

PVUNL-3X800MW PATRATU TPP PHASE-I

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

SPECIFICATION No: **PE-TS -434-142-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-434-142-N101	
		SECTION	CONTENTS (I & II)
		REV. NO.	00
		DATE	12.06.19

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SCOPE OF ENQUIRY



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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 Filled up Quality Plan as minimum technical requirements, is included in this specification in Sec-II. Bidder is required to submit the enclosed Quality Plan, while submitting the bid.
- 1.6 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.
- 1.7 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.
- 1.8 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.
- 1.9 Bidder to provide 2 years of Extended warranty over and above as mentioned in GCC-6.



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PROJECT INFORMATION

CLAUSE NO.	PROJECT INFORMATION			ଝାରଖଣ୍ଡ NTPC															
	PATRATU STPS EXPANSION PHASE-I (3X800 MW)																		
1.00.00	BACKGROUND A Memorandum of Agreement (MOA) has been entered on 29.07.2015 amongst Govt. of Jharkhand (GoJ), Jharkhand Urja Vikash Nigam Limited (JUVNL), Jharkhand UrjaUtpadan Nigam Limited (JUUNL), Jharkhand BijliVitaran Nigam Limited (JBVNL) and NTPC Limited to form a Joint Venture Company of NTPC Limited& JBVNL for transfer of Patratu Thermal Power Station (PTPS) located in Ramgarh District of Jharkhand State to the proposed JV Company for Performance Improvement of existing capacity & 4000 MW Capacity expansion of PTPS. Further to signing of JV agreement on 29.07.2015, a Joint Venture Company namely Patratu Vidyut Utpadan Nigam Limited (PVUNL) has been incorporated amongst GoJ, JUVNL, JBVNL and NTPC Ltd. on 15.10.2015. The Performance Improvement of existing capacity and 4000 MW Capacity expansion of Patratu STPS will be implemented by the JV Company (JVC). The configuration of expansion of 4000 MW shall consist of 5 units of 800 MW to be implemented in two phases; Phase-I: 3x800 MW and Phase-II: 2x800 MW. The present proposal is for Patratu STPS Phase-I (3x800 MW). The project is envisaged to be commissioned during XIII Plan period.																		
2.00.00	CAPACITY Patratu STPS Phase-I: 3x800 MW - Present proposal																		
3.00.00	MODE OF OPERATION Base Load																		
4.00.00	LOCATION AND APPROACH																		
4.01.00	Patratu Thermal Power station (PTPS) is located just outside the coal belt of South Karanpura in Ramgarh District of Jharkhand State. The nearest Railway Station is Patratu which is at a distance of about 4 km on Barkakhana-Barwadih Railway line.																		
4.02.00	The latitudes and longitudes of the site are as follows: <table><tr><th>Corner name</th><th>Latitude</th><th>Longitude</th></tr><tr><td>Top Corner</td><td>23° 38 ‘ 60 ‘ ‘ N</td><td>85° 17’ 51.5” E</td></tr><tr><td>Bottom Corner</td><td>23° 38 ‘12.5 ‘ ‘ N</td><td>85° 17’ 27” E</td></tr><tr><td>Left Corner</td><td>23° 38 ‘ 22.5 ‘ ‘ N</td><td>85° 17’ 10.6 ‘ ‘ E</td></tr><tr><td>Right Corner</td><td>23° 38 ‘ 40 ‘ ‘ N</td><td>85° 17’ 57 ‘ ‘ E</td></tr></table>				Corner name	Latitude	Longitude	Top Corner	23° 38 ‘ 60 ‘ ‘ N	85° 17’ 51.5” E	Bottom Corner	23° 38 ‘12.5 ‘ ‘ N	85° 17’ 27” E	Left Corner	23° 38 ‘ 22.5 ‘ ‘ N	85° 17’ 10.6 ‘ ‘ E	Right Corner	23° 38 ‘ 40 ‘ ‘ N	85° 17’ 57 ‘ ‘ E
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Top Corner	23° 38 ‘ 60 ‘ ‘ N	85° 17’ 51.5” E																	
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Left Corner	23° 38 ‘ 22.5 ‘ ‘ N	85° 17’ 10.6 ‘ ‘ E																	
Right Corner	23° 38 ‘ 40 ‘ ‘ N	85° 17’ 57 ‘ ‘ E																	
4.03.00	Airport The nearest commercial airport is Ranchi at about 45 km by road.																		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02	SUB-SECTION-IB PROJECT INFORMATION																



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SPECIFIC TECHNICAL REQUIREMENTS



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1.0 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 One "High capacity PRDS" with tapping from Main steam line to meet auxiliary steam requirements during unit start-up, low loads and the other "Low Capacity PRDS" with tapping off steam from CRH line to meet auxiliary steam requirements during normal running. Spray water required for desuperheating will be tapped off from CEP discharge. The HCPRDS will reduce the pressure and temperature of the steam tapped off from main steam line to 16 kgf/cm² (abs) & 290°C. The LCPRDS shall reduce the pressure of steam tapped from CRH line to 16 kgf/cm² (abs) and temperature in the range of 290°C to 325°C, depending upon the CRH parameters at corresponding load.

1.3 APRDS System comprises of:

S No	Description	Quantity (Per unit)	Total for the Plant
1	Combined Type High Capacity Pressure Reducing & Desuperheating Valve (On MS line) (ASV-22) (1" needle valve across ASV-22 valve body for warmup purpose shall be provided by bidder)	1	3
2	Low Capacity PRV (on CRH Line) (ASV-26)	1	3
3	Spray Control Valve for HC-PRDS (CDV-262 & CDV-265)	2 nos (1 no. against each tag)	6 nos (3 nos. against each tag)
4	Block valve in spray line (CDV-84)	1	3

1.4 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.
- ii) **Recommended Spares:** The bidder shall furnish a List of Recommended spares for 3 years of normal operation of the Control valves / Accessories. These are to be quoted separately & unit price to be indicated. The BHEL/Customer reserves the right to buy any or all of the recommended spares. The prices of these spares will remain valid for a period of minimum 6 months after the placement of order.
- iii) 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.
- iv) 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



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prevailing at site. Small items shall be packed in sealed transparent plastic bags with desiccators' packs as necessary.

v) Commissioning Spares: As applicable for the project

1.5 SPARES: The following spares are required to be offered:

a) START-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.

LIST OF COMMISSIONING SPARES

S.No.	ITEM DESCRIPTION	QUANTITY REQUIRED
1	Gaskets	One (1) set with each control valve
2	Gland Packings	One (1) set with each control valve
3	SS Tubing	25 Meters of ¼ " SS Tubing, with 1 set of Fittings for each CV & Connector for connection to IA Header on one end and accessories on another end of CV.

b) LIST OF MANDATORY SPARES

Auxiliary Steam Pressure Reducing & Desuperheating System		
High Capacity PRDS System (i.e for ASV-22)		
a)	Steam pressure reducing cum desuperheating valves	2 no
b)	Stem	2 no.
c)	Disc	3 no.
d)	Body seat rings	4 nos. for each type, size and rating of valves
e)	Gland packings	4 nos. for each type, size and rating of valves
f)	Pressure Seal Ring	6 nos.
g)	Gasket	4 nos.
For Spray Water Line Control Valve (i.e. for CDV-262,CDV-265)		
a)	Valve trim (including cage, plug, stem, seat rings, guide bushings etc.)	1 set for each type of control valves



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Low Capacity PRDS System (i.e for ASV-26)

a)	Steam pressure reducing valve	2 no.
b)	Stem	2 no.
c)	Disc	3 no.
d)	Body seat rings	2 nos. for each type/size
e)	Gland packings	4 nos. for each type, size and rating of valves
f)	Pressure Seal Ring	5 nos.
g)	Gaskets	2 nos.

Actuators & Accessories for each control Valve

a)	Pneumatic and electro-hydraulic actuator assembly	10% or 1 no. of each type, model and rating, whichever is more.
b)	Diaphragms, O' rings, seals etc. of all types make etc.	100%
c)	Pressure Gauges of all types, make, rating etc.	10% or 2 nos. of each type whichever is more
d)	Solenoid valves (if applicable)	10% or 2 nos. of each type whichever is more
e)	Positioner units / smart positioners (complete unit) & accessories (link assembly)	10% or 1 no. of each type whichever is more
f)	Pneumatic air-filter/Regulator of each type, make rating etc.	10% or 2 Nos., whichever is more
g)	Air lock relays	10% or 2 nos. of each type whichever is more

Pneumatically operated Block Valves, Actuators & Accessories (CDV-84)

a)	Pneumatic actuator assembly	10% or 1 no. of each type, model and rating, whichever is more.
b)	Diaphragms, O' rings, seals etc. of all types make etc.	100%
c)	Limit switches (complete unit) & accessories (link assembly)	10% or 2 nos., whichever is more
d)	Pneumatic air-filter/Regulator of each type, make rating etc.	10% or 2 Nos., whichever is more



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1.6 Specific Requirements:

- 1 Valve Body Sizes shall be quoted to take care of the specification requirements like parameters, and limitations of Fluid outlet velocities, Noise Level etc. However, Port (Trim) Sizes shall be selected to suit CV requirement for achieving percentage valve lift as per Technical Specification.
- 2 Facility to adjust the maximum travel of the stem & starting point of travel shall be incorporated.
- 3 SS nameplate to control valve shall include Tag no./ KKS no./ Sl. No./ Body material/ size/ Press Rating/ Trim material/ Trim type/ action on air failure/ diaphragm air press at full open and close condition.
- 4 Hand wheel shall have open/ close direction.
- 5 Limit switch shall be designed for 1,00,000 operations.
- 6 The material of filter for Air Filter Regulator shall be Sintered bronze.
- 7 For valves (all sizes) coming on A335 P92 or equivalent pipe line, body material shall be ASTM A182 F92 or equivalent and of forged construction.
- 8 In case during erection/commissioning of the control valve, any spares are required which have not been specified in the Start-up/commissioning spares list, the same will have to be supplied by the bidder free of cost.



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SIZING DATA SHEET- A-1

SIZING DATA FOR COMBINED AUXILIARY STEAM PRDS (ASV-22), SPRAY CONTROL VALVE (CDV-262/CDV-265) & SPRAY BLOCK VALVE (CDV-84)

SL.NO.	PARAMETERS	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	MECH. DESIGN
1.0	INLET OF COMBINED AUX. PRDS (ASV-22)									
1.1	PRESSURE (kgf/cm² (a))	27.00	90.00	110.00	115.00	270.00	115.00	85.00	270.00	298.7
1.2	TEMP. (°C)	265.00	405.00	425.00	535.00	600.00	455.00	360.00	600.00	608
1.3	FLOW (T/Hr)	BIDDER TO CALCULATE								
2.0	OUTLET OF COMBINED AUX. PRDS (ASV-22)									
2.1	PRESSURE (kgf/cm² (a))	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	21.00
2.2	TEMP. (°C)	247.60	290.00	290.00	290.00	290.00	290.00	289.56	290.00	350.00
2.3	FLOW (T/Hr)	63.45	85.95	123.95	129.95	201.65	105.45	167.95	225.00	
3.0	INLET OF SPRAY BLOCK VALVE (CDV-84)									
3.1	PRESSURE (kgf/cm² (a))	20.00	20.00	20.00	20.00	27.00	20.00	20.00	27.00	48.00
3.2	TEMP. (°C)	59.50	59.50	59.50	59.50	59.50	59.50	59.50	59.50	70.00
3.3	FLOW (T/Hr)	BIDDER TO CALCULATE								
4.0	INLET OF SPRAY CONTROL VALVE (CDV-262/265)									
4.1	PRESSURE (kgf/cm² (a))	BIDDER TO DECIDE								48.00
4.2	TEMP.(°C)	59.50	59.50	59.50	59.50	59.50	59.50	59.50	59.50	70.00
4.3	FLOW (T/Hr)	BIDDER TO CALCULATE								

NOTE:

- Case-1 is the capability check point for PRV ASV-22. Case-8 is the capability check point for Spray Water control valves.
- Low capacity steam pressure reducing valve (i.e.ASV-26) at upstream parameters (62.36 kgf/cm²(a),363.2°C) & downstream parameters (16 kgf/cm²(a)) at 95% valve lift shall corresponds to passing capability of High capacity steam pressure reducing valve (i.e.ASV-22) at upstream parameters (270 kgf/cm²(a), 600°C) & downstream parameters (16 kgf/cm²(a), 290°C) min. flow at 15% approx. valve lift.
- Bidder to furnish VWO flow rates (t/hr) for ASV-22 as per following table:



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	Conditions	VWO flow (in T/hr) at 100% lift
CASE-1	Upstream pressure = 298.7 kgf/cm ² (a) Upstream temperature = 608 deg.C Downstream pressure = 22 kgf/cm ² (a)	
CASE-2	Upstream pressure = 270 kgf/cm ² (a) Upstream temperature = 600 deg.C Downstream pressure = 22 kgf/cm ² (a)	

SIZING DATA SHEET- A-2

SIZING DATA FOR AUXILIARY STEAM PRDS (PRV (ASV-26))

SL.NO.	PARAMETERS	CASE-1	CASE-2	CASE-3	MECH. DESIGN
1.0	INLET OF PRV (ASV-26)				
1.1	PRESSURE (kgf/cm ² (a))	26.71	62.36	62.36	75.20
1.2	TEMPERATURE (°C)	320.80	363.20	363.20	382.00
1.3	FLOW (T/Hr)	10.45	10.45	35.00	
2.0	OUTLET OF PRV (ASV-26)				
2.1	PRESSURE (kgf/cm ² (a))	16.00	16.00	16.00	21
2.2	TEMPERATURE (°C)	309.00	319.38	319.38	350
2.3	FLOW (T/Hr)	10.45	10.45	35.00	-



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DATA SHEETS- A & B

AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION

	Technical specification for Control Valves with Accessories (Pneumatically Operated)		SPECIFICATION NO. PE-TS-434-142-N101	
			DOCUMENT NO.	
			VOLUME	
			SECTION I	
			ISSUE NO. 2	
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		SHEET		

Tag No.: ASV-22		Quantity: ONE (1) PER UNIT		Data Sheet No. PES-145-06-DS1-1
DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED-UP BY BIDDER)
GENERAL*	PROJECT	PVUNL-3X800MW PATRATU TPP PHASE-1		
	SERVICE	COMBINED TYPE MAIN STEAM TO AUX. STEAM PRDS (HC PRDS)		
	LOCATION	☒ INDOOR ☐ OUTDOOR		
	DUTY	☐ ON/OFF ☒ MODULATING		
	PIPE SIZE (inlet / outlet)	Ø 219.1x 47 Ø 457 x 9.53		
	PIPE MATERIAL (inlet / outlet)	SA 335 P92 SA 335 P22		
BODY	MODEL NUMBER	Bidder to specify		
	TYPE OF BODY : GUIDING : NO. OF PORTS	☐ GLOBE ☒ ANGLE ☐ TOP ☒ CAGE ONE		
	BODY SIZE : PORT SIZE : DESIGN CV	Bidder to specify		
	END CONNECTION & RATING (ANSI)	☒ BWE ☐ SWE ☐ FLANGED		
	BODY MATERIAL	☐ A216 WCB ☐ A217 WC6 ☐ A217 WC9 ☐ A217 C5 ☐ A351 CF8M ☒ SA182 F92		
	PACKING MATERIAL SINGLE / DOUBLE	☐ PTFE ☒ GRAFOIL ☐ DOUBLE ☒ SINGLE		
	BONNET TYPE	☐ STD ☐ EXTENDED ☒ FINNED		
	TRIM FORM	☐ LINEAR ☒ EQ. PERCENTAGE ☐ QUICK OPEN		
	TRIM MATERIAL : SEAT PLUG	☒ SS 316 STELLITED ☒ SS 316 STELLITED		
	TRIM MATERIAL : CAGE GUIDE	☒ SS 316 STELLITED ☒ SS 316 STELLITED		
	FLOW	☐ BELOW SEAT ☐ ABOVE SEAT		
	OUTLET VELOCITY	☐ < 8M/SEC (WATER) ☒ < 150M/SEC (STM)		
	REQUIRED LEAKAGE CLASS	☐ II ☐ III ☐ IV ☒ V ☐ VI		
	NOISE LEVEL (dBA)	LESS THAN 85 Dba (at 1m Distance)		
	VACUUM SERVICE	☐ YES ☒ NO		
	ANTI CAVITATION TRIM	☐ YES ☒ NO		
PNEUMATIC ACTUATOR (PISTON TYPE)	MODEL NO. & SIZE	Bidder to specify		
	CLOSE AT : OPEN AT (Kg / Cm ² g)	0.2 1.0		
	*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN	LESS THAN 10 SECS.		
	*VALVE POSN. ON SIGNAL AIR FAILURE	☐ TO OPEN ☒ TO CLOSE ☐ TO STAYPUT		
	*VALVE POSN. ON SUPPLY AIR FAILURE	STAYPUT		
ACCESSORIES*	POSITIONER (SMART)	☒ REQUIRED ☐ NOT REQUIRED		
	AIR FILTER REGULATOR	☒ REQUIRED ☐ NOT REQUIRED		
	AIR LOCK RELAY	☒ REQUIRED ☐ NOT REQUIRED		
	POSITION LIMIT SWITCH	☒ REQUIRED ☐ NOT REQUIRED		
	POSITION TRANSMITTER	PART OF SMART POSITIONER		
	SOLENOID VALVE	☒ REQUIRED ☐ NOT REQUIRED		
	E / P CONVERTER	PART OF SMART POSITIONER		
	JUNCTION BOX	REQUIRED		
	HAND WHEEL (SIDE MOUNTED)	REQUIRED		
	LOCAL POSITION INDICATOR	REQUIRED		
	(*refer pneumatic actuator datasheet for details)			

	Technical specification for Control Valves with Accessories (Pneumatically Operated)						SPECIFICATION NO. PE-TS-434-142-N101			
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							VOLUME			
							SECTION I			
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SHEET										
Tag No.: ASV-22							Quantity: ONE (1) PER UNIT		Data Sheet No. PES-145-06-DS1-1	
DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)							DATA SHEET – B (TO BE FILLED-UP BY BIDDER)			
PERFORMANCE OF VALVE	HYSTERSIS			± 1%						
	LINEARITY			± 1%						
	SENSITIVITY			± 0.5%						
	ACCURACY (Overall)			± 2%						
SERVICE CONDITION*	SL.+ NO.	LOAD	FLOW (T/HR)	INLET PR. (KG/CM ² (A)	OUTLET PR. (KG/CM ² (A)	TEMP DEG. C	CALCU- LATED CV	% VALVE LIFT	VALVE O/L VELOCITY	
		REFER SIZING DATA SHEET A-1 FOR HC PRDS								
	VALVE TYPE						☐ CAVITATION ☐ FLASHING ☒ HIGH DP			
	* MAX SHUT OFF PRESS ((KG/CM ² g)						297.7			
	* BODY DESIGN : PRESS ((KG/CM ² g) TEMP (DEG. C)						297.7	608		
	* IBR FORM III-C ☒ REQUIRED ☐ NOT REQUIRED									
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.										

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		SHEET		

Tag No.: ASV-26		Quantity: ONE (1) PER UNIT		Data Sheet No. PES-145-06-DS1-1
DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED-UP BY BIDDER)
GENERAL*	PROJECT	PVUNL-3X800MW PATRATU TPP PHASE-1		
	SERVICE	COLD REHEAT STEAM TO AUXILIARY STEAM PR. REDUCING VALVE (LC PRV)		
	LOCATION	☒ INDOOR ☐ OUTDOOR		
	DUTY	☐ ON/OFF ☒ MODULATING		
	PIPE SIZE (inlet / outlet)	Ø 114.3x6.02 Ø 219.1x12.7		
	PIPE MATERIAL (inlet / outlet)	SA 106 Gr C SA 106 Gr C		
BODY	MODEL NUMBER	Bidder to specify		
	TYPE OF BODY : GUIDING : NO. OF PORTS	☒ GLOBE ☐ ANGLE ☐ TOP ☒ CAGE ONE		
	BODY SIZE : PORT SIZE : DESIGN CV	Bidder to specify		
	END CONNECTION & RATING (ANSI)	☒ BWE ☐ SWE ☐ FLANGED		
	BODY MATERIAL	☐ A216 WCB ☐ A217 WC6 ☒ A217 WC9 ☐ A217 C5 ☐ A351 CF8M		
	PACKING MATERIAL SINGLE / DOUBLE	☐ PTFE ☒ GRAFOIL ☐ DOUBLE ☒ SINGLE		
	BONNET TYPE	☐ STD ☒ EXTENDED ☐ FINNED		
	TRIM FORM	☐ LINEAR ☒ EQ. PERCENTAGE ☐ QUICK OPEN		
	TRIM MATERIAL : SEAT PLUG	☒ SS 316 STELLITED ☒ SS 316 STELLITED		
	TRIM MATERIAL : CAGE GUIDE	☒ SS 316 STELLITED ☒ SS 316 STELLITED		
	FLOW	☐ BELOW SEAT ☐ ABOVE SEAT		
	OUTLET VELOCITY	☐ < 8M/SEC (WATER) ☒ < 150M/SEC (STM)		
	REQUIRED LEAKAGE CLASS	☐ II ☐ III ☐ IV ☒ V ☐ VI		
	NOISE LEVEL (dBA)	LESS THAN 85 Dba (at 1m Distance)		
	VACUUM SERVICE	☐ YES ☒ NO		
	ANTI CAVITATION TRIM	☐ YES ☒ NO		
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	Bidder to specify		
	CLOSE AT : OPEN AT (Kg / Cm ² g)	1 0.2		
	*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN	LESS THAN 10 SECS.		
	*VALVE POSN. ON SIGNAL AIR FAILURE	☒ TO OPEN ☐ TO CLOSE ☐ TO STAYPUT		
	*VALVE POSN. ON SUPPLY AIR FAILURE	STAYPUT		
ACCESSORIES*	POSITIONER (SMART)	☒ REQUIRED ☐ NOT REQUIRED		
	AIR FILTER REGULATOR	☒ REQUIRED ☐ NOT REQUIRED		
	AIR LOCK RELAY	☒ REQUIRED ☐ NOT REQUIRED		
	POSITION LIMIT SWITCH	☒ REQUIRED ☐ NOT REQUIRED		
	POSITION TRANSMITTER	PART OF SMART POSITIONER		
	SOLENOID VALVE	☒ REQUIRED ☐ NOT REQUIRED		
	E / P CONVERTER	PART OF SMART POSITIONER		
	JUNCTION BOX	REQUIRED		
	HAND WHEEL (SIDE MOUNTED)	REQUIRED		
	LOCAL POSITION INDICATOR	REQUIRED		
	(*refer pneumatic actuator datasheet for details)			

	Technical specification for Control Valves with Accessories (Pneumatically Operated)						SPECIFICATION NO. PE-TS-434-142-N101			
							DOCUMENT NO.			
							VOLUME			
							SECTION I			
							ISSUE NO. 2			
							REV. NO. 00		DATE: 12.06.2019	
SHEET										
Tag No.: ASV-26							Quantity: ONE (1) PER UNIT		Data Sheet No. PES-145-06-DS1-1	
DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED-UP BY BIDDER)		
PERFORMANCE OF VALVE	HYSTERSIS			± 1%						
	LINEARITY			± 1%						
	SENSITIVITY			± 0.5%						
	ACCURACY (Overall)			± 2%						
SERVICE CONDITION*	SL.+ NO.	LOAD	FLOW (T/HR)	INLET PR. (KG/CM ² (A)	OUTLET PR. (KG/CM ² (A)	TEMP DEG. C	CALCU- LATED CV	% VALVE LIFT	VALVE O/L VELOCITY	
		REFER SIZING DATA SHEET A-2 FOR LC PRV								
	VALVE TYPE						☐ CAVITATION ☐ FLASHING ☒ HIGH DP			
	* MAX SHUT OFF PRESS ((KG/CM ² g)						74.2			
	* BODY DESIGN : PRESS ((KG/CM ² g) TEMP (DEG. C)						74.2	382		
	* IBR FORM III-C ☒ REQUIRED ☐ NOT REQUIRED									
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.										

	Technical specification for Control Valves with Accessories (Pneumatically Operated)	SPECIFICATION NO. PE-TS-434-142-N101	
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		REV. NO. 00	DATE: 12.06.2019
SHEET			

Tag No.: CDV-262 & CDV-265		Quantity: TWO (2) PER UNIT (ONE AGAINST EACH TAG)		Data Sheet No. PES-145-06-DS1-1		
DATA SHEET – A & B						
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED-UP BY BIDDER)		
GENERAL*	PROJECT	PVUNL-3X800MW PATRATU TPP PHASE-1				
	SERVICE	SPRAY TO COMBINED PRDS CONTROL VALVE				
	LOCATION	☒ INDOOR ☐ OUTDOOR				
	DUTY	☐ ON/OFF ☒ MODULATING				
	PIPE SIZE (inlet / outlet)	Ø 60.3 x 5.54		Ø 60.3 x 5.54		
	PIPE MATERIAL (inlet / outlet)	SA 106 Gr B SA 106 Gr B				
BODY	MODEL NUMBER	Bidder to specify				
	TYPE OF BODY : GUIDING : NO. OF PORTS	☒ GLOBE ☐ ANGLE	☐ TOP ☒ CAGE	ONE		
	BODY SIZE : PORT SIZE : DESIGN CV	Bidder to specify				
	END CONNECTION & RATING (ANSI)	☐ BWE ☒ SWE ☐ FLANGED				
	BODY MATERIAL	☒ A216 WCB ☐ A217 WC6 ☐ A217 WC9 ☐ A217 C5 ☐ A351 CF8M				
	PACKING MATERIAL SINGLE / DOUBLE	☐ PTFE ☒ GRAFOIL ☐ DOUBLE ☒ SINGLE				
	BONNET TYPE	☒ STD ☐ EXTENDED ☐ FINNED				
	TRIM FORM	☐ LINEAR ☒ EQ. PERCENTAGE ☐ QUICK OPEN				
	TRIM MATERIAL : SEAT PLUG	☒ SS 316 STELLITED		☒ SS 316 STELLITED		
	TRIM MATERIAL : CAGE GUIDE	☒ SS 316 STELLITED		☒ SS 316 STELLITED		
	FLOW	☐ BELOW SEAT ☐ ABOVE SEAT				
	OUTLET VELOCITY	☒ < 8M/SEC (WATER)		☐ < 150M/SEC (STM)		
	REQUIRED LEAKAGE CLASS	☐ II ☐ III ☐ IV ☒ V ☐ VI				
	NOISE LEVEL (dBA)	LESS THAN 85 Dba (at 1m Distance)				
	VACUUM SERVICE	☐ YES ☒ NO				
	ANTI CAVITATION TRIM	☐ YES ☒ NO				
	PNEUMATIC ACTUATOR	MODEL NO. & SIZE	Bidder to specify			
		CLOSE AT : OPEN AT (Kg / Cm ² g)	0.2 1.0			
*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN		LESS THAN 10 SECS.				
*VALVE POSN. ON SIGNAL AIR FAILURE		☐ TO OPEN ☒ TO CLOSE ☐ TO STAYPUT				
*VALVE POSN. ON SUPPLY AIR FAILURE		STAYPUT				
ACCESSORIES*	POSITIONER (SMART)	☒ REQUIRED ☐ NOT REQUIRED				
	AIR FILTER REGULATOR	☒ REQUIRED ☐ NOT REQUIRED				
	AIR LOCK RELAY	☒ REQUIRED ☐ NOT REQUIRED				
	POSITION LIMIT SWITCH	☒ REQUIRED ☐ NOT REQUIRED				
	POSITION TRANSMITTER	PART OF SMART POSITIONER				
	SOLENOID VALVE	☒ REQUIRED ☐ NOT REQUIRED				
	E / P CONVERTER	PART OF SMART POSITIONER				
	JUNCTION BOX	REQUIRED				
	HAND WHEEL (SIDE MOUNTED)	REQUIRED				
	LOCAL POSITION INDICATOR	REQUIRED				
	(*refer pneumatic actuator datasheet for details)					

	Technical specification for Control Valves with Accessories (Pneumatically Operated)						SPECIFICATION NO. PE-TS-434-142-N101		
							DOCUMENT NO.		
							VOLUME		
							SECTION I		
							ISSUE NO. 2		
							REV. NO. 00		DATE: 12.06.2019
SHEET									
Tag No.: CDV-262 & CDV-265 Quantity: TWO (2) PER UNIT (ONE AGAINST EACH TAG) Data Sheet No. PES-145-06-DS1-1									
DATA SHEET – A & B									
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)							DATA SHEET – B (TO BE FILLED-UP BY BIDDER)		
PERFORMANCE OF VALVE	HYSTERSIS			± 1%					
	LINEARITY			± 1%					
	SENSITIVITY			± 0.5%					
	ACCURACY (Overall)			± 2%					
SERVICE CONDITION*	SL.+ NO.	LOAD	FLOW (T/HR)	INLET PR. (KG/CM ² (A)	OUTLET PR. (KG/CM ² (A)	TEMP DEG. C	CALCU- LATED CV	% VALVE LIFT	VALVE O/L VELOCITY
		REFER SIZING DATA SHEET A-1 FOR HC PRDS							
	VALVE TYPE						☐ CAVITATION ☐ FLASHING ☐ HIGH DP		
	* MAX SHUT OFF PRESS ((KG/CM ² g)						47		
	* BODY DESIGN : PRESS ((KG/CM ² g) TEMP (DEG. C)						47		70
	* IBR FORM III-C ☐ REQUIRED ☒ NOT REQUIRED								
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.									

	Technical specification for Control Valves with Accessories (Pneumatically Operated)	SPECIFICATION NO. PE-TS-434-142-N101	
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		VOLUME	
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SHEET			

Tag No.: CDV-84		Quantity: ONE (1) PER UNIT		Data Sheet No. PES-145-06-DS1-1		
DATA SHEET – A & B						
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED-UP BY BIDDER)		
GENERAL*	PROJECT	PVUNL-3X800MW PATRATU TPP PHASE-1				
	SERVICE	BLOCK VALVE FOR APRDS SPRAY LINE				
	LOCATION	☒ INDOOR ☐ OUTDOOR				
	DUTY	☒ ON/OFF ☐ MODULATING				
	PIPE SIZE (inlet / outlet)	Ø 60.3 x 5.54		Ø 60.3 x 5.54		
	PIPE MATERIAL (inlet / outlet)	SA 106 Gr B SA 106 Gr B				
BODY	MODEL NUMBER	<i>Bidder to specify</i>				
	TYPE OF BODY : GUIDING : NO. OF PORTS	☒ GLOBE ☐ ANGLE	☐ TOP ☒ CAGE	ONE		
	BODY SIZE : PORT SIZE : DESIGN CV	<i>Bidder to specify</i>				
	END CONNECTION & RATING (ANSI)	☐ BWE ☒ SWE ☐ FLANGED				
	BODY MATERIAL	☒ A216 WCB ☐ A217 WC6 ☐ A217 WC9 ☐ A217 C5 ☐ A351 CF8M				
	PACKING MATERIAL SINGLE / DOUBLE	☐ PTFE ☒ GRAFOIL ☐ DOUBLE ☒ SINGLE				
	BONNET TYPE	☒ STD ☐ EXTENDED ☐ FINNED				
	TRIM FORM	☐ LINEAR ☐ EQ. PERCENTAGE ☒ QUICK OPEN (ON/OFF)				
	TRIM MATERIAL : SEAT PLUG	☒ SS 316 STELLITED		☒ SS 316 STELLITED		
	TRIM MATERIAL : CAGE GUIDE	☒ SS 316 STELLITED		☒ SS 316 STELLITED		
	FLOW	☐ BELOW SEAT ☐ ABOVE SEAT				
	OUTLET VELOCITY	☒ < 8M/SEC (WATER)		☐ < 150M/SEC (STM)		
	REQUIRED LEAKAGE CLASS	☐ II ☐ III ☐ IV ☒ V ☐ VI				
	NOISE LEVEL (dBA)	LESS THAN 85 Dba (at 1m Distance)				
	VACUUM SERVICE	☐ YES ☒ NO				
	ANTI CAVITATION TRIM	☐ YES ☒ NO				
	PNEUMATIC ACTUATOR	MODEL NO. & SIZE	<i>Bidder to specify</i>			
		CLOSE AT : OPEN AT (Kg / Cm ² g)	0.2 1.0			
*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN		LESS THAN 10 SECS.				
*VALVE POSN. ON SIGNAL AIR FAILURE		☐ TO OPEN ☒ TO CLOSE ☐ TO STAYPUT				
*VALVE POSN. ON SUPPLY AIR FAILURE		STAYPUT				
ACCESSORIES*	POSITIONER (SMART)	☐ REQUIRED ☒ NOT REQUIRED				
	AIR FILTER REGULATOR	☒ REQUIRED ☐ NOT REQUIRED				
	AIR LOCK RELAY	☒ REQUIRED ☐ NOT REQUIRED				
	POSITION LIMIT SWITCH	☒ REQUIRED ☐ NOT REQUIRED				
	POSITION TRANSMITTER	☐ REQUIRED ☒ NOT REQUIRED				
	SOLENOID VALVE	☒ REQUIRED ☐ NOT REQUIRED				
	E / P CONVERTER	☐ REQUIRED ☒ NOT REQUIRED				
	JUNCTION BOX	REQUIRED				
	HAND WHEEL (SIDE MOUNTED)	REQUIRED				
	LOCAL POSITION INDICATOR	REQUIRED				
	(*refer pneumatic actuator datasheet for details)					

	Technical specification for Control Valves with Accessories (Pneumatically Operated)	SPECIFICATION NO. PE-TS-434-142-N101	
		DOCUMENT NO.	
		VOLUME	
		SECTION I	
		ISSUE NO. 2	
		REV. NO. 00	DATE: 12.06.2019
SHEET			

Tag No.: CDV-84				Quantity: ONE (1) PER UNIT				Data Sheet No. PES-145-06-DS1-1		
DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED-UP BY BIDDER)		
PERFORMANCE OF VALVE	HYSTERSIS			± 1%						
	LINEARITY			± 1%						
	SENSITIVITY			± 0.5%						
	ACCURACY (Overall)			± 2%						
SERVICE CONDITION*	SL.+ NO.	LOAD	FLOW (T/HR)	INLET PR. (KG/CM ² (A)	OUTLET PR. (KG/CM ² (A)	TEMP DEG. C	CALCU- LATED CV	% VALVE LIFT	VALVE O/L VELOCITY	
		REFER SIZING DATA SHEET A-1 FOR HC PRDS								
	VALVE TYPE						☐ CAVITATION ☐ FLASHING ☐ HIGH DP			
	* MAX SHUT OFF PRESS ((KG/CM ² g)						47			
	* BODY DESIGN : PRESS ((KG/CM ² g) TEMP (DEG. C)						47		70	
	* IBR FORM III-C ☐ REQUIRED ☒ NOT REQUIRED									
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.										



Technical specification for Control Valves with Accessories (Pneumatically Operated)

SPECIFICATION NO.: **PE-TS-434-145-1104**VOLUME **II-B**SECTION **C**

REV. NO. 00

DATE: 18.06.19

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

Data Sheet No. PES-145-06-DS1-1

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 (SMART) WITH HART PROTOCOL	MFR. & MODEL NUMBER				
	BYPASS	GAUGES	ENCL. CLASS	☐ YES ☒ NO	☐ THREE ☒ TWO ☒ IP-65
	INPUT SIGNAL (Kg / Cm ²)		☒ 0.2 – 1.0 ☐ 0.2 – 0.6 ☐ 0.6 – 1.0		
	OUTPUT SIGNAL (Kg / Cm ²)		TO SUIT ACTUATOR		
AIR FILTER REGULATOR	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		5 MICRON		
	OUTPUT GAUGE		☒ 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 240V AC AND 0.2A 220V DC		
	ENCLOSURE CLASS		☒ IP 65 ☐		
POSITION TRANSMITTER	MFR. & MODEL NUMBER		PART OF SMART 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	☐ Stayput ☐ Interlock ☐ 1 ☐ 2		
	COIL INSULATION CLASS		CLASS - H		
	ENCLOSURE CLASS		☒ IP 65 ☐ NEMA 4 ☐		
HANDWHEEL	ORIENTATION		☐ TOP MOUNTED ☒ SIDE MOUNTED		
JUNCTION BOX	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	BODY MATERIAL		☒ FRP ☐ SS ☐ METAL SHEET		
	INPUT SIGNAL	POWER SUPPLY	PART OF SMART POSITIONER		
	SPLIT RANGE				
	ENCLOSURE CLASS				
	LINEARITY				
HYSTERESIS					
Tubing & Fittings / per CV	This is in addition to Tubing and fittings which are integral part of CV		15 Meters of ¼ " 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 ☐		
	THICKNESS (DFT) – in microns				
	TYPE		☒ EPOXY ☐ ENAMEL ☐		
					COMPANY SEAL
					NAME
					SIGNATURE
					DATE

CUSTOMER REQUIREMENT

CONTROL VALVES AND ACTUATORS

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	CONTROL VALVES, ACTUATORS & ACCESSORIES			
1.00.00	CONTROL VALVES, ACTUATORS & ACCESSORIES			
1.01.00	General Requirements			
1.01.01	The control valves and accessories equipment furnished by the Bidder shall be designed constructed and tested in accordance with the latest applicable requirements of code for pressure piping ANSI B 31.1, the ASME Boiler & pressure vessel code, Indian Boiler Regulation (IBR), ISA, and other standards specified elsewhere as well as in accordance with all applicable requirements of the “Federal Occupational Safety and Health Standards, USA” or acceptable equal standards. All the Control Valves, their actuators and accessories to be furnished under this Sub-section will be fully suitable and compatible with the modulating loops covered under the Specification.			
1.01.02	All the control valves and accessories offered by the Bidder shall be from reputed, experienced manufacturers of specified type and range of valves.			
1.01.03	For special type of control valves such as combined pressure and temperature control valves for Aux PRDS application, separator drain control valves, refer to the corresponding mechanical sections.			
1.01.04	Specification for control valves in this Sub-section has to be read in conjunction with other relevant Sub-sections of this specification.			
1.02.00	CONTROL VALVE SIZING & CONSTRUCTION			
1.02.01	The design of all valve bodies shall meet the specification requirements and shall conform to the requirements of ANSI (USA) for dimensions, material thickness and material specification for their respective pressure classes.			
1.02.02	The valve sizing shall be suitable for obtaining maximum flow conditions with valve opening at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 10% of total valve stem travel. All the valves shall be capable of handling at least 120% of the required maximum flow. Further, the valve stem travel range from minimum flow condition to maximum flow condition shall not be less than 50% of the total valve stem travel. The sizing shall be in accordance with the latest edition of ISA handbook on control valves. While deciding the size of valves, Bidder shall ensure that valves outlet velocity as defined in ISA handbook does not exceed 8 m/sec for liquid services, 150 m/sec. for steam services and 50% of sonic velocity for flashing services. Bidder shall furnish the sizing calculations clearly indicating the outlet velocity achieved with the valve size selected by him as well as noise calculations, which will be subject to Employer's approval during detailed engineering.			
1.02.03	Control valves for steam and water applications shall be designed to prevent cavitation, wire drawing, flashing on the downstream side of valve and down stream piping. Thus for cavitation/flashing service, only valve with anti cavitation trim shall be provided. Detailed calculations to establish whether cavitation will occur or not for any given application shall be furnished.			
1.02.04	VACANT			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS:9585-001-2	SUB-SECTION-IIIC-08 CONTROL VALVES, ACTUATORS & ACCESSORIES	PAGE 1 OF 6

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
1.02.05	The control valve induced noise shall be limited to 85 dBA at 1 meter from the valve surface under actual operating conditions. The noise abatement shall be achieved by valve body and trim design and not by use of silencers except for few cases as per contractor's standard and proven practice subject to employer's approval.			
1.02.06	Control valves for steam and water application shall be provided with rangability of 30:1 for all services except for applications wherein control valves are envisaged to be operated in lower range like Reheater spray and superheater spray system wherein control valve with rangability of 50:1 shall be provided			
2.00.00	VALVE CONSTRUCTION			
2.01.00	All valves shall be of globe body design & straightaway pattern with single or double port, unless other wise specified or recommended by the manufacturer to be of angle body type. Rotary valve may alternatively be offered when pressure and pressure drops permit.			
2.02.00	Valves with high lift cage guided plugs & quick-change trims shall be supplied.			
2.03.00	Cast Iron valves are not acceptable.			
2.04.00	Bonnet joints for all control valves shall be of the flanged and bolted type or other construction acceptable to the Employer. Bonnet joints of the internal threaded or union type will not be acceptable.			
2.05.00	Plug shall be of one-piece construction cast, forged or machined from solid bar stock. Plug shall be screwed and pinned to valve stems or shall be integral with the valve stems.			
2.06.00	All valves connected to vacuum on down stream side shall be provided with packing suitable for vacuum applications (e.g. double vee type chevron packing)			
2.07.00	Valve characteristic shall match with the process characteristics.			
2.08.00	Extension bonnets shall be provided when the maximum temperature of flowing fluid is greater than 280 deg. C.			
2.09.00	Flanged valves shall be rated at no less then ANSI press class of 300 lbs.			
3.00.00	VALVE MATERIALS			
	Sr. No.	Service	Body material	Trim Material
	1	Non-corrosive, non-flashing and non-cavitation service except DM water	Carbon steel ASTM-A216 Gr. WCB for design fluid temperature below 275 Deg. C Alloy steel ASTM-A217Gr. WC6 for design fluid temperature above 275 Deg. C and upto 400 Deg. C Alloy steel ASTM-A217Gr. WC9 for design fluid temperature above 400 Deg. C	316SS stellited with stellited faced guide posts and bushings.
	2.	Severe flashing/cavitati on services	Alloy steel ASTM-A217 Gr. WC9	440 C
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS:9585-001-2		SUB-SECTION-IIIC-08 CONTROL VALVES, ACTUATORS & ACCESSORIES
PAGE 2 OF 6				

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	3.	Low flashing/cavitation on service	Alloy steel ASTM-A217 Gr. WC6 17-4 PH SS	
	4.	DM water service	316 SS	316 SS
	NOTE: (a) Valve body rating shall meet the process pressure and temperature requirement as per ANSI B16.34.			
	(b) Severe flashing / cavitation services includes as a minimum all control valves whose downstream piping is connected to condenser or flash tank.			
	However, Bidder may offer valves with body and trim materials better than specified materials and in such cases Bidder shall furnish the comparison of properties including cavitation resistance, hardness, tensile strength, strain energy, corrosion resistance and erosion resistance etc. of the offered material vis-a-vis the specified material for Employer's consideration and approval.			
	Contractor shall ensure that all required measures like proper selection of anti-corrosive/erosive material along with durable epoxy coating with polyurethane finish shall be provided for all the C&I equipment/ devices being supplied in this contract, which are mounted in non-AC areas (prone to sea water environment corrosion / erosion) like measuring instruments, control valves & actuators, JBs, LIEs / LIRs, impulse pipes, sample pipes, fittings, conduits, cable trays and accessories, local control panels, erection hardware items etc. Contractor shall furnish their comprehensive proposal regarding the anti-corrosion/ erosion measures for protection against sea water environment which shall be finalized during detailed engineering subject to Employer's approval.			
4.00.00	END PREPARATION			
	Valve body ends shall be either butt welded/socket welded			
	The welded ends wherever required shall be butt welded type as per ANSI B 16.25 for control valves of sizes 65 mm and above. For valves size 50 mm and below welded ends shall be socket welded as per ANSI B 16.11.			
5.00.00	VALVE ACTUATORS			
	All control valves shall be furnished with pneumatic actuators except for pressure and temperature control valve for auxiliary PRDS application (electro-hydraulic / pneumatically operated) and separator drain control valve (electro-hydraulic type).The Bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut off pressure and leakage class requirements. The valve actuators shall be capable of operating at 60 deg.C continuously.			
	Valve actuators and stems shall be adequate to handle the unbalanced forces occurring under the specified flow conditions or the maximum differential pressure specified. An adequate allowance for stem force, at least 0.15 Kg/sq.cm. per linear millimeter of seating surface, shall be provided in the selection of the actuator to ensure tight seating unless otherwise specified.			
	The travel time of the pneumatic actuators shall not exceed 10 seconds.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS:9585-001-2		SUB-SECTION-IIIC-08 CONTROL VALVES, ACTUATORS & ACCESSORIES
PAGE 3 OF 6				

CLAUSE NO.	TECHNICAL REQUIREMENTS			
6.00.00	CONTROL VALVE ACCESSORY DEVICES			
6.01.00	All pneumatic actuated control valve accessories such as air locks, hand wheels/hand-jacks, limit switches, microprocessor based electronic Positioner, diffusers, external volume chambers, position transmitters (capacitance or resistance type only), reversible pilot for Positioner, tubing and air sets, solenoid valves and junction boxes etc. shall be provided as per the requirements.			
7.00.00	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER			
	1	Electrical	a) Input Demand Signal	4-20 mA
			b) Power Supply	Loop Powered from the output card of Control System.
			c) HART Protocol	Compatibility for Remote Calibration & Diagnostics (Super-imposed 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-65 Minimum
	3	Software for Configuration and Diagnostics	Software	Software shall meet the requirements for Configuration, Diagnostics, Calibration and Testing of the actuator.
			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 (Pr Vs Valve travel and Travel Vs 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
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS:9585-001-2	SUB-SECTION-IIIC-08 CONTROL VALVES, ACTUATORS & ACCESSORIES	PAGE 4 OF 6

CLAUSE NO.	एनटीपीसी NTPC TECHNICAL REQUIREMENTS			
			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. (In case the fail freeze feature is not intrinsic to the positioner, Bidder shall achieve the 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	¼" NPT
	10	Performance	Characteristic deviation	<=0.5 % of span.
			Ambient temp effect	<=0.01 %/ deg C or better.
	10	EMC & CE Compliance	Required to International Standard like EN/IEC.	EN50081-2 & EN50082 or equivalent.
	11	Accessories	In-built Operator Panel	Display with push buttons for configuration and display on the positioner itself (Password protected/Hardware lock).
			Hand Held Hart Calibrator	Universal Hart Calibrator to be provided (for quantity, refer Part-A: Contract quantities of the specification).
			Press Gauge Block	For supply & output pressures, Air Filter Regulator 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
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS:9585-001-2		SUB-SECTION-IIIC-08 CONTROL VALVES, ACTUATORS & ACCESSORIES PAGE 5 OF 6

CLAUSE NO.	TECHNICAL REQUIREMENTS			
			ingress.	
		Valves Mounting Assembly	For Sliding Stem/Rotary/Single acting/Double acting actuators on as required basis	
	* Note: The HART signals shall be picked up from marshalling terminals of DDCMIS (SG/TG DDCMIS as well as BOP DDCMIS), as applicable. The details of the above mentioned HART management system specification are mentioned in HART system (Annexure IIIC-02C to DDCMIS). The positioners shall be monitored from this HART management system .To achieve this, Bidder shall provide the necessary software to achieve the functionalities described above under " Software for Configuration and Diagnostics", and this software shall be loaded in the HART management system.			
8.00.00	TEST AND EXAMINATION			
	All valves shall be tested in accordance with the quality assurance programme agreed between the Employer and Contractor, which shall meet the requirements of IBR and other applicable codes mentioned elsewhere in the specifications. The tests shall include but not be limited to the following:			
8.01.00	Non Destructive Test as per ANSI B-16.34.			
8.02.00	Hydrostatic shell test in accordance with ANSI B 16.34 prior to seat leakage test.			
8.03.00	Valve closure test and seat leakage test in accordance with ANSI-B 16.34/ FCI 70.2 standard and as per the leakage class indicated above			
8.04.00	Functional Test: The fully assembled valves including actuators control devices and accessories shall be functionally tested to demonstrate times from open to close position.			
8.05.00	CV Test: Please refer CI No. 1.00.00 & 3.00.00 OF Sub-section- IIIC-10 (Type test requirements), Control Valves.			
	Bidder shall furnish all the control valves under this main plant package as finalized during detailed engineering stage without any price repercussions whatsoever depending on the process requirements. All the control valves provided by the Bidder for this project shall meet the specifications requirements specified herein. Specification for control valves in this Sub-section has to be read in conjunction with other relevant Sub-sections of this specification.			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X 800MW)		TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS:9585-001-2		SUB-SECTION-IIIC-08 CONTROL VALVES, ACTUATORS & ACCESSORIES
PAGE 6 OF 6				



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

SPEC. NO.: PE-TS-434-142-N101

SECTION II

REV. NO. 00

DATE 12.06.19

SPECIFICATION FOR CONTROL VALVES



SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)

SPECIFICATION NO.: PE-TS-434-145-I801

DOCUMENT NO.: PES – 145 - 06

VOLUME

SECTION II

ISSUE NO. 2

REV. NO. 00

DATE : 18.06.19

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 Control valve (with Pneumatic/Electric Actuator as identified in the datasheet-A) for use in Utility/Captive Power Station/Combined Cycle 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)	:	FCI-70.2
Allowable Seat leakage	:	ANSI-B16.34
Pressure & Temperature ratings	:	IEC-144 / NEMA / IS-13947
Enclosure class	:	ISA S-75
Control Valves Sizing	:	IS-9334
Electric Motor operated Actuators	:	

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 $\geq 3"$ 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 The trim material and body material has been specified in the Datasheet-A. Bidder to offer body material and trim material combination as per the datasheet. 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. Double packing is mandatory for applications involving vacuum service. For valves where downstream is subjected to vacuum, flow action shall be "flow to close" (over the seat). Bonnets having Teflon packing shall have valve stem finished to 2-4 microns. Packing material requiring lubrication will not be acceptable.



SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)

SPECIFICATION NO.: PE-TS-434-145-I801

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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.

Cast Steel (CS) yokes shall be offered for CEP Minimum Recirculation valve/GSC minimum recirculation control valve. Cast Iron (CI) yokes are not acceptable for this service.

- 3.1.5 The valve end connection as specified in Data Sheet-A shall conform to ANSI B16.25 for Butt Weld connection, ANSI B16.11 for Socket Weld connection and ANSI B16.5 for flanged ends. 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 up to 50 NB and Butt Welded for sizes above 50 NB.
- 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, and the valve capacity shall be selected so as to meet the following:
- | | | | | |
|--|---|---|---|--------------------|
| Valve with Linear Characteristic | - | Normal Flow (Design Point) | : | 70-75% valve lift. |
| | - | Max. Flow | : | 90% valve lift. |
| | - | Min. Flow | : | >10% valve lift. |
| Valve with Equipercantage Characteristic | - | Normal Flow (Design Point) | : | 75-85% valve lift. |
| | - | Max. Flow | : | 90% valve lift. |
| | - | Min. Flow | : | >10% valve lift. |
| ON/OFF Quick open Characteristic | - | 1.1 times the CV calculated on the basis of maximum flow condition. | | |
- The valve offered shall be capable of handling 120 % of the required maximum flow.
- 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 m/sec |
| ii) | Steam service | <= | 150 m/sec |
| iii) | Flashing service | <= | 50% of sonic velocity for flashing services. |
- 3.1.11 For flashing duty, trim design shall be such that the vapour bubbles are kept away from valve body.
- 3.1.12 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.
- 3.1.13 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 exceed 85 dBA (without pipe insulation). The offer shall include noise prediction calculations for each valve.



**SPECIFICATION FOR CONTROL VALVE
(WITH PNEUMATIC / ELECTRIC ACTUATOR)**

SPECIFICATION NO.: PE-TS-434-145-I801

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- 3.1.14 In case of predicted noise level above 85 dBA, same shall be brought down to acceptable noise level i.e. below 85 dBA 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.
- 3.1.15 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 either pneumatically (with pneumatic actuator) or electrically (with electric actuator).
For pneumatic actuator, clause nos. 3.2.1 through 3.2.6 to be followed.
- For electric actuator, please refer the technical specification for electric actuator (Refer Document No. PES-145-06D).
- 3.2.1 **Pneumatic Actuator**
- The actuator shall be designed for a thrust of 120% of valve's shut-off pressure at an airline supply pressure of 5 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.
- 3.2.5 The actuator's hand wheel shall have OPEN & CLOSE direction marking and clockwise rotation as viewed from front shall close the valve.
- 3.2.6 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 **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



**SPECIFICATION FOR CONTROL VALVE
(WITH PNEUMATIC / ELECTRIC ACTUATOR)**

SPECIFICATION NO.: PE-TS-434-145-I801

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- 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-vendor list –**
- The sub-vendors shall be as per the list enclosed elsewhere in this specification. In case the bidder proposes sub-vendors other than those listed in the specification, the same shall be subject to BHEL's/Customer's approval.
- 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.
- 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 along with the bid: 4 Sets**
- 6.1.1 Data sheet-B, completely filled-up along with all enclosures.
- 6.1.2 Schedule of prices in attached format (VOL.-III).
- 6.1.3 Quality Plan duly signed & stamped.
- 6.1.4 All relevant Catalogs with detailed technical information.



SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)

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

5 sets of the following documents for approval + 2 sets of CDs:

6.2.1 CONTROL VALVE DOCUMENTS (Drg. No. PE-VO-XXX-145-I004) including the following:-

- (a) Assembly (dimensional) drawings.
- (b) Valve Edge preparation details.
- (c) Data sheet-C completely filled-up.
- (d) Hook-up diagram of Control Valve with Actuator & Accessories.
- (e) Valve & Actuator assembly dimensional drawings with weights.
- (f) All calculations like CV, Noise Level, Valve Outlet Velocity, Actuator sizing etc.
- (g) All relevant catalogues for models of the valves as well as accessories finalized.

6.2.2 QUALITY PLAN (Drg. No. PE-QP-XXX-145-I006) duly signed and stamped.

6.3 Final documentation:

Documents / drawings to be furnished by the successful bidder shall be as follows:
15 sets with 6 CD-ROMS of:-

6.3.1 Category I & IV approved CONTROL VALVE DOCUMENTS

6.3.2 Test certificates

6.3.3 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.

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 enclosed (Refer specification no. PES-145-06C).

8.0 APPLICABLE DATA SHEET FORMS

This document shall be read with one or more of the following data sheet forms:

- Data sheet A&B for Control Valve with Pneumatic Actuator : Data sheet no. PES-145-06-DS1-1
- Data sheet C for Control Valve with Pneumatic Actuator : Data sheet no. PES-145-06-DS2-1

	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)	SPECIFICATION NO.: PE-TS-434-145-I801	
		DOCUMENT NO.: PES-145-06A	
		VOLUME.	
		SECTION II	
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1.0 Electrical

Input Signal	4-20mA
Power Supply	Loop Powered from the output card of Control System (12-30 V DC)
Hart Protocol	Compatibility For Remote Calibration & Diagnostic (Super-Imposed HART Signal On Input Signal (4-20mA)
Valve Position Feedback (4-20mA)	Position Sensing 4-20mA O/P Signal For Control System To Be Provided. If non contact type of Position feedback signal is required, Position transmitter to be separately provided.

2.0 Environment

Operating Temperature	(-) 30 To 80 Deg.C
Humidity	0-95%
Protection Class	IP-65 (Minimum)

3.0 Software For Configuration & Diagnostic

Software	Windows Based Software, Software Shall Meet The Requirement For Configuration, Diagnostics, Calibration And Testing Of the Actuator. Valve positioning timing, actuator leakage, and Valve Wear & tear, fault alarm to be offered as a minimum. Easily up gradable with same hardware and compatible with any HART management systems / AMS.
Diagnostic/Test Features (Optional)	Advanced Diagnostic Features Like Stroke On Line Partial Closure Test, Valve Signature Analysis (Online graphical representation), Step Response Test, Valve Friction/Jamming Detection Etc To Be Provided.

	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)	SPECIFICATION NO.: PE-TS-434-145-I108	
		DOCUMENT NO.: PES-145-06A	
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Factory Valve Signature Tests Reports (Pr Vs Valve Travel And Travel Vs I/P Signal) Are To Be Provided.

Hardware PC For Configuration/Software (OPTIONAL)

Test Certificates Test Certificates As Per Manufacture Standard/ Relevant Standard Are To Be Submitted.

Configuration / Remote Calibration, Auto & Manual Calibration Shall Be Possible.

4.0 Modes

Valve Action	Direct & Reverse, Valve Action. (Same positioner for Single Acting or Double Acting And no separate relays required for changing from Single acting to double).
Flow Characterization	Possible to fit valve characteristic curve linear & Equal percentage
Fail Safe/Fail Freeze (Optional)	Fail Safe/Fail Freeze feature is to be provided.

5.0 Performance

Characteristic Deviation	$\leq 0.75\%$ of span
Ambient temp effect	$\leq 0.01\%$ /Deg C or better.
Dead Band	Adjustable 0.1 to 10%.
Scan Time	10ms
Resolution	$\leq 0.05\%$
Sensitivity/Linearity	0.3-0.4% of FS
Repeatability	0.32% of FS
Auto-Tune	Yes

	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)	SPECIFICATION NO.: PE-TS-434-145-I108	
		DOCUMENT NO.: PES-145-06A	
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Leak Test Yes

7.0 EMC & CE compliance

Required International Standard Like EN/IEC. To En50081-2&En50082 or equivalent

8.0 Accessories

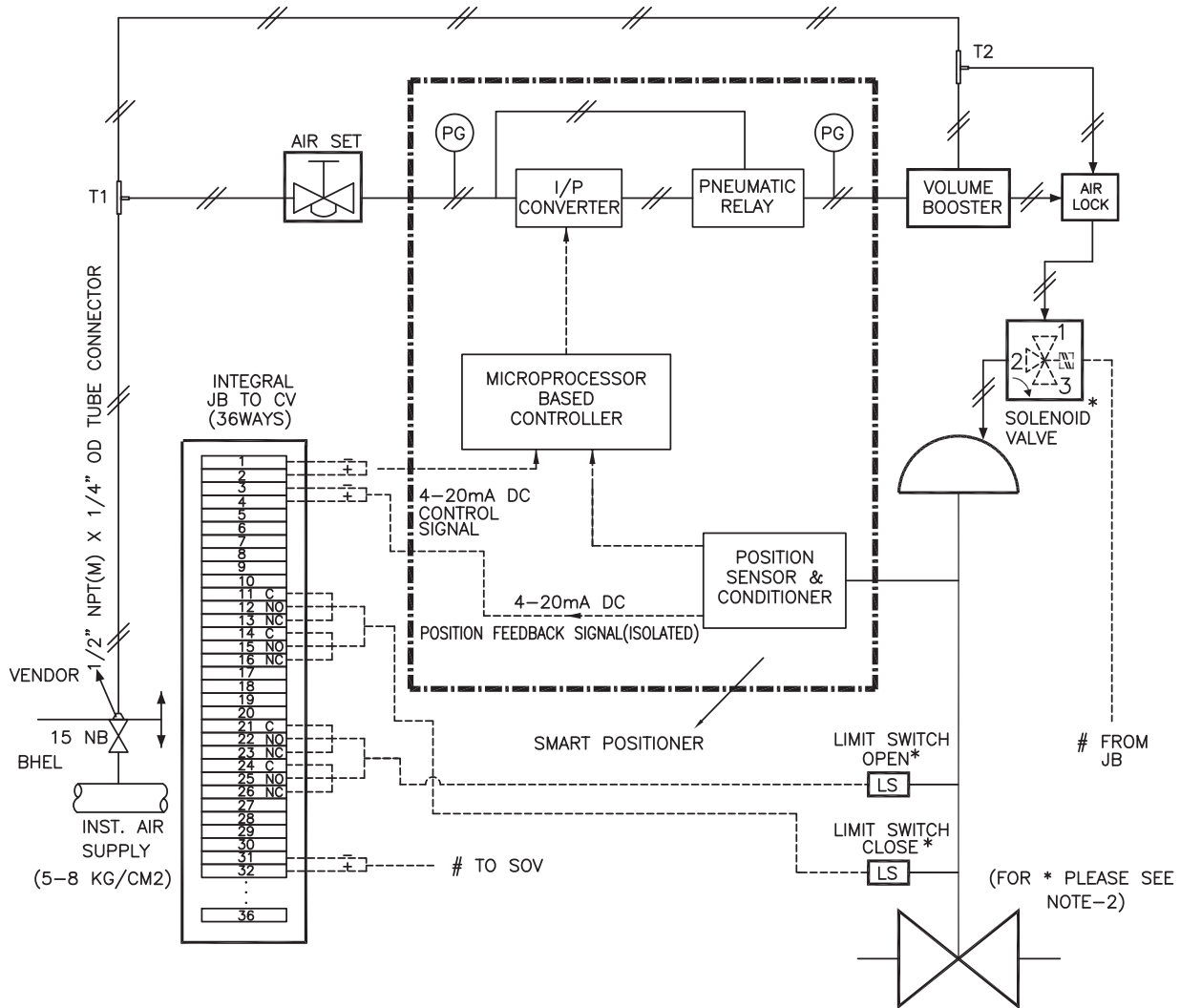
In Built Operator Panel Display With Push Buttons For Configuration And Display On The Positioner Itself

Hand Held Hart Calibrator (Optional) Universal Hart Calibrator To Be Provided, One Per Unit.

Press Gauge Block For Supply & Output Pr., Filter Regulator Other Accessories Shall Be Provided As On Required Basis For Making System Complete.

Electrical cable entry $\frac{1}{2}$ -Npt, side or bottom entry to avoid water Ingress.

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. 15 METERS 1/4" 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.



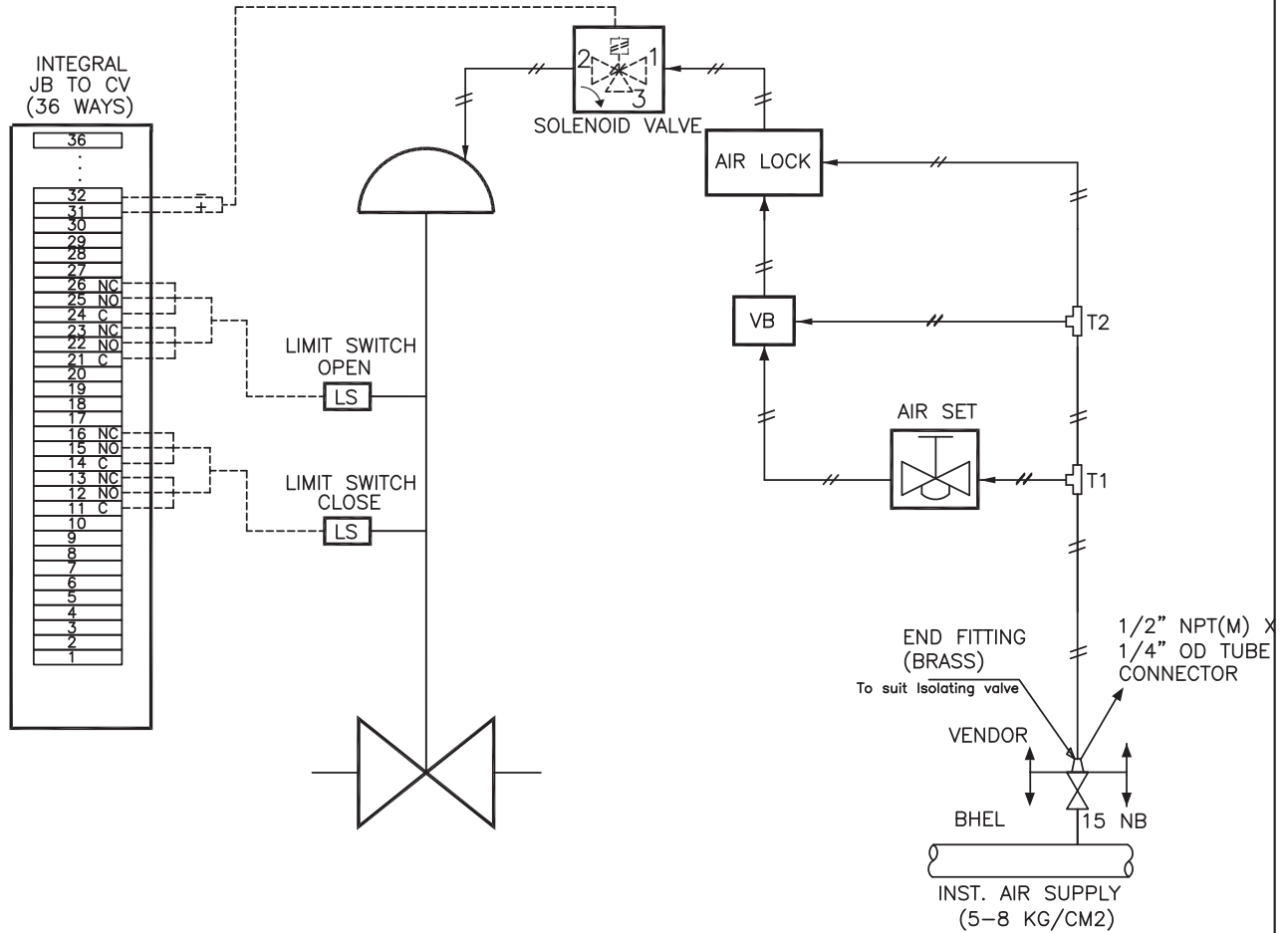
TITLE:-

CONTROL VALVE HOOK-UP DIAGRAM

DRG.
No.

PES-145-06B

CONTROL VALVE HOOK-UP DIAGRAM (FOR ON / OFF TYPE)



NOTES :-

1. POSITION OF EACH VALVE ON SUPPLY AIR FAILURE / ELECTRIC SIGNAL FAILURE SHALL BE AS PER SPECIFICATION / DATA SHEET.
2. 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.
3. MOUNTING ACCESSORIES AS REQUIRED.
4. 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.
5. ALL APPLICABLE ACCESSORIES SHALL BE PROVIDED AS INDICATED IN THE INDIVIDUAL CONTROL VALVE DATA SHEET / ACCESSORIES DATA SHEET.
6. 15 METERS 1/4" 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.



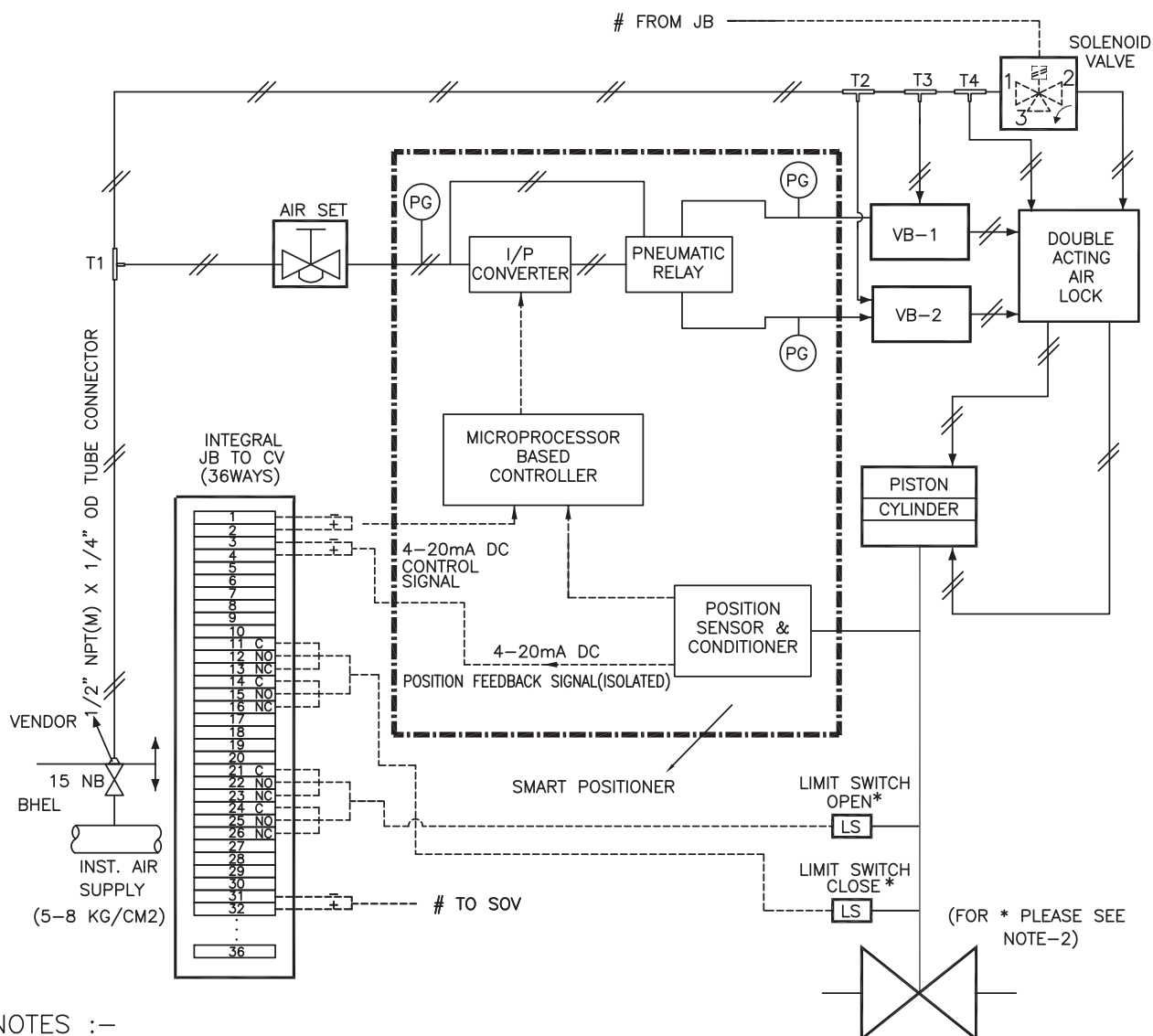
TITLE:-

CONTROL VALVE HOOK-UP DIAGRAM

DRG.
No.

PES-145-06B

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



NOTES :-

1. POSITION OF EACH VALVE ON SUPPLY AIR FAILURE / ELECTRICAL SIGNAL FAILURE SHALL BE AS PER SPECIFICATION / DATA SHEET. AIR LOCK SHALL BE PROVIDED ACCORDINGLY.
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. 15 METERS 1/4" 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 & TEE-T3 SHALL BE PROVIDED.



TITLE:-

CONTROL VALVE HOOK-UP DIAGRAM

DRG.
No.

PES-145-06B

	Technical specification for Control Valves with Accessories (Pneumatically Operated)	SPEC NO.: PE-TS-434-145-I108
		DOCUMENT NO.: PES-145-06C
		VOLUME
		SECTION II
		ISSUE NO. 2, REV. 00 DATE 24.12.2016

Guidelines for Packing

- ✓ 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.



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)



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

SPECIFICATION NO. **PE-TS-434-145-1801**

DOCUMENT NO. PE-QP-999-145-1006

VOLUME

SECTION **II**

ISSUE NO. 2

REV. NO. 00

DATE : 18.06.2019

QUALITY PLAN

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)												QUALITY PLAN NO.: PE-QP-999-145-I 006					
												VOLUME					
												SECTION II					
												ISSUE NO. 2		REV. NO. 00		DATE: 18.06.19	
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 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									

 PEM :: C&I		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)										QUALITY PLAN NO.: PE-QP-999-145-I 006											
												VOLUME											
												SECTION II											
												ISSUE NO. 2			REV. NO. 00		DATE: 18.06.19						
												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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भारतीय वैद्युत मशीन  PEM :: C&I		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)										QUALITY PLAN NO.: PE-QP-999-145-I 006				
VOLUME																
SECTION II																
ISSUE NO. 2 REV. NO. 00 DATE: 18.06.19																
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)			
		Soundness of Painting	MA	Visual and Measurement	100%	Mfr. Standard	Mfr. Standard	Inspection Report	2	---	---	---	Refer Note-2			
6.0	PAINING	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(not more than 3 yrs old from tender date) 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 MA MI	- Critical characteristics	RT- Radiographic Test	PT – Dye penetrant Test	\$ P - Agency Performing the Test.		1 - BHEL			
	- Major characteristics	UT – Ultrasonic Test	MT- Magnetic Test	W - Agency Witnessing the Test.		2 - Vendor			
	- Minor characteristics			V - Agency Verifying the Test.		3 - Sub-vendor			

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-434-142-N101	
		SECTION II	
		REV. NO. 00	DATE

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-434-142-N101

SECTION II

REV. NO.

00

DATE

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

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

DATA SHEET-C

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-434-142-N101			
						SECTION II			
						REV. NO.	00	DATE	
Tag No..... Quantity..... Data Sheet No. PES-145-06-DS2-1									
DATA SHEET-C									
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-434-142-N101		
		SECTION II		
		REV. NO.	00	DATE

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

DATA SHEET-C			
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 QU	ANTITY	
	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		
	HYSTERESIS		
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



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

SPEC. NO.: PE-TS-434-142-N101

SECTION II

REV. NO. 00

DATE 12.06.19

SCHEDULE OF TECHNICAL DEVIATION/ CLARIFICATION

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



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

SPEC NO.: PE-TS-434-145-I801

DOCUMENT NO.

VOLUME

SECTION II

ISSUE NO. 2

REV. NO. 00

DATE 18.06.19

SUB VENDOR LIST

(FOR ACCESSORIES)

SI. No.	ITEM DESCRIPTION	SUB-VENDORS
1.	SMART POSITIONER	ABB MASOLENIEN SIEMENS SAMR YOKOGAWA EMERSON(FISHER ROSEMOUNT) METSO YAMALKE MOORE
2.	JUNCTION BOX	K.S.INSTRUMENTS PVT.LTD. SUCHITRA INDUSTRIES Shrenik & Company, FLEXPPO ELECTRICALS PVT. LTD. AJMERA INDUSTRIAL & ENGINEERING WORKS