

MAHAGENCO-1X660 MW BHUSAWAL TPP

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

SPECIFICATION No: **PE-TS -415-142-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-415-142-N101	
		SECTION	CONTENTS (I & II)
		REV. NO.	00
		DATE	08.01.2020

CONTENTS

	<u>TITLE</u>	<u>PAGE NO.</u>
	<u>SECTION-I</u>	3-37
A	Scope of enquiry	
B	Project Information	
C	Specific Technical Requirements	
1.0	Brief System Description	
2.0	Sizing Data sheets (A-1 & A-2)	
3.0	Data Sheets (A & B) for APRDS Control Valves	
4.0	Tender Drawing	
5.0	Customer Requirement	
	<u>SECTION-II</u>	38-62
D	Standard specification for Control Valves	
1.0	Scope	
2.0	Codes And Standards	
3.0	Technical requirements	
4.0	Testing And Inspection	
5.0	Spares And Consumables	
6.0	Drawings And Documents	
7.0	Marking And Packing	
8.0	Specification for Micro Processor based Electronic Positioner (SMART)	
9.0	Hook-up Diagrams	
10.0	Guidelines for Packing	
11.0	Quality Plan for Control Valve	
12.0	Compliance Certificate	
13.0	Data Sheet-C for Control Valves	
14.0	Schedule of Technical Deviation/ Clarification	
15.0	Sub vendor list for Accessories	



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

SPEC. NO.: PE-TS-415-142-N101

SECTION I

REV. NO. 00

DATE
08.01.2020

SCOPE OF ENQUIRY



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

SPEC. NO.: PE-TS-415-142-N101

SECTION I

REV. NO. 00

DATE
08.01.2020

- 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.

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION		SPEC. NO.: PE-TS-415-142-N101
			SECTION I
	REV. NO.	00	DATE 08.01.2020

B. PROJECT INFORMATION

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 19 of 555
1.0 <u>INTRODUCTION</u> The proposed 1x 660 MW Bhusawal Thermal Power Project will be set up by Maharashtra State Power Generation Co. Ltd. (MAHAGENCO) in Dipnagar near Bhusawal, Maharashtra, India. The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given herein under is for general guidance and shall not be contractually binding on the Owner. All relevant site data/information as may be necessary shall have to be obtained /collected by the Bidder. 2.0 <u>APPROACH TO SITE</u> Deepnagar is well connected by rail and road. By road, it is about 8 Km from Bhusawal city. Nearest railway station is at Bhusawal. The nearest Airport is at Aurangabad. The nearest sea port is at Mumbai. The site is located on the Mumbai-Nagpur Highway. 3.0 <u>LAND</u> Bhusawal Thermal Power Plant is already having 1x62.5 MW + 2x210 MW Units and Two (2) Units of 500 MW each are under execution stage. About 108.94 Hectares of land is acquired by MAHAGENCO near existing TPS. It is proposed to install 1x 660 MW unit on this land. 4.0 <u>SOURCE OF COAL</u> Indian coal would be sourced from Machaakata coal blocks in Orissa state. The Coal will be received at Plant site directly by rail. The coal from the railway wagons would be unloaded by means of wagon tipplers and will be either bunkered or stacked in the stock pile at site. 5.0 <u>SOURCE OF WATER</u> The main source of water is considered Ozerkheda Reservoir which is located at around 18 km from plant site.		

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 20 of 555
6.0 <u>ASH DISPOSAL AREA</u> The ash generated from 1 x 660 MW unit shall be disposed off in slurry form to the existing Ash Pond located at Velhala, approx. 12 Km from the site.		
7.0 <u>PROJECT INFORMATION</u>		
7.1	Client / Owner	: Maharashtra State Power Generation Co. Ltd.
7.2	Consultant	: Procon Engineers, Navi Mumbai (Division of Nimoto Consulting Engineers Pvt. Ltd.)
7.3	Project Title	: BHUSAWAL T.P.S. UNIT – 6 : 1X660 MW
7.4	Location	: Dipnagar, Near Bhusawal, Maharashtra, India
7.5	Nearest railway station	: Bhusawal
7.6	Nearest Airport	: Aurangabad
7.7	Nearest Harbour	: Mumbai
7.8	Access Roads	: NH 6 (Mumbai-Nagpur Highway)
7.9	Elevation above MSL	: 210 M
7.10	Longitude/latitude	: 75°51'10" East /21° 02' 30" North
7.11	Seismic Zone	: Zone III as per IS:1893
7.12	<u>AMBIENT TEMPERATURE</u>	
7.12.1	Mean of daily maximum temperature	: 48.25 °C (during May)
7.12.2	Mean of daily minimum temperature	: 18 °C (during January)
7.12.3	Highest temperature recorded	: 48.7°C

CONSULTANT : PROCON ENGINEERS



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

SPEC. NO.: PE-TS-415-142-N101

SECTION I

REV. NO. 00

DATE 08.01.2020

C. SPECIFIC TECHNICAL REQUIREMENTS



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

SPEC. NO.: PE-TS-415-142-N101

SECTION I

REV. NO. 00

DATE 08.01.2020

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)
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
2	Low Capacity PRV (on CRH Line) (ASV-26)	1
3	Spray Control Valve for HC-PRDS (CDV-93)	1 nos

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



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

SPEC. NO.: PE-TS-415-142-N101

SECTION I

REV. NO. 00

DATE 08.01.2020

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)		
1)	Steam pressure reducing cum desuperheating valves	
a)	Stem	1 no.
b)	Disc	1 no.
c)	Body seat rings	2 nos. for each type, size and rating of valves
d)	Gland packings	3 nos. for each type, size and rating of valves
e)	Pressure Seal Ring	3 nos.
f)	Gasket	3 nos.
2)	Desuperheater liners	1 no.



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

SPEC. NO.: PE-TS-415-142-N101

SECTION I

REV. NO. 00

DATE 08.01.2020

For Spray Water Line Control Valve (i.e. for CDV-93)

a)	Valve trim (including cage, plug, stem, seat rings, guide bushings, stem packing etc.)	1 set for each type of control valves
----	--	---------------------------------------

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

	Steam pressure reducing valve	
a)	Stem	1 no.
b)	Disc	1 no.
c)	Body seat rings	2 nos. for each type/size & rating of valves
d)	Gland packings	3 nos. for each type, size and rating of valves
e)	Pressure Seal Ring	3 nos.
f)	Gaskets	3 nos.
2)	Desuperheater liners	1 no.

Common spares & Accessories for each control Valve

a)	Feedback transmitter unit	10% of total quantity used or 2 nos. whichever is more for each type/rating.
b)	Electronic Positioner	10% of total quantity used or 2 nos. whichever is more for each type/rating.
c)	Solenoid valves	10% of total quantity used or 2 nos. whichever is more for each type/rating.
d)	Air filter regulator	2 nos.
e)	Air lock relay	4 nos. of each type
f)	Complete Actuator for each type and model	1 Set
g)	Volume booster	2 Nos each type/size

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.



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

SPEC. NO.: PE-TS-415-142-N101

SECTION I

REV. NO. 00

DATE 08.01.2020

- 6 The material of filter for Air Filter Regulator shall be Sintered bronze.
- 7 For valves (all sizes) coming on **A335 P91 or equivalent pipe line, body material shall be ASTM A182 F91** 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.
- 9 **ASV-22 valve shall have side entry & bottom exit for steam.**



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

SPEC. NO.: PE-TS-415-142-N101

SECTION I

REV. NO. 00

DATE 08.01.2020

2.0 SIZING DATA SHEET- A-1

SIZING DATA FOR COMBINED AUXILIARY STEAM PRDS (ASV-22), SPRAY CONTROL VALVE (CDV-93)

SL.NO.	PARAMETERS	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	MECH. DESIGN
1.0	INLET OF COMBINED AUX. PRDS (ASV-22)							
1.1	PRESSURE (kgf/cm ² (a))	40	90	105	105	247	247	270.3
1.2	TEMP. (°C)	345	380	400	530	565	565	573
1.3	FLOW (T/Hr)	BIDDER TO CALCULATE						
2.0	OUTLET OF COMBINED AUX. PRDS (ASV-22)							
2.1	PRESSURE (kgf/cm ² (a))	16	16	16	16	16	16	21
2.2	TEMP. (°C)	290	290	290	290	290	290	350
2.3	FLOW (T/Hr)	42.55	54.55	105.15	118.15	88.50	175.00	
4.0	INLET OF SPRAY CONTROL VALVE (CDV-93)							
4.1	PRESSURE (kgf/cm ² (a))	BIDDER TO DECIDE						
4.2	TEMP.(°C)	36.0	36.0	37.9	37.9	44.8	44.8	60
4.3	FLOW (T/Hr)	BIDDER TO CALCULATE						

NOTE:

- Case-1 is the capability check point for PRV ASV-22. Case-6 is the capability check point for Spray Water control valves.
- Low capacity steam pressure reducing valve (i.e.ASV-26) at upstream parameters (52.39 kgf/cm²(a), 324.1 °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 (247 kgf/cm²(a), 565 °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:

	Conditions	VWO flow (in T/hr) at 100% lift
CASE-1	Upstream pressure = 270.3 kgf/cm ² (a) Upstream temperature = 573 deg.C Downstream pressure = 22 kgf/cm ² (a)	



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

SPEC. NO.: PE-TS-415-142-N101

SECTION I

REV. NO. 00

DATE 08.01.2020

CASE-2

Upstream pressure = 247 kgf/cm²(a)

Upstream temperature = 565 deg.C

Downstream pressure = 22 kgf/cm² (a)

SIZING DATA SHEET- A-2

SIZING DATA FOR AUXILIARY STEAM PRV (ASV-26)

SL.NO.	PARAMETERS	CASE-1	CASE-2	MECH. DESIGN
1.0	INLET OF PRV (ASV-26)			
1.1	PRESSURE (kgf/cm ² (a))	22.66	52.39	67.2
1.2	TEMPERATURE (°C)	279.2	324.1	360.0
1.3	FLOW (T/Hr)	8.90	8.90	
2.0	OUTLET OF PRV (ASV-26)			
2.1	PRESSURE (kgf/cm ² (a))	16	16	21
2.2	TEMPERATURE (°C)	269.80	281.50	350
2.3	FLOW (T/Hr)	8.90	8.90	-



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

SPEC. NO.: PE-TS-415-142-N101

SECTION I

REV. NO. 00

DATE 08.01.2020

3.0 DATA SHEETS- A & B

AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION

	Technical specification for Control Valves with Accessories (Pneumatically Operated)	SPECIFICATION NO. PE-TS-415-142-N101	
		DOCUMENT NO.	
		VOLUME	
		SECTION I	
		ISSUE NO. 2	
		REV. NO. 00	DATE: 08.01.2020
SHEET			

Tag No.: ASV-22		Quantity: ONE (1)		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	1x660 MW BHUSAWAL TPS			
	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 32 Ø 457 x 9.53			
	PIPE MATERIAL (inlet / outlet)	SA 335 P91 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 F91			
	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	☐ < 7M/SEC (WATER) ☒ < 1/3 MACH (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-415-142-N101			
							DOCUMENT NO.			
							VOLUME			
							SECTION I			
							ISSUE NO. 2			
							REV. NO. 00		DATE: 08.01.2020	
SHEET										
Tag No.: ASV-22							Quantity: ONE (1)		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)						269.3			
	* BODY DESIGN : PRESS ((KG/CM ² g) TEMP (DEG. C)						269.3	573		
	* 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-415-142-N101	
			DOCUMENT NO.	
			VOLUME	
			SECTION I	
			ISSUE NO. 2	
			REV. NO. 00	DATE: 08.01.2020
			SHEET	

Tag No.: ASV-26		Quantity: ONE (1)		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	1x660 MW BHUSAWAL TPS				
	SERVICE	COLD REHEAT STEAM TO AUXILIARY STEAM PR. REDUCING VALVE (LC PRV)				
	LOCATION	☒ INDOOR ☐ OUTDOOR				
	DUTY	☐ ON/OFF ☒ MODULATING				
	PIPE SIZE (inlet / outlet)	$\varnothing$ 114.3x6.02 $\varnothing$ 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	☐ < 7 M/SEC (WATER) ☒ < 1/3 MACH (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-415-142-N101			
							DOCUMENT NO.			
							VOLUME			
							SECTION I			
							ISSUE NO. 2			
							REV. NO. 00		DATE: 08.01.2020	
						SHEET				
Tag No.: ASV-26							Quantity: ONE (1)		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/CM² (A))	OUTLET PR. (KG/CM² (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)							66.2			
* BODY DESIGN : PRESS ((KG/CM ² g) TEMP (DEG. C)							66.2		360	
* 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-415-142-N101	
			DOCUMENT NO.	
			VOLUME	
			SECTION I	
			ISSUE NO. 2	
			REV. NO. 00	DATE: 08.01.2020
SHEET				

Tag No.: CDV-93		Quantity: ONE (1)		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	1x660 MW BHUSAWAL TPS		
	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	☒ < 7M/SEC (WATER) ☐ < 1/3 MACH (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-415-142-N101	
		DOCUMENT NO.	
		VOLUME	
		SECTION I	
		ISSUE NO. 2	
		REV. NO. 00	DATE: 08.01.2020
SHEET			

Tag No.: CDV-93				Quantity: ONE (1)			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/CM² (A))	OUTLET PR. (KG/CM² (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		60
	* IBR FORM III-C ☐ REQUIRED ☒ NOT REQUIRED								
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.									

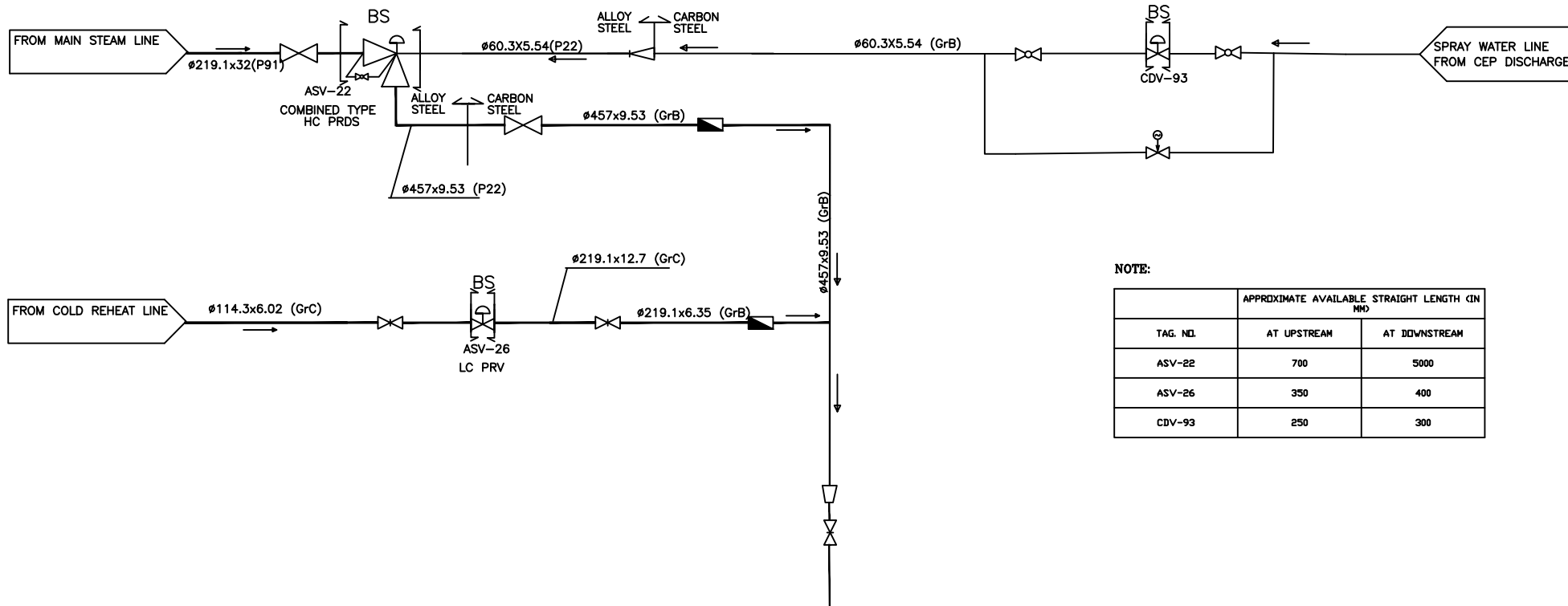
	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR) 1X660 MW BHUSAWAL STPP		SPECIFICATION NO. PE-TS-415-145-I104	
			VOLUME	
			SECTION	
			REV. NO. 02	DATE: 08.03.19
			SHEET 51	OF 51

Tag No.....		Quantity.....		Data Sheet No. PES-145-06-DS1-0	
ITEMS SHALL BE 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)	MFR. & MODEL NUMBER		TO BE INDICATED IN VENDOR'S DOCUMENT		
	BYPASS	GAUGES	ENCL. CLASS	☐ YES ☒ NO	☐ THREE ☒ TWO ☒ IP-65
	INPUT SIGNAL (ELECTRICAL)		4-20 mA DC		
	OUTPUT SIGNAL (PNEUMATIC)(Kg / Cm ²)		TO SUIT ACTUATOR		
AIR FILTER REGULATOR	MFR. & MODEL NUMBER		TO BE INDICATED IN VENDOR'S DOCUMENT		
	AIR SUPPLY PRESS (Kg / Cm ² g)		☒ 5.0 - 8.0		
	FILTER SIZE		5 MICRONS		
	OUTPUT PRESS (Kg / Cm ² g)		TO SUIT SMART POSITIONER		
	OUTPUT GAUGE		☒ REQUIRED ☐ NOT REQUIRED		
AIR LOCK	MFR. & MODEL NUMBER		TO BE INDICATED IN VENDOR'S DOCUMENT		
	SET PRESS (Kg / Cm ²)		TO BE INDICATED IN VENDOR'S DOCUMENT		
	SUPPLY PRESS (Kg / Cm ²)		☒ 5.0 - 8.0		
	RESET TYPE		AUTO		
	VENT PLUG		REQUIRED		
LIMIT SWITCH (APPLICABLE FOR ON/OFF VALVE ONLY)	MFR. & MODEL NUMBER		TO BE INDICATED IN VENDOR'S DOCUMENT		
	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 (IN BUILT IN SMART POSITIONER)	MFR. & MODEL NUMBER		NOT APPLICABLE		
	TYPE		☒ Electronic (2-Wire Type), Non-Contact Type ☐ OTHER		
	SUPPLY		☒ 24V DC ☐ 220V DC ☐ 110V AC ☐ 240V AC		
	OUTPUT RATING		☒ 4-20mA ☐ 0-100 ohms		
	ACCURACY		± 1% FS		
	ENCLOSURE CLASS		☒ IP 65		
SOLENOID VALVE	MFR. & MODEL NUMBER		TO BE INDICATED IN VENDOR'S DOCUMENT		
	RATING		☒ 24V DC ☐ 220V DC ☐ 240V AC ☐		
	OPERATION	QUANTITY	☐ Stayput ☒ Interlock	AS PER DATASHEET & HOOK UP	
	COIL INSULATION CLASS		CLASS - H		
	ENCLOSURE CLASS		☒ IP 65		
HANDWHEEL	ORIENTATION		☐ TOP MOUNTED ☒ SIDE MOUNTED		
JUNCTION BOX (Galvanized sheet steel, thickness not less than 2mm.)	NO. OF WAYS		☐ 24-WAYS ☒ 36-Ways ☐ AS REQUIRED		
	SIZE		AS REQUIRED		
	CABLE GLANDS (Size / Quantity)		AS REQUIRED (Double Compression Type).		
	ENCLOSURE CLASS		☒ IP 65		
I/P CONVERTER	MFR. & MODEL NUMBER		IN BUILT IN SMART POSITIONER		
	INPUT SIGNAL	POWER SUPPLY			
	SPLIT RANGE				
	ENCLOSURE CLASS				
SS Tubing & Fittings / per CV	This is in addition to SS Tubing and fittings which are integral part of CV		12 Meters of ¼" SS Tubing, with 1 set of SS Fittings for each CV for connection to IA Header on one end and accessories on another end of CV.		
					COMPANY SEAL
					NAME
					SIGNATURE
					DATE

4.0

NOTE

1. EQUIPMENTS IN BIDDER'S SCOPE HAVE BEEN MARKED AS BS
2. NEEDLE VALVE ACROSS ASV-22 VALVE BODY FOR WARM UP PURPOSE SHALL BE PROVIDED BY BIDDER.
3. ALL ACTUATOR SHALL BE IN VERTICAL POSITION ONLY.
4. ASV-22 VALVE SHALL BE SIDE ENTRY & BOTTOM EXIT.



NOTE:

TAG. NO.	APPROXIMATE AVAILABLE STRAIGHT LENGTH (IN MM)	
	AT UPSTREAM	AT DOWNSTREAM
ASV-22	700	5000
ASV-26	350	400
CDV-93	250	300

JOB NO. 415

1X660 MW BHUSAWAL TPS

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

DEPT.	DESIGN	CHK	APPD	DATE
PE	AKS	AKS	AKS	08.01.2009
CH	AKS	AKS	AKS	08.01.2009
APPD	AKS	AKS	AKS	08.01.2009

TITLE
TECHNICAL SPEC. FOR AUXILIARY PRDS

CM	DEPT.	SCALE	HTS	DRAWING NO.
CM	PE	1:1	1:1	PE-TS-415-142-N102
DATE	SHEET	OF	OF	REV. 00

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION		SPEC. NO.: PE-TS-415-142-N101
			SECTION I
	REV. NO. 00		DATE 08-01-2020

5. CUSTOMER REQUIREMENT

SPECIFIC TECHNICAL REQUIREMENTS

The requirements in this section are specific for this project and shall override the standard specification for control valve- Section D in case of any contradiction. However, bidder to comply with the more stringent requirement out of the two. Moreover, BHEL's decision shall be final for deciding the more stringent requirement and bidder to comply with the same without any commercial implication.

1. 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.

Refer clause no 3.0 OF SECTION D SPECIFICATIONS FOR MICROPROCESSOR BASEDELECTRONIC POSITIONER (SMART)

		MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V
		BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5
REV: R0		CONTROL & INSTRUMENTATION	Page 293 of 718
SR. NO.	ITEM	DESCRIPTION	
	(k) Colour of letters	Black (for white windows)	
	(l) Facia front cover	Hi-impact polystyrene	
	(m) Facia rear plate	Translucent plastic	
	(n) Colour of background	Milk white and red for critical / trip.	
	(o) Fascia block plate	Cold rolled sheet steel epoxy painted.	
	(p) Audible alarm	Cone type speaker	
	(q) Tone generator	Electronic with adjustable tone, amplitude and frequency	
	(r) Preferred sequence	(i) Ordinary Channel : ISA-S-18.1-1979-R	
		(ii) First-up channel : ISA-S-16.1-1979- F3M3	
NOTE:			
1. Instruments which are open to atmosphere should be covered with proper canopy.			
3.0 <u>CONTROL VALVES, ACTUATORS & ACCESSORIES</u>			
General Technical Guidelines for the Control Valves shall be as follows :			
(a) Bidder shall exercise caution in selecting severe service control valves like BFP recirculation valves, HP & LP bypass valves, superheater & reheater attemperator valves, PRDS valves for Boiler & Turbine, Soot blower steam pressure control valve, control valves whose down stream are connected to vacuum such as HP/LP heater emergency level control, condenser make up water control valve, separator level control and CEP minimum flow control valve. For such critical applications, Bidder shall offer valves which are proven			

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5
REV: R0	CONTROL & INSTRUMENTATION	Page 294 of 718
for similar application. 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, combined PRDS type valves shall be offered. (c) Bidder shall provide redundant control valves for Main condensate flow control, Superheat attemperation control and Reheat attemperation control as a minimum for high availability. For other application, if the availability criteria for the plant cannot be met even with the best established product, redundant control valves shall be provided. (d) Control valves shall be located near floor or platform for ease of access and with adequate clearances for maintenance and lay-down and shall be placed as station with upstream motorized isolating valve, down-stream isolating valve, inching duty motorized bypass valve and manual drain valves. Each redundant control valve shall have its upstream motorized and down-stream manual isolating valves. Where quick shut off requirement is foreseen such as in case of SH & RH attemperation valves, upstream isolation valve shall be pneumatic type. 3.1 <u>GENERAL</u> 3.1.1 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 except for the control valves indicated above. 3.1.2 Where the operating time is critical for the operation of the plant, as in case of HP or LP bypass valves, hydraulic actuators with electro-hydraulic interface shall be offered. 3.1.3 Bonnet joints for all control valves shall be of flanged and bolted type. 3.1.4 Flanged valve shall be rated at no less than class 300 lbs.		

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5
REV: R0	CONTROL & INSTRUMENTATION	Page 295 of 718

3.2 VALVE BODY/END CONNECTIONS

3.2.1 Valve end to end dimension and 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 inlet pressure.

3.2.2 Control valves of 40 mm. size and above with line pressure up to 50 Kg/Sq. cm may have flanged or welded end connections.

3.2.3 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.

3.2.4 Control valve body shall be selected as per the ISA guideline. Generally control valve body shall be cast and machined for pressure rating up to 1500 lbs. Above 1500 lbs, valve body shall be of forged steel. For Demineralized Water application, valve body shall be Stainless Steel.

3.2.5 The direction of flow shall be clearly engraved on the body.

3.2.6 Valve Body Material

SR.NO.	SERVICE	MATERIAL
(a)	Non corrosive, non-flashing and non cavitating service for fluid temperature upto 275°C	: Cast carbon steel ASTM A216 Gr. WCB
(b)	Non corrosive, non-flashing and non cavitating service for fluid temperature above 275°C	: Cast alloy steel ASTM A217 Gr. WC9
(c)	Severe flashing / cavitating services	: Cast alloy steel ASTM A217 Gr. WC9
(d)	Low flashing / cavitating services	: Cast alloy steel ASTM A217 Gr. WC6

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5
REV: R0	CONTROL & INSTRUMENTATION	Page 296 of 718
SR.NO. SERVICE MATERIAL (e) DM water application : Cast type 316 stainless steel (condenser hotwell normal, ASTM A351 Gr. CF8M emergency make up etc.) 3.3 <u>VALVE SIZE</u> The control valve sizing (Cv/Kv) shall be based on following guidelines : (a) The valves shall pass normal flow (MCR condition) with 60 to 70 percent opening for linear characterized valves and between 70 to 80 percent opening for equal percentage characterized valves. (b) The valves shall have adequate rangeability to pass the minimum and maximum flows at 10% and 85% of the valve opening respectively. Valve stem travel range from minimum to maximum flow condition shall not be less than 50% of the total valve stem travel. (c) Valve CV shall be selected in such a way that the valve shall be capable of handling at least 120% of required maximum flow. (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) Trim outlet velocity for the control valves shall be no more than 7 m/sec for water service and Mach number less than 1/3 for steam and air service application. (f) The sizing procedure followed shall be as per latest edition of ANSI/ISA or equivalent standard. 3.4 <u>VALVE TOP WORK</u> 3.4.1 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.		

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V									
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5									
REV: R0	CONTROL & INSTRUMENTATION	Page 297 of 718									
3.4.2	Extended bonnet/Finned bonnet and high temperature packing shall be used for high temperature application.										
3.4.3	The gland material shall be chosen to suit the operating temperature. PTFE may be chosen for lower temperature application (232°C maximum) and for high temperature application graphite asbestos glands are to be provided. For vacuum services, the glands shall be of dry seal type.										
3.5	<u>VALVE TRIM</u>										
3.5.1	Valve trim for 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 (stelliting or equivalent) shall be used. Other alloys or treatment such as nitride shall be used if severe erosion is expected.										
3.5.2	Balanced trim valves shall be offered for high shut-off pressure or high pressure drop condition to reduce the size of the actuators.										
3.5.3	For flashing services and two stage mixtures, the trim material shall be 17-4 PH SS or equivalent.										
3.5.4	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 number of discrete pressure drop stages to eliminate the chances of erosion, cavitation, noise and vibration throughout the control range of the valve.										
3.5.5	Quick replacement type trim shall be considered for easy maintenance.										
3.5.6	Trim Material										
	<table> <thead> <tr> <th data-bbox="402 1472 516 1503">SR. NO.</th> <th data-bbox="537 1472 667 1503">SERVICE</th> <th data-bbox="1122 1472 1284 1503">MATERIAL</th> </tr> </thead> <tbody> <tr> <td data-bbox="402 1535 435 1566">(a)</td> <td data-bbox="537 1535 1040 1640">Non corrosive, non-flashing and non cavitating service for fluid temperature upto 275°C.</td> <td data-bbox="1122 1535 1317 1566">SS 316 stellited</td> </tr> <tr> <td data-bbox="402 1682 435 1713">(b)</td> <td data-bbox="537 1682 1040 1755">Non corrosive, non-flashing and non cavitating service for fluid</td> <td data-bbox="1122 1682 1317 1713">SS 316 stellited</td> </tr> </tbody> </table>		SR. NO.	SERVICE	MATERIAL	(a)	Non corrosive, non-flashing and non cavitating service for fluid temperature upto 275°C.	SS 316 stellited	(b)	Non corrosive, non-flashing and non cavitating service for fluid	SS 316 stellited
SR. NO.	SERVICE	MATERIAL									
(a)	Non corrosive, non-flashing and non cavitating service for fluid temperature upto 275°C.	SS 316 stellited									
(b)	Non corrosive, non-flashing and non cavitating service for fluid	SS 316 stellited									

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V															
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5															
REV: R0	CONTROL & INSTRUMENTATION	Page 298 of 718															
<table border="0"> <thead> <tr> <th style="text-align: left;">SR. NO.</th> <th style="text-align: left;">SERVICE</th> <th style="text-align: left;">MATERIAL</th> </tr> </thead> <tbody> <tr> <td></td> <td>temperature above 275°C.</td> <td></td> </tr> <tr> <td>(c)</td> <td>Severe flashing /cavitating services</td> <td>: 440 C</td> </tr> <tr> <td>(d)</td> <td>Low flashing /cavitating services</td> <td>: 17-4 PH SS</td> </tr> <tr> <td>(e)</td> <td>DM water application (condenser hotwell normal, emergency make up etc.)</td> <td>: 17-4 PH SS</td> </tr> </tbody> </table>			SR. NO.	SERVICE	MATERIAL		temperature above 275°C.		(c)	Severe flashing /cavitating services	: 440 C	(d)	Low flashing /cavitating services	: 17-4 PH SS	(e)	DM water application (condenser hotwell normal, emergency make up etc.)	: 17-4 PH SS
SR. NO.	SERVICE	MATERIAL															
	temperature above 275°C.																
(c)	Severe flashing /cavitating services	: 440 C															
(d)	Low flashing /cavitating services	: 17-4 PH SS															
(e)	DM water application (condenser hotwell normal, emergency make up etc.)	: 17-4 PH SS															
3.6	<u>NOISE LEVEL</u> 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 dB. 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 spool piece. The spool piece shall be in conformity with the main line piping specification.																
3.7	<u>VALVE ACTUATORS</u> Spring-diaphragm type actuators shall generally be used. Piston type actuators shall be offered in case of high shut-off pressure & quick response requirement.																
3.7.1	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.																
3.7.2	Diaphragms shall be designed for 200% maximum operating pressure.																
3.7.3	Nylon reinforced neoprene is preferred as diaphragm material.																
3.7.4	Valve actuators shall be capable of operating at 80°C ambient, continuously.																
3.7.5	Entire actuator assembly shall be painted with corrosion inhibiting paint.																

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5
REV: R0	CONTROL & INSTRUMENTATION	Page 299 of 718
3.7.6	Air connection size shall be ¼" NPT (F) unless otherwise dictated by process response time. Integral tubing shall be stainless steel.	
3.7.7	Bidder shall indicate the stroking time of the valve assemblies with positioner and ensure that the stroke time shall meet the process and equipment dynamics and shall be better than 20 seconds.	
3.7.8	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.	
3.8	<u>VALVE POSITIONERS</u>	
3.8.1	Regulating duty valves shall be offered with SMART Electro Pneumatic Positioners to ensure accuracy and repeatability of response.	
3.8.2	Positioners shall have integral non contact type position transmitter, input and output gauges, local keypad & display.	
3.8.3	Positioners shall be capable of functioning under hot, humid and vibrating conditions.	
3.8.4	Positioner casings shall be dust tight, corrosion resistant and weatherproof.	
3.8.5	In general, positioner shall operate at signal range 4 - 20 mA DC for the full travel of the valve. Remote calibration from control room shall be possible through HART management station for main plant positioners. However the calibration of positioner of off-site plants shall be carried out from hand held station.	
3.9	<u>VALVE ACCESSORIES</u>	
	Accessories shall include side mounted hand wheels, limit switches, junction boxes, airlock relays etc.. Solenoid valve wherever required shall be furnished.	

 MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V	
	Section – 5	
REV: R0	CONTROL & INSTRUMENTATION	Page 269 of 718
SR. NO.	ITEM	DESCRIPTION
1.35.15	Stability	Less than 0.25% of Span / Zero for six months.
1.35.16	Cable connection	¾" ET.
1.35.17	Mounting	Field (pipe/wall mounting).
1.35.18	Accessories	Air filter regulator, mounting accessories, cable gland etc.
1.36	<u>AIR FILTER REGULATOR</u>	
1.36.1	Filter Element	Sintered Bronze.
1.36.2	Filter Size	5 microns.
1.36.3	Input Air	10.0 Kg/Sq. cm (maximum)
1.36.4	Output	Adjustable from 0-2.0 Kg / Sq. cm or 0-7.0 Kg/Sq. cm (continuous) as applicable for I/P converter, control drives and control valve.
1.36.5	Effect of Supply	Maximum 0.02 Kg/Sq. cm for a change pressure variation in supply pressure of 4 Kg/Sq. cm.
1.36.6	Bowl Material	Metallic cover around high temperature area/clear transparent polycarbonate with metallic cover for ordinary applications.
1.36.7	Accessories	2" dial size output pressure gauge.
1.36.8	Desirable Feature	No perceptible drop of pressure on opening the drain port.

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5
REV: R0	CONTROL & INSTRUMENTATION	Page 270 of 718
SR. NO.	ITEM	DESCRIPTION
1.37	<u>SOLENOID VALVE</u>	
1.37.1	Operating Principle	Electromagnetic. (noiseless)
1.37.2	Coil voltage rating	24 V DC
1.37.3	Ways	Generally 3-ways other depending on requirement
1.37.4	Port size	1/4" NPT all ports.
1.37.5	Body	SS bar stock.
1.37.6	Trim	SS-316.
1.37.7	Duty	Suitable for continuous energization.
1.37.8	Sealing	Airtight and leak proof.
1.37.9	Ambient Temperature	0 - 50 ° C.
1.37.10	Fluid Temperature	0-150 ° C (approx.)
1.37.11	Coil Enclosure	Stainless Steel.
1.37.12	Insulation	Class-H.
1.37.13	Coil Casing	IP-65 (Explosion proof for NEC Class-1, Division-1 area)
1.37.14	Mounting	On pipe or on panel.
1.37.15	Cable Connection	3/4" ET.
1.37.16	Accessories	Mounting brackets, nuts and bolts.
1.37.17	Preferred feature	(a) Solenoid valve directly integral to actuator body shall have NAMOOR interface for uniformity.

CONSULTANT : PROCON ENGINEERS

	MAHARASHTRA STATE POWER GENERATION CO. LTD.		Volume : V
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1		Section – 5
REV: R0	CONTROL & INSTRUMENTATION		Page 247 of 718
SR. NO.	ITEM	DESCRIPTION	
		drawing and Flow vs. DP curve.	
1.17.7	Meter run pipe	Same as pipe material.	
1.17.8	Accessories	Meter run pipe, nipples and root valves (Inspection port assembly for nozzles used in plant performance purpose).	
1.18	<u>GAUGE GLASS</u>		
1.18.1	Type	Reflex.	
1.18.2	Glass	Toughened borosilicate Resistant to mechanical and thermal shocks.	
1.18.3	Body material	Carbon steel / stainless steel - As per process requirements (Flanged Connection).	
1.18.4	Pressure rating	Twice the maximum working pressure.	
1.18.5	Temperature rating	As required.	
1.18.6	Bolts and nuts	Rust proof alloy steel.	
1.18.7	Accessories	Suitable ball check valves of SS-304 /316 body, gaskets, companion flange etc.	
1.19	<u>POWER CYLINDERS (PNEUMATIC)</u>		
1.19.1	Mounting Type	(a) Fixed position mounting. (End mounting)	
		(b) Trunnion mounting.	
1.19.2	Control Signal	4-20 mA DC to SMART positioner with Superimposed HART protocol for	

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5
REV: R0	CONTROL & INSTRUMENTATION	Page 248 of 718
SR. NO.	ITEM	DESCRIPTION
		modulating purposes. 24V DC operated solenoid valve operating on pneumatic line for open & closing purpose of on & off drive.
1.19.3	Supply Air	7 Kg / cm ² .
1.19.4	Selection	Based upon thrust/torque, stroke length, angular movement, full-scale travel time, repeatability, space factor etc Provision for air-to-open and air-to-close operation.
1.19.5	Casing	IP-65.
1.19.6	Accessories	(a) Air lock relay.
		(b) Hand wheel.
		(c) Air filter regulator with gauge.
		(d) Volume Booster.
		(e) Limit Switches.
		(f) Smart Positioner with Input and Output pressure gauges, local keypad & display.
		(g) Solenoid Valve.
		(h) Integral non contact type position Transmitter. (4-20 mA DC linear output)
		(i) Junction box with cable gland.
1.19.7	Fail-safe operation	For regulating duty- stay put against

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5
REV: R0	CONTROL & INSTRUMENTATION	Page 249 of 718
SR. NO.	ITEM	DESCRIPTION
		power & air fail.
1.19.8	Repeatability	Better than 0.5% of full travel.
1.19.9	Hysteresis	Less than $\pm 1\%$ of full travel.
1.19.10	Operating Temp. limit	80 Deg. C (min.)
1.20	<u>SMOKE DENSITY ANALYZER</u>	
1.20.1	Type	Insitu dry visible light. (through LED)
1.20.2	Principle of measurement	Transmission & absorption. (Dual beam type)
1.20.3	Light source	Modulated high intensity LED.
1.20.4	Display	Back Lit LCD.
1.20.5	Measurement range	0-999 mg/m ³ , 0-999 mg/Nm ³ , 0-100% Opacity.
1.20.6	Measurement averaging	Selectable 10 sec to 60 minutes.
1.20.7	Accuracy	0.2% opacity.
1.20.8	Resolution	0.1% opacity.
1.20.9	Linearity	0.1% opacity.
1.20.10	Repeatability	0.1% opacity.
1.20.11	Flue gas temperature	350 °C (max 600 °C).
1.20.12	Ambient temperature	0 - 60 °C.
1.20.13	Operating temperature	Transmitter & receiver - 0-90°C, Electronic unit - 70 °C.

CONSULTANT : PROCON ENGINEERS



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

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

SECTION II

REV. NO. 00

DATE 08.01.2020

D. STANDARD SPECIFICATION FOR CONTROL VALVES



STANDARD SPECIFICATION - SECTION-D

SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)

SPECIFICATION NO.: PE-TS-415-145-I801

DOCUMENT NO.: PES – 145 - 06 C

VOLUME II B

SECTION D

ISSUE NO. 2

REV. NO. 00

DATE : 12.09.19

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)		
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
Electric Motor operated Actuators	:	IS-9334

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-415-145-I801

DOCUMENT NO.: PES – 145 - 06

VOLUME II B

SECTION D

ISSUE NO. 2

REV. NO. 00

DATE : 12.09.19

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 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 | - | 1.1 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 | <= | 7 m/sec |
| ii) Steam service | <= | 1/3 MACH |
| 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-415-145-I801

DOCUMENT NO.: PES – 145 - 06

VOLUME II B

SECTION D

ISSUE NO. 2

REV. NO. 00

DATE : 12.09.19

- 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 150% of valve's shut-off pressure at an airline supply pressure of 5.5 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-415-145-I801		
DOCUMENT NO.: PES – 145 - 06		
VOLUME	II B	
SECTION	D	
ISSUE NO.	2	
REV. NO.	00	DATE : 12.09.19

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)

SPECIFICATION NO.: PE-TS-415-145-I801

DOCUMENT NO.: PES – 145 - 06

VOLUME II B

SECTION D

ISSUE NO. 2

REV. NO. 00

DATE : 12.09.19

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).

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)	
---	---	--

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)	
---	---	--

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)	
---	---	--

Leak Test Yes

7.0 **EMC & CE compliance**

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

8.0 **Accessories**

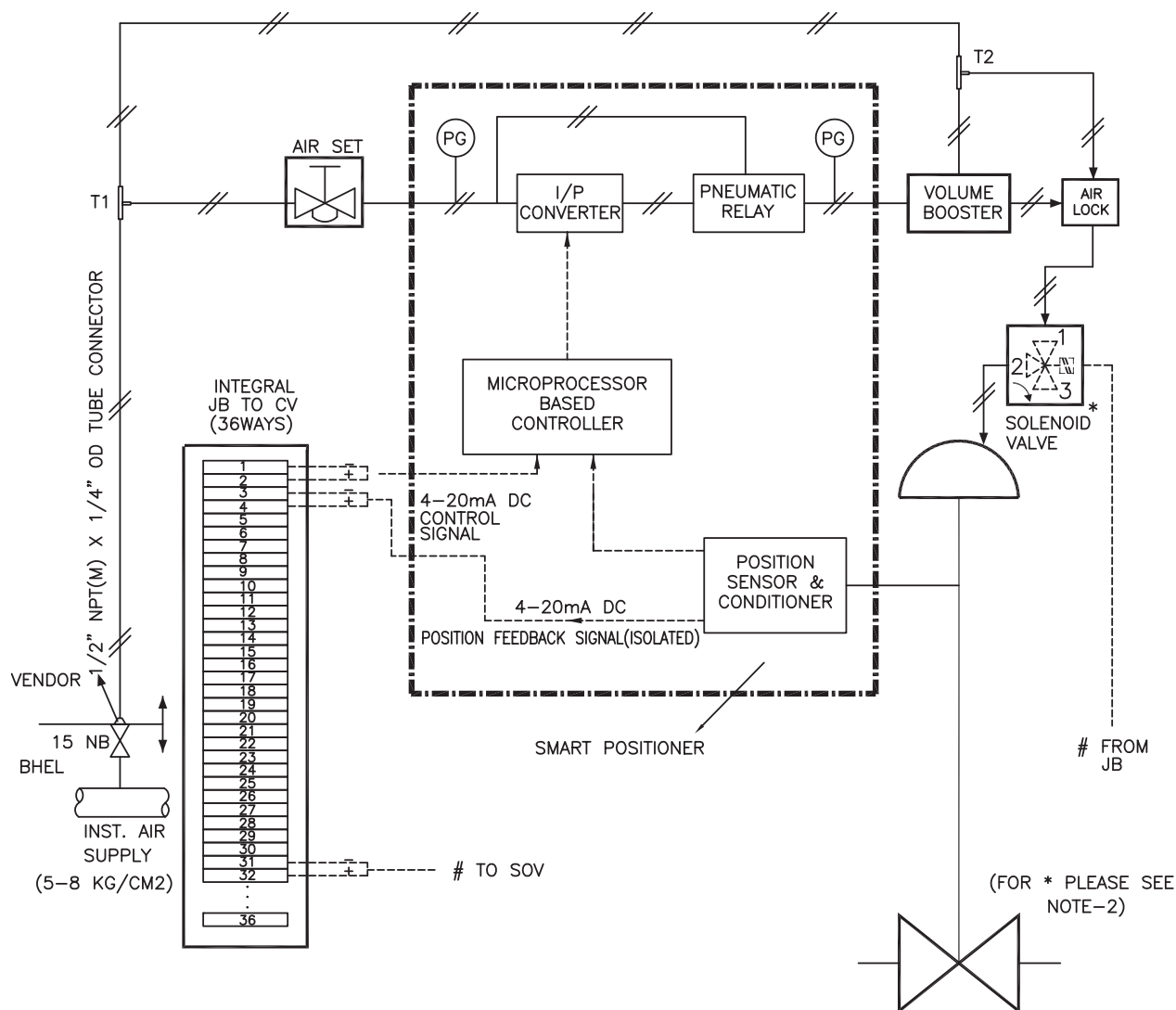
In Built Operator Display With Push Buttons For
Panel Configuration And Display On The Positioner Itself

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

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 ½-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 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, 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" SS TUBING (AS PER ACCESSORIES DATA SHEET) & 1 SET OF SS 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 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.



1 X 660 MW BHUSAWAL STPP

TITLE:-

CONTROL VALVE HOOK-UP DIAGRAM

DRG.
No.

PE-TS-415-145-I104

REV.
No.

02

DATE

08.03.19

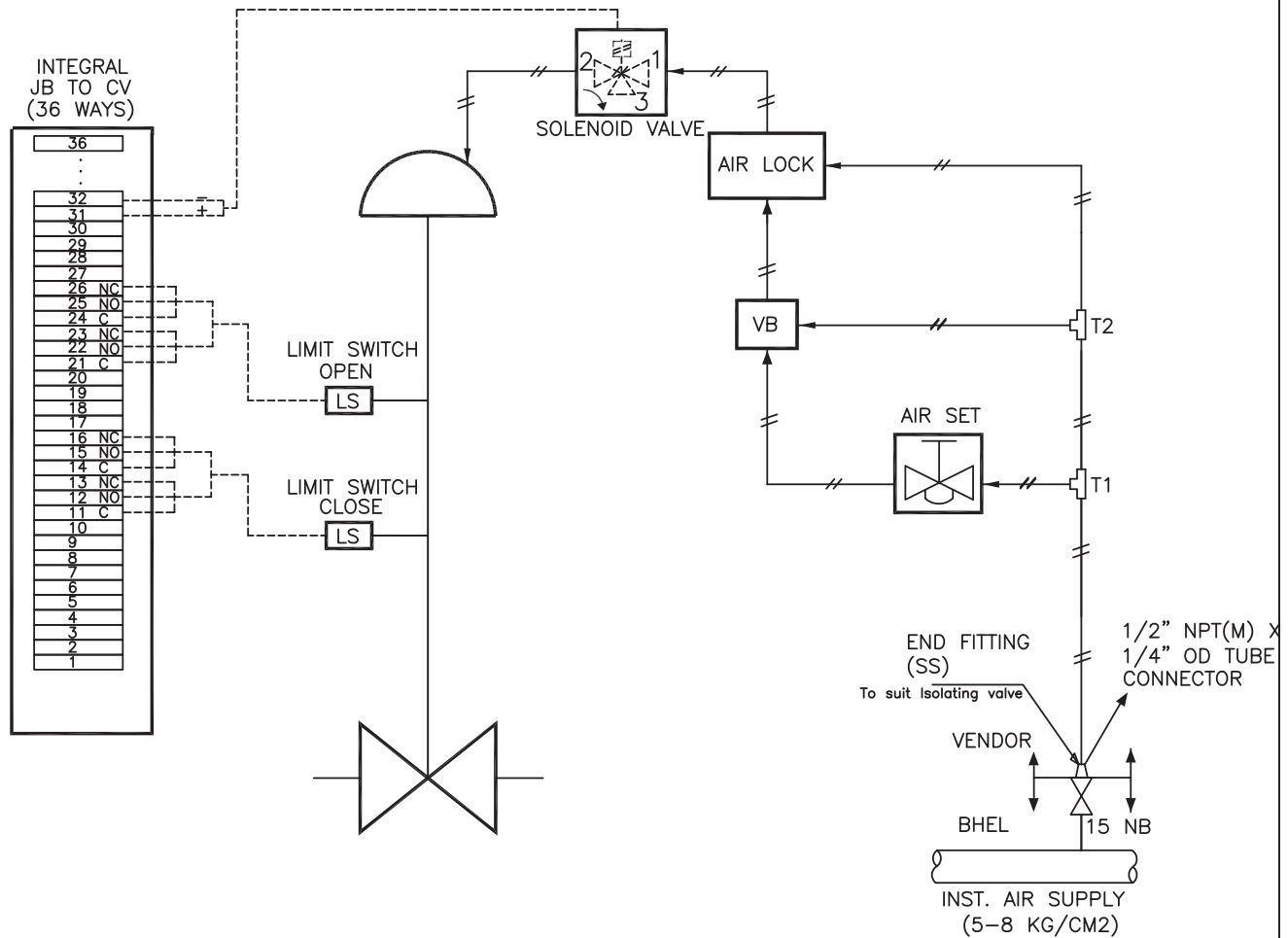
SHEET

48

OF

51

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, 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. 12 METERS 1/4" SS TUBING (AS PER ACCESSORIES DATA SHEET) & 1 SET OF SS 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 SS FITTINGS SHALL BE DOUBLE COMPRESSION TYPE.



1 X 660 MW BHUSAWAL STPP

TITLE:-

CONTROL VALVE HOOK-UP DIAGRAM

DRG.
No.

PE-TS-415-145-I104

REV.
No.

02

DATE _____

08.03.19

SHEET

49

OF

51



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

SPEC NO.: PE-TS-415-145-I108

DOCUMENT NO.: PES-145-06C

VOLUME II B

SECTION D

ISSUE NO. 2, REV. 00

DATE 12.09.2019

10.0 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-415-145-1801**

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

VOLUME

SECTION **II**

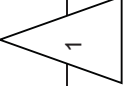
ISSUE NO. 2

REV. NO. 00

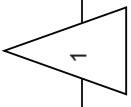
DATE : 17.10.2019

11. QUALITY PLAN

 PEM :: C&I		QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)										QUALITY PLAN NO.: PE-QP-415-145-I 006													
												VOLUME IIB													
												SECTION C													
												ISSUE NO. 2 REV. NO. 3 DATE: 06.12.18													
												SHEET 2 OF 7													
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 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														
	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	MA	Visual	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2,1														
LEGEND: * CR - Critical characteristics MA - Major characteristics MI - Minor characteristics													\$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.												
													1 - BHEL 4-MAHAGENCO 2 - Vendor 3 - Sub-vendor												

 QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)		QUALITY PLAN NO.: PE-QP-415-145-I 006										
		VOLUME		IIB								
		SECTION		C								
		ISSUE NO. 2		REV. NO. 3		DATE: 06.12.18						
		SHEET 3		OF 7								
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	
		2. Hardness	MA	Measurement	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2,1	
		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	---	2,1	
		2. Mech. Properties	MA	Mech. Test	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
		3. Performance	MA	1. Stiffness ratio 2. Scragging 3. Cyclic test (Endurance) 4. Dimension (Measurement)	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
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	---	2,1	
		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 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	4-MAHAGENCO
---	---	--	---	--	-------------

 QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)		QUALITY PLAN NO.: PE-QP-415-145-I 006										
		VOLUME IIB										
		SECTION C										
		ISSUE NO. 2		REV. NO. 3		DATE: 06.12.18						
		SHEET 4		OF 7								
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	---	2,1	
		2. Marking	MA	Visual	100%	Mfr. standard	Mfr. standard	Records	3	---	2,1	
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	1,4	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	1,4	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	1,4	1	Refer Note-4
		2. Opening/Closing time	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1,4	1	Refer Note-4
		3. Linearity/cam characteristic	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1,4	1	Refer Note-4
LEGEND: * CR - Critical characteristics MA - Major characteristics MI - Minor characteristics \$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test. 1 - BHEL 2 - Vendor 3 - Sub-vendor 4-MAHAGENCO												

 QUALITY PLAN NO.: PE-QP-415-145-I 006		QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)										
VOLUME IIB		SECTION C		ISSUE NO. 2		REV. NO. 3		DATE: 06.12.18		SHEET 5 OF 7		
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	1,4	1	Refer Note-4
5.	Hysteresis		MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1,4	1	Refer Note-4
6.	Sensitivity		MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1,4	1	Refer Note-4
7.	Accuracy (Overall)		MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1,4	1	Refer Note-4
8.	Control Valve characteristics / CV Test		MA	♦ Measurement (Press. vs. discharge and opening 0-100% in steps of 10%)	100%	Mfr. Procedure	Approved drg. / data sheet	Test Certificate	2	1,4	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	1,4	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	1,4	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	1,4	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	1,4	1	
13.	Surface Quality		MA	Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2,1	

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	4-MAHAGENCO
---	---	--	---	--	-------------

 PEM :: C&I	QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)										QUALITY PLAN NO.: PE-QP-415-145-I 006					
											VOLUME		IIB			
											SECTION		C			
											ISSUE NO. 2		REV. NO. 3		DATE: 06.12.18	
											SHEET 6		OF 7			
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	---	1	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	---	1	(C.O.C)
		2. Overall leakage	MA	Visual (soap solution)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	(C.O.C)
5.3	Air lock relay	Performance Test	MA	Leakage test	100%	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	(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	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	---	1	(C.O.C)
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	1	(C.O.C)
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	1	(C.O.C)
		4. Hysteresis	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	1	(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	---	1	(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	4-MAHAGENCO
--	--	--	--	---	--	---	--	-------------

 QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)		QUALITY PLAN NO.: PE-QP-415-145-I 006										
		VOLUME		IIB								
		SECTION		C								
		ISSUE NO. 2		REV. NO. 3		DATE: 06.12.18						
		SHEET 7		OF 7								
Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency \$			Remarks
	(As Applicable)	2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	1	(C.O.C)
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	1	(C.O.C)
		4. Hysteresis	CR	Measurement	100%	Approved drg. / data sheet /	Approved drg. / data sheet /	Inspection Report	2	---	1	(C.O.C)
		5. Calibration with Hand Held Communicator	MA	Measurement	Each type	Mfr. Standard	Mfr. Standard	Test Certificate	2	---	1	(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 100% for Customer/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	4-MAHAGENCO
---	---	--	---	--	-------------

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-415-142-N101	
		SECTION II	
		REV. NO. 00	DATE - 17.10.2019

12. 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.



13. TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION

SPEC. NO.: PE-TS-415-142-N101

SECTION II

REV. NO. 01

DATE
17.10.2019

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-415-142-N101

SECTION II

REV. NO. 01

DATE
17.10.2019

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/CM² (A))	OUTLET PR. (KG/CM² (A))	TEMP DEG. C	CALCULATED 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-415-142-N101	
		SECTION II	
		REV. NO. 01	DATE 17.10.2019

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	15 Meters of ¼ " SS T ubing, with 1 set of Fittings f o r e ach CV fo r connection to IA Header o n one end and accessories on another end of CV.		
PAINTING	COLOUR/SHADE		
	THICKNESS (DFT)		
	TYPE		
			COMPANY SEAL
			NAME
			SIGNATURE
			DATE



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

SPEC. NO.: PE-TS-415-142-N101

SECTION II

REV. NO. 00

DATE 08.01.2020

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-415-145-I801	
		DOCUMENT NO.	
		VOLUME	
		SECTION II	
		ISSUE NO. 2	
		REV. NO. 00	DATE 08.01.2020

15. SUB VENDOR LIST

(FOR ACCESSORIES)

S.No.	ITEM DESCRIPTION	SUB-VENDORS
1	APRDS CONTROL VALVES	INSTRUMENTATION LTD CONTROL COMPONENT INC., USA HORA (HOLTER REGELARMATUREN GMBH & CO)
2	CONTROL VALVES NON-CRITICAL	DEZURIKH COPES VULCAN LTD., UK CONTROL COMPONENT INC., USA FISCHER SANMAR LIMITED INSTRUMENTATION LTD MIL CONTROLS LTD FISCHER XOMOS SANMAR LTD HORA (HOLTER REGELARMATUREN GMBH & CO)
3	SOLENOID VALVE	ASCO, CHENNAI ROTEX AUTOMATION LTD., GUJARAT AVCON CONTROLS, MUMBAI
4	JUNCTION BOX	DEVI POLYMERS, CHENNAI SUCHITRA INDUSTRIES, BANGALORE RITTAL PYROTECH L&T HENSEL ELECTRIC INDIA PVT LTD, SRIPERUMBUDUR
5	AIR FILTER REGULATOR	PLACKA, CHENNAI SHAVO NORGREN, INDIA