The Quality Plans submitted by the bidders shall be subject to approval of BHEL/their Customer who reserves the right to ask for further checks during finalization of Quality Plans.

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BHEL/their Customer shall indicate customer hold points in the approved Quality Plans beyond which the work shall not proceed without their approval.

- 4.4.0 The supplier shall furnish their production program along with scheduled dates of testing at least three months in advance to enable BHEL/their customer to plan for witnessing the tests identified as hold points.
- 4.5.0 Material identification and co-relation with test certificates for all major components shall be essentially required. In absence of these, the material of each component shall be tested as per relevant specification for Chemical Composition and Mechanical properties i.e. Yield Stress, Ultimate Tensile Stress, Impact test, % Elongation, % Reduction in Area, Hardness etc. In addition, to ensure freedom from surface and sub-surface defects, suitable Non Destructive Testing shall also be carried out.
- 4.6.0 Following tests shall be done at Manufacturers' works during various stages as minimum requirement :
- 4.6.1 Visual examination of all components.
- 4.6.2 Check for weld joints for proper fit up, Dye Penetration Test after root run and final welding. 100% Radiographic test as per ASTM E 165 for all butt welds.
- 4.6.3 Verification of stress relieving chart if post-weld heat treatment is called for.
- 4.6.4 Check / test for pressure retaining bolts and nuts as per relevant Codes/Standards.
- 4.6.5 Dimension check for all components including surface finish.
- 4.6.6 Hydraulic Test to two times the rated design pressure for desuperheater body and other pressure retaining parts.
- 4.6.7 Check for final completeness, cleaning, surface finish, appearance, identification, surface preparation, painting, marking and packing including spares.
- 4.6.8 The equipment comes under the purview of IBR (Indian Boiler Regulations). All tests certificates duly signed by Chief Inspector (IBR) / authorized representative shall be furnished in IBR from III-C.
- 4.6.9 The particulars of proposed shop tests and process of test shall be submitted to BHEL/their Customer along with Quality Plan for approval.

5.0.0 PERFORMANCE REQUIREMENTS

Bidder shall guarantee that equipment offered shall meet the rating and performance requirements as stipulated in this specification. In case it is not as per guarantee furnished by the bidder, the deficiency shall be made good by the bidder by rectification / replacement of defective parts within reasonable time at their own cost inclusive of cost of transportation both ways if required. The Purchaser is entitled to reject the equipment in case of repeated failures to meet the guaranteed performance.

6.0.0 PAINTING

- 6.1.0 All foundry sand and loose material shall be removed and surface should be made thoroughly clean for further protection as required.
- 6.2.0 A shop coat of paint, removable after installation at site, shall be applied to all steel surfaces and other exposed surfaces requiring corrosion protection during transit and storage at site.



**TECHNICAL SPECIFICATION FOR
AUXILIARY STEAM PRESSURE REDUCING &
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SPEC. NO.: PE-TS-422-142-N101

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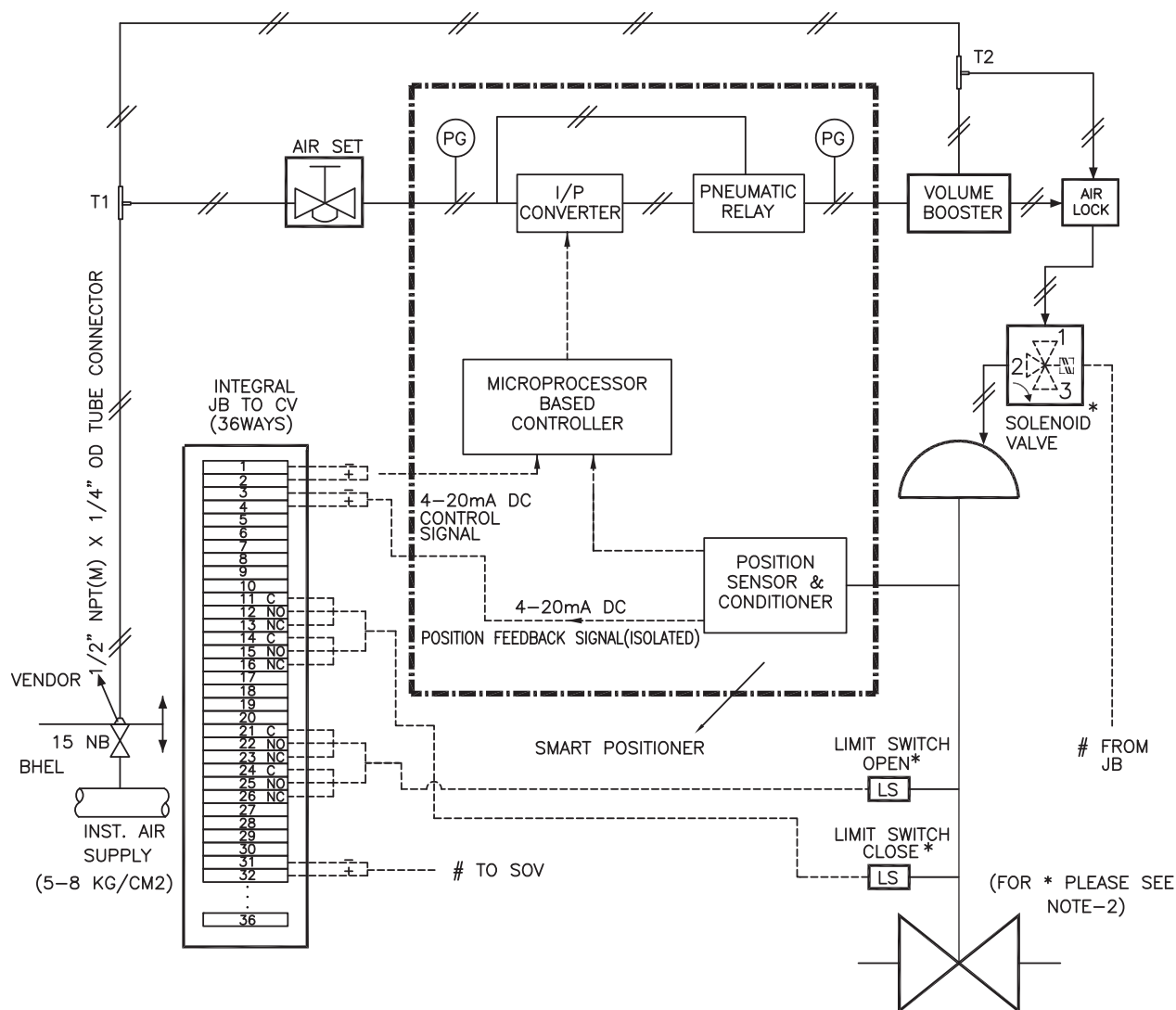
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7.0..0 PRESERVATION, MARKING AND PACKING

- 7.1.0 A Stainless Steel metal nameplate should be permanently fixed on each equipment giving its Tag. No. and technical specifications i.e. Service, Size, Pressure Rating etc.
- 7.2.0 All equipments / materials shall be packed suitably and protected from impact, abrasion, corrosion, incidental damage due to vermin, Sun-light, high temperature, rain, moisture, humidity, dust, sea water (where applicable) as well as rough handling during entire period of dispatch, storage and erection including delays in transit and storage in open.
- 7.3.0 Spares shall be packed separately and marked clearly for identification. These shall be specially packed for long storage without damage.

STANDARD CONTROL VALVE HOOK-UP DIAGRAM (WITH SMART POSITIONER)

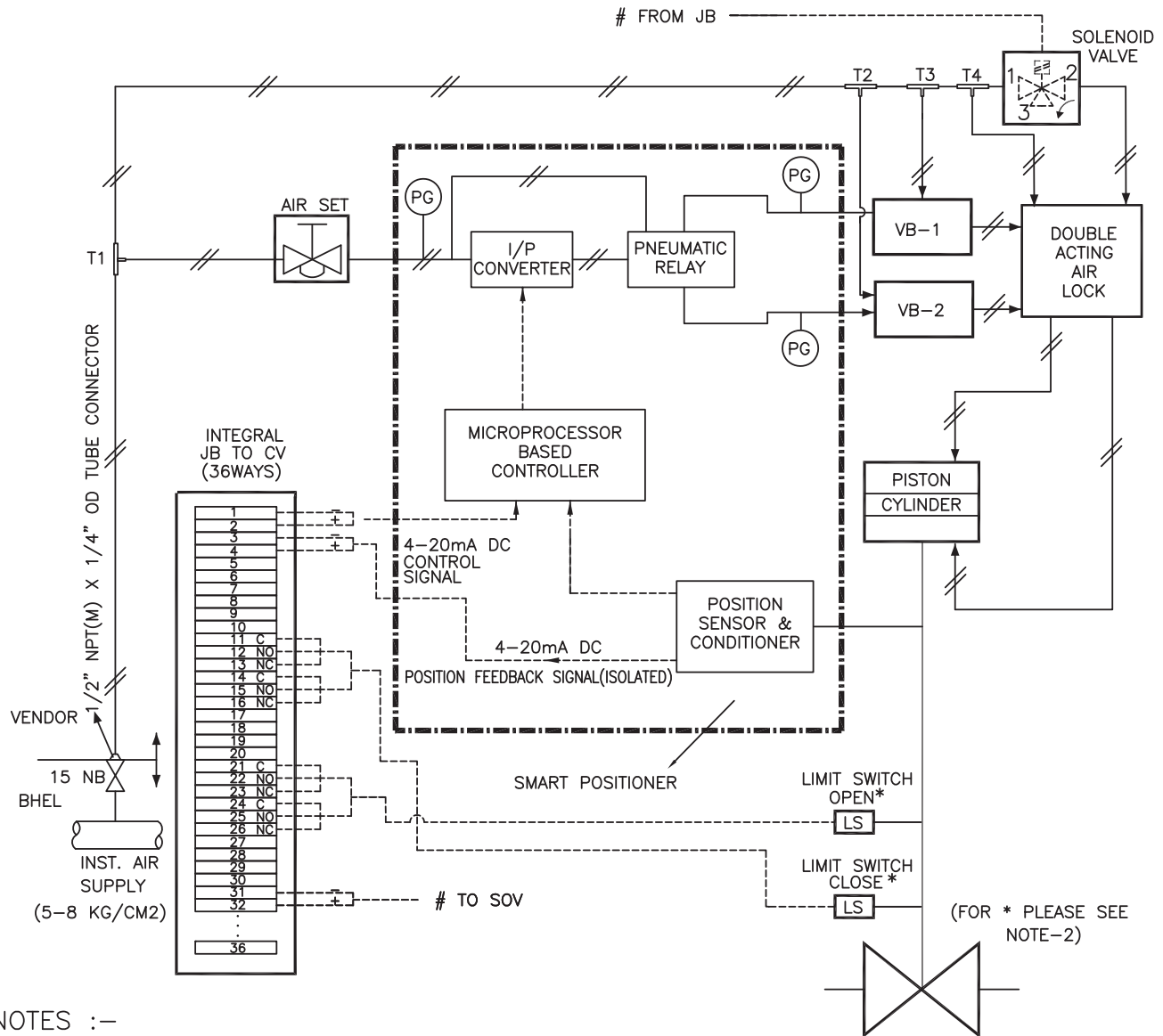


NOTES :-

1. POSITION OF EACH VALVE ON SUPPLY AIR FAILURE / ELECTRICAL SIGNAL FAILURE SHALL BE AS PER SPECIFICATION / DATA SHEET.
2. SOLENOID VALVE & LIMIT SWITCHES WILL BE PROVIDED ONLY FOR CONTROL VALVES IF INDICATED IN RESPECTIVE DATA SHEETS.
3. SOLENOID VALVES PORTS CONDITION:
PORT 1 AND 2 SHALL BE CONNECTED UNDER DE-ENERGISED CONDITION.
PORT 2 AND 3 SHALL BE CONNECTED UNDER ENERGISED CONDITION.
4. PRESSURE GAUGES REQUIRED FOR AIR SUPPLY & OUTPUT(S).
5. MOUNTING ACCESSORIES AS REQUIRED.
6. POSITION FEEDBACK SIGNAL SHALL BE 2 WIRE 4-20mA ISOLATED SIGNAL.
7. JB TERMINALS SHALL BE CAGE CLAMP TYPE SUITABLE FOR 2.5 SQ. MM COPPER WIRE. EXTERNAL CONNECTION, OF PLUG IN TYPE OR THROUGH CABLE GLAND, SHALL BE AS PER DATA SHEET
8. ALL APPLICABLE ACCESSORIES SHALL BE PROVIDED AS INDICATED IN THE INDIVIDUAL CONTROL VALVE DATA SHEET / ACCESSORIES DATA SHEET.
9. 12 METERS 1/4" PVC COATED COPPER / SS TUBING (AS PER ACCESSORIES DATA SHEET) & 1 SET OF FITTINGS TO BE SUPPLIED FOR EACH CONTROL VALVE FOR CONNECTION TO ISO VLV AT INST AIR HEADER ON ONE END AND TO AIR LOCK RELAY/AIR FILTER REGULATOR ON THE OTHER END. ALL THE BRASS / SS FITTINGS SHALL BE DOUBLE COMPRESSION TYPE.
10. VOLUME BOOSTER (ALONG WITH TEE-T2 AND RELATED TUBING & CONNECTORS) SHALL BE PROVIDED IF REQUIRED. AIR CONNECTION TO VOLUME BOOSTER FROM TEE-T2 SHALL BE PROVIDED.

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STANDARD CONTROL VALVE HOOK-UP DIAGRAM (DOUBLE ACTING PISTON ACTUATOR WITH SMART POSITIONER)



NOTES :-

- POSITION OF EACH VALVE ON SUPPLY AIR FAILURE / ELECTRICAL SIGNAL FAILURE SHALL BE AS PER SPECIFICATION / DATA SHEET. AIR LOCK SHALL BE PROVIDED ACCORDINGLY.
- SOLENOID VALVE & LIMIT SWITCHES WILL BE PROVIDED ONLY FOR CONTROL VALVES IF INDICATED IN RESPECTIVE DATA SHEETS.
- SOLENOID VALVES PORTS CONDITION:
PORT 1 AND 2 SHALL BE CONNECTED UNDER DE-ENERGISED CONDITION.
PORT 2 AND 3 SHALL BE CONNECTED UNDER ENERGISED CONDITION.
- PRESSURE GAUGES REQUIRED FOR AIR SUPPLY & OUTPUT(S).
- MOUNTING ACCESSORIES AS REQUIRED.
- POSITION FEEDBACK SIGNAL SHALL BE 2 WIRE 4-20mA ISOLATED SIGNAL.
- JB TERMINALS SHALL BE CAGE CLAMP TYPE SUITABLE FOR 2.5 SQ. MM COPPER WIRE. EXTERNAL CONNECTION, OF PLUG IN TYPE OR THROUGH CABLE GLAND, SHALL BE AS PER DATA SHEET
- ALL APPLICABLE ACCESSORIES SHALL BE PROVIDED AS INDICATED IN THE INDIVIDUAL CONTROL VALVE DATA SHEET / ACCESSORIES DATA SHEET.
- 12 METERS 1/4" PVC COATED COPPER / SS TUBING (AS PER ACCESSORIES DATA SHEET) & 1 SET OF FITTINGS TO BE SUPPLIED FOR EACH CONTROL VALVE FOR CONNECTION TO ISO VLV AT INST AIR HEADER ON ONE END AND TO AIR LOCK RELAY/AIR FILTER REGULATOR ON THE OTHER END. ALL THE BRASS / SS FITTINGS SHALL BE DOUBLE COMPRESSION TYPE.
- VOLUME BOOSTER (ALONG WITH TEE-T2 AND RELATED TUBING & CONNECTORS) SHALL BE PROVIDED IF REQUIRED. AIR CONNECTION TO VOLUME BOOSTER FROM TEE-T2 & TEE-T3 SHALL BE PROVIDED.



STANDARD

DRG.
No.

PES-145-06B

TITLE:-

CONTROL VALVE HOOK-UP DIAGRAM

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STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: PE-QP-999-145-I 006

SECTION II

ISSUE NO. 1 REV. NO. 00 DATE: 27.12.2016

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^s			Remarks
									P	W	V	
1.0	INCOMING MATERIAL											
1.1	Body & Bonnet casting / forgings, plug, valve stem, seat ring/cage.	1. Physical, Chemical properties	MA	Physical, Chemical tests	One/ Heat(HT Batch)	Approved drg. / data sheet /	Approved drg. / data sheet /	Test Certificate	3	---	2,1	TC for body/bonnet from foundry only
		2. Heat Treatment	MA	Review of H.T. Chart	Each H.T.	Approved drg. / data sheet /	Approved drg. / data sheet /	Test Certificate	3/2	2	1	1.IBR Certification (if applicable) to be verified by BHEL. 2.Applicable for body /bonnet only
		3. Internal quality of castings	MA	RT for Body & UT for Bonnet	100%	ASME B 16.34	ASME B 16.34	Test Report / FILM	3/2	2	1	Applicable for body and bonnet for rating ANSI 900 and above.
		4. Surface Quality	MA	1. Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2	
				2. MT/PT	100%	ASME B 16.34	ASME B 16.34	Test Certificate	3	2	1	After Machining on machined surface only
		5. Pressure test for shell	MA	Hyd. Test	100%	ISA-S-75.19/ ASME B 16.34	ISA-S-75.19/ ASME B 16.34	Test Certificate	2	2	1	For Body & Bonnet after machining.
1.2	Diaphragm	1. Surface Quality	MA	Visual	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2	

LEGEND: * CR - Critical characteristics
MA - Major characteristics
MI - Minor characteristics

RT- Radiographic Test
UT - Ultrasonic Test
PT - Dye penetrant Test
MT- Magnetic Test

\$ P - Agency Performing the Test.
W - Agency Witnessing the Test.
V - Agency Verifying the Test.

1 - BHEL
2 - Vendor
3 - Sub-vendor



STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-999-145-I 006**

SECTION II

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									P	W	V	
		2. Hardness	MA	Measurement	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2	
		3. Endurance / Life cycle	MA	Cyclic test 10,000 cycles	One / Type	10,000 cycles/ Mfr. standard.	No damage	Test Certificate	3/2	---	2,1	
1.3	Spring	1. Composition	MA	Chemical-Analysis	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2	
		2. Mech. Properties	MA	Mech. Test	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2	
		3. Performance	MA	1. Stiffness ratio	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2	
				2. Scragging	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2	
				3. Cyclic test (Endurance)	One / type	10,000 cycles	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
				4. Dimension (Measurement)	One sample/ Lot	Mfr. standard	Mfr. standard	Record	3	---	2	
1.4	Electrical items [Limit switches, Solenoids, Position Transmitter(if provided externally)]	1. Routine Test	MA	HV, IR, Continuity function	100%	Relevant Standards	Relevant Standards	Test Certificate	3	---	2	
		2. Degree of protection	MA	IP/NEMA Tests	One sample / type	Approved Data sheet	Approved Data sheet	Test Certificate	3	---	2,1	

LEGEND: * CR - Critical characteristics
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RT- Radiographic Test
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1 - BHEL
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3 - Sub-vendor

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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
1.5	Pressure Gauges	1. Performance	MA	Review of calibration certificates	100%	Mfr. Standard	Mfr. Standard	Test Certificate	3	---	2	
		2. Marking	MA	Visual	100%	Mfr. standard	Mfr. standard	Records	3	---	2	
2.0 IN PROCESS INSPECTION												
2.1	After machining, i, Body ii Bonnet iii Plug iv Valve Stem v seat ring/cage	1. Surface flaws	MA	Visual & MT/PT	100% (on accessible surfaces)	ASME B 16.34	ASME B 16.34	Test Records	2	---	1	Butt weld ends shall be included.
		2. Dimensional checks	MA	Measurement	100%	Mfr. Standard	Mfr. Standard	Records	2	---	1	
		3. Hard facing (wherever applicable)	MA	Hardness Measurement	One sample/Lot	Mfr. Standard	Mfr. Standard	Records	2	---	1	
3.0 TESTS ON COMPLETED VALVE												
3.1	Actuator Chamber	Leakage & Strength	MA	Pneumatic test	100%	Mfr. Standard	No Leakage	Test Certificate	2	1	1	Refer Note-4
3.2	Body	Leakage and Pressure test (Body Mount Leakage)	MA	Hydro test	100%	ISA - S-75.19/ ASME B16.34	No Leakage	Test Certificate	2	1	1	Refer Note-4
3.3	Seat leakage test for completed valve	Seat Leakage	MA	Pneumatic Test	100%	FCI-70.2	FCI-70.2	Test Certificate	2	1	1	Refer Note-4
4.0	OPERATION TEST ON COMPLETED VALVE (Final inspection)	1. Valve Travel	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		2. Opening/Closing time	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		3. Linearity/cam characteristic	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
LEGEND: * CR - Critical characteristics RT- Radiographic Test PT – Dye penetrant Test ^{\$} P - Agency Performing the Test. 1 - BHEL MA - Major characteristics UT – Ultrasonic Test MT- Magnetic Test W - Agency Witnessing the Test. 2 - Vendor MI - Minor characteristics V - Agency Verifying the Test. 3 - Sub-vendor												



STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency \$			Remarks
									P	W	V	
		4. Repeatability	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		5. Hysteresis	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		6. Sensitivity	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		7. Accuracy (Overall)	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		8. Control Valve characteristics / CV Test	MA	♦ Measurement (Press. vs. discharge and discharge vs. opening 0-100% in steps of 10%)	One per type	Mfr. Procedure	Approved drg. / data sheet	Test Certificate	2	--	1	♦ Size = Body & port size Or Body size & CV for non std port. Refer Note 1.
		9. Operation of limit switch & solenoids and other accessories	MA	Function	100%	Mfr. Procedure	Approved drg./ data sheet	Test Report	2	1	1	On assembled valve Refer Note-4
		10. Overall dimensions	MI	Visual and dimensional	100%	Approved drg. / data sheet	Approved drg./ data sheet	Records	2	1	1	Refer Note-4
		11. Pre defined valve position in case of air failure	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	1	1	
		12. Cleanliness, painting, stamping (for direction of flow), Tag No.	MA	Visual and dimensional, paint thickness	100%	Mfr. Procedure	Approved drg./ data sheet	Test Certificate	2	1	1	
		13. Surface Quality	MA	Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2,1	

LEGEND: * CR - Critical characteristics
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		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)						QUALITY PLAN NO.: PE-QP-999-145-I 006				
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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency \$			Remarks
									P	W	V	
5.0	AUXILIARY ITEMS (Performance test of auxiliary items shall be performed on the completely assembled valve)											
5.1	Positioner	Overall leakage after assembly including Nozzles leakage	MA	Leak Test (in the steady state input signal)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	---	Certificate of Conformance (C.O.C)
5.2	Air filter regulator	1. Normal air consumption	MA	Measurement	Each type	Mfr. Standard	No leakage	Test Certificate	3/2	---	---	(C.O.C)
		2. Overall leakage	MA	Visual (soap solution)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	---	(C.O.C)
5.3	Air lock relay	Performance Test	MA	Leakage test	100%	Mfr. Standard	No leakage	Test Certificate	3/2	---	---	(C.O.C)
5.4	Electronic position transmitter(not applicable if provided integral to smart positioner)	1. Accuracy	MA	Operation	100%	Approved data sheet /	Approved data sheet /	Test Certificate	2	1	---	(C.O.C)
5.5	Current to Pneumatic converter(not applicable for smart positioner)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	---	(C.O.C)
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	---	(C.O.C)
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	---	(C.O.C)
		4. Hysteresis	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	---	(C.O.C)
5.6	Smart Positioner	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	---	(C.O.C)

LEGEND:	* CR - Critical characteristics MA - Major characteristics MI - Minor characteristics	RT- Radiographic Test UT – Ultrasonic Test	PT – Dye penetrant Test MT- Magnetic Test	\$ 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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		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)						QUALITY PLAN NO.: PE-QP-999-145-I 006				
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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
	(As Applicable)	2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	---	(C.O.C)
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	---	(C.O.C)
		4. Hysteresis	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	---	(C.O.C)
		5. Calibration with Hand Held Communicator	MA	Measurement	Each type	Mfr. Standard	Mfr. Standard	Test Certificate	2	---	---	(C.O.C)
6.0	PAINTING	Soundness of Painting	MA	Visual and Measurement	100%	Mfr. Standard	Mfr. Standard	Inspection Report	2	---	---	Refer Note-2
7.0	PACKING	Soundness of Packing against transit damage	MA	Visual	100%	Mfr. Standard	Mfr. Standard	Inspection Report	2	---	---	Refer Note-3

NOTES:

1. In case valid CV test certificate for a similar control valve(same size, same CV, same trim characteristics) is not submitted to BHEL by the vendor, CV test shall be conducted at FCRI/Any govt. approved laboratory/ BHEL approved Laboratory.
2. In the absence of BHEL spec. for painting, vendor to obtain BHEL's approval on their painting specification / procedure.
3. Sea worthy packing shall be provided, if called for in the Data sheets.
4. The quantum of check shall be 100% for manufacturer and 10% for BHEL/BHEL nominated inspection agency.
5. IBR certificates in Form III-C shall be submitted if called for in the specification/datasheet.
6. Copies of all TC's(Test Certificates) for materials duly correlated with Heat Nos., TC's for electrical items and mechanical tests(Leak/Operation), C.O.C's(Certificates of Conformance) shall be submitted to BHEL for verification and acceptance.

LEGEND: * CR - Critical characteristics MA - Major characteristics MI - Minor characteristics		RT- Radiographic Test UT – Ultrasonic Test	PT – Dye penetrant Test MT- Magnetic Test	^{\$} 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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STANDARD QUALITY PLAN FOR STEAM DESUPERHEATER

QUALITY PLAN NO.: **PE-QP-999-145-I 006**

SECTION II

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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency \$			Remarks
									P	W	V	

1.0	Raw Materials											
1.1	Pipes	Mechanical & Chemical Prop.		Mechanical & Chemical	100%	Appd Specn./ Data Sheet/Drg.	Appd Specn./ Data Sheet/Drg.	TC	3/2	-	1	Correlation required
		Leakproofness		Hydraulic test	100%	-do-	-do-	TC	3/2	-	1	
		Dimensions		Measurement	100%	-do-	-do-	IR	3/2	-	1	
1.2	Forging	Physical & Chemical Prop.		Physical & Chemical Prop.	1/heat	Appd Specn./ Data Sheet/Drg.	Appd Specn./ Data Sheet/Drg.	TC	3/2	-	1	Correlation required
		Dimensions		Measurement	100%	-do-	-do-	IR	3/2	-	1	
		Heat Treatment		Scrutiny	100%	-do-	-do-	HT/SR Chart	3/2	-	1	Correlation required
2.0	In Process											
2.1	Forgings	Internal defects		U.T	100%	ASTMA 435	ASTMA 435	IR	3/2	-	1	
2.2	Machining Body Internals Body	Dimensions		Measurement	100%	Appd.Drg.	Appd.Drg.	IR	3/2	-	1	Correlation required
2.3		Surface Defects		D.P. Check	100%	ASTME165	ASME-B 16.34 ,Appendix-III	TC	3/2	-	1	
2.4	WPS,PQR,WPQ	WPS,PQR,WPQ		Physical	100%	ASME Sec-IX/IBR	ASME Sec-IX/IBR	Format	3/2	-	1	Records to be shown

LEGEND: * CR - Critical characteristics RT- Radiographic Test PT – Dye penetrant Test \$ P - Agency Performing the Test. 1 - BHEL
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 MI - Minor characteristics V - Agency Verifying the Test. 3 - Sub-vendor

		STANDARD QUALITY PLAN FOR STEAM DESUPERHEATER							QUALITY PLAN NO.: PE-QP-999-145-I 006				
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									P	W	V		
3.0	Final Inspection												
3.1	Assembly	Completeness and Marking		Visual	100%	Appd Specn./Data Sheet/Drg.	IR	3/2	1	-			
		Dimensional		Measurement	100%	Appd Specn./Data Sheet/Drg.	IR	3/2	1	-			
3.2	Pressure Test	Leak Proofness		Hydraulic Test	100%	-do-	IR	3/2	1	-			
4.0	Painting	Surface Prepn., Uniformity, Shade & Thick.		Visual, Measurement	100%	-do-	IR	3/2	-	1			
5.0	Packing	Soundness of Packing, Marking		Visual	100%	Appd Specn./Mfr.S standard	IR	3/2	-	1			
Note:: IBR –Certificate in Form III C shall be submitted.													

LEGEND: * CR - Critical characteristics RT- Radiographic Test PT – Dye penetrant Test \$ P - Agency Performing the Test. 1 - BHEL												
MA - Major characteristics UT – Ultrasonic Test MT- Magnetic Test W - Agency Witnessing the Test. 2 - Vendor												
MI - Minor characteristics V - Agency Verifying the Test. 3 - Sub-vendor												



**TECHNICAL SPECIFICATION FOR
AUXILIARY STEAM PRESSURE REDUCING &
DESUPERHEATING STATION**

SPEC. NO.: PE-TS-422-142-N101

SECTION II

REV. NO. 00

DATE 27.12.16

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance with following by signing/ stamping this compliance certificate and furnish same with the offer.

- a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions with regard to same.
- b) There is no other deviations w.r.t. specification other than those furnished in the 'Schedule of Technical Deviation/ Clarification'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn. The acceptance of the deviations is not binding on BHEL/ Customer.
- c) Bidder shall submit stamped QP on compliance basis in the event of order based on the guidelines given in the specification. In case, the bidder is supplying the item from outside India, the third party inspection shall be arranged and considered by the bidder in their offer.
- d) Any drawing/ document/ data-sheet/ calculation/ Quality plan/ Instrumentation etc. submitted along with the offer shall be considered for reference only, same shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.
- e) The offered materials shall be either equivalent or superior to those specified in the specification. For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.
- f) Bidder to confirm that any calculation/format required during the contract (in the event of order) to ascertain any calculated/selected value shall be furnished.
- g) Selection of valves and actuators are bidder's responsibility. Any change in selection of type of valve / sizing / percentage opening, calculations, QP, etc., if desired by BHEL / customer during approval of the documents after award of contract, without major changes in process parameters as per tender specification, shall be carried out by bidder without any commercial implication and time delay.
- h) All sub - vendors shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.



**TECHNICAL SPECIFICATION FOR
AUXILIARY STEAM PRESSURE REDUCING &
DESUPERHEATING STATION**

SPEC. NO.: PE-TS-422-142-N101

SECTION II

REV. NO. 00

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Data Sheet No. PES-145-06-DS2-1

DATA SHEET-B

**DATA SHEET – C FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR)
(TO BE FILLED BY THE BIDDER AFTER THE AWARD OF CONTRACT)**

GENERAL*	PROJECT	
	SERVICE	
	LOCATION	
	DUTY	
	PIPE SIZE (inlet / outlet)	
	PIPE MATERIAL (inlet / outlet)	
BODY	MODEL NUMBER	
	TYPE OF BODY : GUIDING : NO. OF PORTS	
	BODY SIZE : PORT SIZE : DESIGN CV	
	END CONNECTION & RATING (ANSI)	
	BODY MATERIAL	
	PACKING MATERIAL SINGLE / DOUBLE	
	BONNET TYPE	
	TRIM FORM	
	TRIM MATERIAL : SEAT PLUG	
	TRIM MATERIAL : CAGE GUIDE	
	FLOW	
	OUTLET VELOCITY	
	REQUIRED LEAKAGE CLASS	
	NOISE LEVEL (dBA)	
	VACUUM SERVICE	
	ANTI CAVITATION TRIM	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	
	CLOSE AT : OPEN AT (Kg / Cm ² g)	
	*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN	
	*VALVE POSN. ON SIGNAL AIR FAILURE	
	*VALVE POSN. ON SUPPLY AIR FAILURE	
ACCESSORIES	POSITIONER	
	AIR FILTER REGULATOR	
	AIR LOCK RELAY	
	POSITION LIMIT SWITCH	
	POSITION TRANSMITTER	
	SOLENOID VALVE	
	E / P CONVERTER	
	JUNCTION BOX	
	HAND WHEEL (SIDE MOUNTED)	
	LOCAL POSITION INDICATOR	
	ELECTRO PNEUMATIC POSITIONER	

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION				SPEC. NO.: PE-TS-422-142-N101				
					SECTION II				
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DATA SHEET-B									
DATA SHEET – C FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY THE BIDDER AFTER THE AWARD OF CONTRACT)									
PERFORMANCE OF VALVE	HYTERSIS								
	LINEARITY								
	SENSITIVITY								
	ACCURACY (Overall)								
SERVICE CONDITION*	SL.+ NO.	LOAD	FLOW (T/HR)	INLET PR. (KG/CM ² (A)	OUTLET PR. (KG/CM ² (A)	TEMP DEG. C	CALCULA TED CV	% VALVE LIFT	VALVE O/L VELOCITY
		VALVE TYPE							
		* MAX SHUT OFF PRESS ((KG/CM ² g)							
		* BODY DESIGN : PRESS ((KG/CM ² g) TEMP (DEG. C)							
		* IBR FORM III-C							
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.									
SEA WORTHY PACKING									

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-422-142-N101	
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Data Sheet No. PES-145-06-DS2-1

DATA SHEET-B

**DATA SHEET – C FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR)
(TO BE FILLED BY THE BIDDER AFTER THE AWARD OF CONTRACT)**

POSITIONER	MFR. & MODEL NUMBER				
	BYPASS	GAUGES	ENCL. CLASS		
	INPUT SIGNAL (Kg / Cm ²)				
	OUTPUT SIGNAL (Kg / Cm ²)				
AIR FILTER REGULATOR	MFR. & MODEL NUMBER				
	AIR SUPPLY PRESS (Kg / Cm ² g)				
	OUTPUT PRESS (Kg / Cm ² g)				
	OUTPUT GAUGE				
	FILTER SIZE				
AIR LOCK	MFR. & MODEL NUMBER				
	SET PRESS (Kg / Cm ²)				
	SUPPLY PRESS (Kg / Cm ²)				
	RESET TYPE				
	VENT PLUG				
LIMIT SWITCH	MFR. & MODEL NUMBER				
	OPEN posn	INT posn	CLOSE posn		
	CONTACT TYPE				
	RATING (AC / DC)				
	ENCLOSURE CLASS				
POSITION TRANSMITTER	MFR. & MODEL NUMBER				
	TYPE				
	SUPPLY				
	OUTPUT RATING				
	ACCURACY				
	ENCLOSURE CLASS				
SOLENOID VALVE	MFR. & MODEL NUMBER				
	RATING				
	OPERATION	QUANTITY			
	COIL INSULATION CLASS				
	ENCLOSURE CLASS				
HANDWHEEL	ORIENTATION				
JUNCTION BOX	NO. OF WAYS				
	SIZE				
	CABLE GLANDS (Size / Quantity)				
	ENCLOSURE CLASS				
	BODY MATERIAL				
I/P CONVERTER	INPUT SIGNAL	POWER SUPPLY			
	SPLIT RANGE				
	ENCLOSURE CLASS				
	LINEARITY				
	HYSTERISIS				
Cu. Tubing & Fittings / per CV	25 Meters of ¼ " PVC coated Cu. Tubing, with 1 set of Fittings for connection to IA Header on one end and accessories on another end of CV				
PAINTING	COLOUR/SHADE				
	THICKNESS (DFT)				
	TYPE				
			COMPANY SEAL		
			NAME		
			SIGNATURE		
			DATE		

		TITLE DATASHEET-C STEAM DESUPERHEATER			SPEC. NO.: PE-TS-422-142-N101	
					SECTION-II	
					SHEET 1 OF 2	
SL.NO.	ITEM	UNIT	PARTICULARS			
1.0	TYPE OF DESUPERHEATER	-				
2.0	MODEL NO.	-				
3.0	NUMBER OFFERED NOS.					
4.0	FLOW CAPACITY (OUTLET OF DESUPERHEATER)	T/HR				
5.0	STEAM PARAMETERS AT INLET					
5.1	PRESSURE	KG/CM ² A				
5.2	TEMPERATURE	°C				
5.3	FLOW T/HR					
6.0	STEAM PARAMETERS AT OUTLET					
6.1	PRESSURE	KG/CM ² A				
6.2	TEMPERATURE	°C				
7.0	SPRAY WATER PARAMETERS					
7.1	PRESSURE	KG/CM ² A				
7.2	QUANTITY	T/HR				
8.0	DESIGN PARAMETERS OF DESUPERHEATER BODY					
8.1	PRESSURE	KG/CM ² G				
8.2	TEMPERATURE	°C				
9.0	DESIGN PRESSURE OF SPRAY NOZZLE	KG/CM ² G				
10.0	TYPE OF SPRAY NOZZLE					
10.1	FIXED / VARIABLE AREA ORIFICE					
10.2	SINGLE HOLE / MULTI HOLE					
Name of Bidder / Vendor					Project	
Revision Number		0	1	2	3	BIDDER'S SEAL
Signature of Bidder / Vendor / Authorised Representative						
Date						

		TITLE DATASHEET-C STEAM DESUPERHEATER			SPECIFICATION NO: PE-TS-422-142-N101	
					SECTION-II	
					SHEET	2
SL.NO.	ITEM	UNIT	PARTICULARS			
11.0	NUMBER OF SPRAY NOZZLE / TURNDOWN RATIO					
12.0	SPRAY WATER NOZZLE CHARACTERISTICS					
13.0	SIZE OF ORIFICE	MM				
14.0	MIN. VELOCITY ACCEPTABLE IN THE DESUPERHEATER PIPE	M/SEC				
15.0	END CONNECTIONS TYPE & SIZE					
15.1	DESUPERHEATER INLET / OUTLET					
15.2	SPRAY WATER INLET					
16.0	MATERIAL OF CONSTRUCTION					
16.1	BODY					
16.2	SPRAY NOZZLE					
17.0	OVERALL DIMENSIONS	MM				
18.0	WEIGHT OF DESUPERHEATER	KG				
19.0	MOUNTING RECOMMENDATIONS (IF ANY)					
20.0	DESIGN CODE					
21.0	HYDRAULIC TEST PRESSURE	KG/CM ² G				
Name of Bidder / Vendor					Project	
Revision Number		0	1	2	3	BIDDER'S SEAL
Signature of Bidder / Vendor / Authorised Representative						
Date						



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

SPECIFICATION NO PE-TS-422-142-N101

DOCUMENT NO.

SECTION-II

REV. NO. 00

DATE : 24.12.2016

SUB-VENDOR LIST

PACKAGE WISE REGISTERED SUPPLIER LIST (PERMANENT CATEGORY) AS ON 12/26/2016 2:31:39 PM

SI No	Package Code	Package Name	Supplier Name	Supplier Communication Address	Supplier Works Address
285	145-25000-A	JUNCTION BOX	Shrenik & Company,	Mr. Mitesh Shah/Mr. Pulin Shah 39 A/3 ,Panchratna Industrial Estate, Sarkhej-Bavla Road Ahmedabad Phone- 9825024921 Pincode : 382213 Email : sales@pustron.com, pulin@sumip.com	Works-1->Mr.Pulin Shah/ Mr. Kaloesh Parmar 39 A/3 ,Panchratna Industrial Est,Sarkhej-Bavla Road, Changodhar -Ahmedabad-GUJARAT INDIA Phone- 98250 80339 1 FAX : 079-26932424 Pincode : 382213 Email : sales@sumip.com
286	145-25000-A	JUNCTION BOX	K.S.INSTRUMENTS PVT.LTD.	S Raghavan No. 72, 3rd Main, 1st Stage Industrial Suburb, Yeshwanthpur Bangalore Phone- 9880385770 Pincode : 560022 Email : sales1@ksinstruments.net	
287	145-25000-A	JUNCTION BOX	SUCHITRA INDUSTRIES	NO-2,OPP-27 AECS LAYOUT 2ND STG REJAMAHALVILAS EXTN 2ND STG BANGALORE Phone- Pincode : Email : suchitra.industriesblr@gmail.com	Works-1->B. Srinivas Suchitra Industries, Opp No 53, Muneshwara Black Devinagar, Lottagal hal -BANGALORE-KARNATAKA INDIA Phone- 080-23511247 FAX : Pincode : 560094 Email : suchitra_industries@yahoo.com
288	145-25000-A	JUNCTION BOX	AJMERIA INDUSTRIAL & ENGINEERING WORKS	JIGNESH MAHENDRA AJMERIA DENA BANK BLDG.,SHREE NAGESH INDL ESTATE,STATION ROAD, MUMBAI Phone- 022 67973578 Pincode : 400 088 Email : ajmera@ajmera.net, jmajmera@yahoo.com	Works-1->JIGNESH MAHENDRA AJMERIA DENA BANK BLDG., SHREE NAGESHINDL ESTATE,STATION ROAD, -MUMBAI-MAHARASHTRA INDIA Phone- 022 67973578 FAX : Pincode : 400 088 Email : ajmera@ajmera.net

PACKAGE NAME
AIR TRAP

SUPPLIER NAME
1. PENNANT ENGINEERING PVT LTD
2. FORBES MARSHALL STEAM SYSTEM PVT LTD



**TECHNICAL SPECIFICATION FOR
AUXILIARY STEAM PRESSURE REDUCING &
DESUPERHEATING STATION**

SPEC. NO.: PE-TS-422-142-N101

SECTION II

REV. NO. 00

DATE 27.12.16

SCHEDULE OF TECHNICAL DEVIATION/ CLARIFICATION

S. No.	Document Ref/ Title / Section	Page No.	Clause No.	Description	Deviation/ Clarification