CUSTOMER: TSGENCO

PROJECT: 5X800 MW YADADRI TPS, NALGONDA

TECHNICAL SPECIFICATION
FOR

AUXILIARY STEAM PRESSURE REDUCING AND DESUPERHEATING STATION ALONGWITH ACCESSORIES

SPECIFICATION No: **PE–TS –417-142–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-417-142-N101	
		SECTION CONTENTS (I & II)	
		REV. NO. 00	DATE 15.06.2021

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A. SCOPE OF ENQUIRY

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-417-142-N101	
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1.1 This enquiry covers the Design, Manufacture, Assembly, Inspection and Testing at Vendor's and/or his sub-vendors works, painting and delivery to site of Auxiliary Steam Pressure Reducing & Desuperheating Stations, as mentioned in different sections of this specification .

1.2 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to the Engineer/Owner who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgment is not in full accordance herewith.

1.3 The bidder may quote for his standard, proven design of equipment and shall submit stamped compliance certificate (enclosed in Section II) conforming all the specification requirements.

1.4 The bids shall be in English language and MKS Units.

1.5 Filled up Quality Plan as minimum technical requirements, is included in this specification in Sec-II. Bidder is required to submit the enclosed Quality Plan, while submitting the bid.

1.6 The omission of specific reference to any component / accessory necessary for the proper performance of the equipments shall not relieve the supplier of the responsibility of providing such facilities to complete the supply within the quoted prices.

1.7 BHEL's / CUSTOMER'S representatives shall be given access to the shop in which the equipments are being manufactured or tested and all test records shall be made available to him.

1.8 The Equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and Material Dispatch Clearance Certificate (MDCC) is issued by BHEL / CUSTOMER.

B. PROJECT INFORMATION

PROJECT INFORMATION

1	Name of the Project	YADADRI Thermal Power Station
2	Station Capacity	5X800 MW (Coal based)
3	Owner	Telangana State Power Generation Corporation Limited (TSGENCO)
4	Site Location	Site is located 7 km from the NH5.
5	Latitude	*16° 42*'20.40 N
6	Longitude	79° 34'41.56 E
7	Nearest Town	30 Km Miryalaguda
8	Nearest Railway Station	6.5 Km Damercherla
9	Nearest Airport	130 Kms (Vijayawada)
10	Site Conditions	
	Ambient Temperature	
	Daily minimum (average)	10°C
	Daily maximum (average)	47°C
	Design Ambient Temperature	50°C
	Ambient temperature (performance)	38°C
	Relative Humidity for design / efficiency	48-84 %
	Annual rainfall, mm	600 mm
	Plant Elevation above MSL	85 m above MSL
	Mean Wind Speed	8 km/h
	Wind Pressure	As per the latest revision of IS 875/1987
	Seismic co-efficient	Zone-II as per IS- 1893 (Part-IV)

C. SPECIFIC TECHNICAL REQUIREMENTS

1.0 BRIEF SYSTEM DESCRIPTION

1.1 Auxiliary steam system is designed to provide steam for the turbine auxiliaries such as main turbine gland sealing, BFPT turbine sealing, deaerator pegging and boiler auxiliaries such as mill inerting, SCAPH & FO atomisation etc during start-up, fuel oil heating system during low loads and normal running of unit.

1.2 The system comprises of:

i) A "1x100% HCPRDS", tag no. ASV-22, with tapping off steam from main steam line to meet auxiliary steam requirements during unit start-up, low loads & intermittent requirements.

ii) A "1x30% Intermediate Capacity PRDS", tag no. ASV-20, with tapping off steam from main steam line to meet auxiliary steam requirements during unit start-up, low loads & intermittent requirements.

iii) A "Low Capacity PRV", tag no. ASV-26, with steam tapped from CRH line to meet auxiliary steam requirements during normal running.

iv) Spray water required for desuperheating will be tapped off from condensate extraction pump discharge. Spray water for 1x100% HCPRDS is controlled through the control valve CDV-138 and for 1x30% ICPRDS is controlled through the control valve CDV-11.

1.2 The HCPRDS & ICPRDS will reduce the pressure and temperature of the steam tapped off from main steam Line to 16 kg/cm^2 (abs) & 290^{0}C. The LC-PRV shall reduce the pressure of steam tapped from CRH line to 16 kg/cm^2 (abs) and temperature in the range of 295^{0}C to 310^{0}C, depending upon the CRH parameters at corresponding load.

1.4 APRDS system Comprises of:

S No	Description	Quantity/unit	Total
1	Combined Type 1x100 % High Capacity Pressure Reducing & De-superheating Valve (On MS line) **(1" needle valve across ASV-22 valve body for warmup purpose shall be provided by bidder)**	1 no.	5 no.
2	Combined Type 1x30 % Intermediate Capacity Pressure Reducing & De-superheating Valve (On MS line) **(1" needle valve across ASV-20 valve body for warmup purpose shall be provided by bidder)**	1 no.	5 no.
3	Low Capacity PRV (on CRH Line)	1 no.	5 no.
4	Spray Control Valve for 1x100 % HC-PRDS	1 no.	5 no.
5	Spray Control Valve for 1x30 % IC-PRDS	1 no.	5 no.

1.5 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) The bidder shall supply one complete set of special tools & tackles (if any) required for the erection, assembly, disassembly & maintenance of the equipment. A list of such tools & tackles to be supplied shall be submitted along with the bid.

iii) Bidder to indicate the service life expectancy period for the spare parts under normal working conditions. The spares shall be treated and packed for long storage under climatic conditions prevailing at site. Small items shall be packed in sealed transparent plastic bags with desiccators' packs as necessary.

1.6 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.

1.7 Mandatory Spares: Optional (Price not to be Evaluated)

The items listed in list of mandatory spares to be offered by the bidder, and the price (Lump sum as well as individual) for each item to be quoted separately under the separate heading. The format for price schedule format.

LIST OF MANDATORY SPARES

Sl. No.	ITEM DESCRIPTION	QUANTITY FOR 1 UNIT
1.	Stem Packing	2 sets for each control valve
2.	Trim (including cage, plug, stem, seat rings, guide bushings etc.)	1 set for each control valve
3.	Actuators	1 Set of each type and rating
4.	SMART positioner	10% or minimum 01 no. of each type
5.	Limit Switch	10% of each type

1.8 Specific Requirements:

i) 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.

ii) Facility to adjust the maximum travel of the stem & starting point of travel shall be incorporated.

iii) 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.

iv) Hand wheel shall have open/ close direction.

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

vi) The material of filter for Air Filter Regulator shall be Sintered bronze.

vii) 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.

viii) 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.

ix) ASV-22 & ASV-20 valve shall have side entry & bottom exit for steam.

1.9 BIDDER TO COMPLY FOLLOWING AFTER PLACEMENT OF PO:

1. Supplier to submit detailed 'Bill of Material ' (BOM) at the time of drawing/document submission after placement of PO. Each item of the BOM to be uniquely identified with item code no. or item serial no.

2. Supplier to ensure that all items which will find separate mention in the packing list are covered in this detailed BOM.

3. Supplier to also give the following undertaking in the BOM:

"The BOM provided herewith completes the scope (in content and intent) of material supply under PO No. ……., dated …….
Any additional material which may become necessary for the intended application of the supplied item(s)/package will be supplied free of cost in most reasonable time."

2.0 SIZING DATA SHEET- A-1

COMBINED AUXILIARY STEAM PRDS & SPRAY CONTROL VALVE (ASV-22 & ASV-20)

S.No.	Parameters	Cond.-1	Cond.-2	Cond.-4	Cond.-5	Cond.-6	Cond.-7	Cond.-8	Mech. Design
1.0	**Inlet of Combined APRDS (ASV-22 & ASV-20)**								
1.1	Pressure (kg/cm^2 (a))	50	100	247	247	88	100	247	271.3
1.2	Temp. (^OC)	352	500	565	565	375	390	565	573
1.3	Flow for 100% Capacity valve (TPH)	**Bidder To Calculate**							
1.4	Flow for 30% Capacity valve (TPH)	**Bidder To Calculate**							
2.0	**Outlet of combined APRDS (ASV-22 & ASV-20)**								
2.1	Pressure (kg/cm^2 (a))	16	16	16	16	16	16	16	21
2.2	Temp. (^OC)	290	290	290	290	290	290	290	310
2.3	Flow for 100% Capacity valve (TPH)	145.7	94.7	82.0	207.7	158.7	114.7	179.8	-
2.4	Flow for 30% Capacity valve (TPH)	43.7	28.4	24.6	62.3	47.6	34.4	53.9	-
3.0	**Inlet of Spray Control Valve (CDV-138 & CDV-11)**								
3.1	Pressure (kg/cm^2 (a))	40.5	40	38	38	40.5	40	38	46
3.2	Temp. (^OC)	40	40	44	44	40	40	44	60
3.3	Flow for 100% Capacity valve (TPH)	**BIDDER TO CALCULATE**							
3.4	Flow for 30% Capacity valve (TPH)	**BIDDER TO CALCULATE**							

Note:

1) Low capacity steam pressure reducing valve (i.e.ASV-26) at upstream parameters (64.98 kg.cm^2(a), 357.4 ^{0}C) & downstream parameters (16 kg.cm^2(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 kg.cm^2(a), 565^{0}C) & downstream parameters (16 kg.cm^2(a), 290 ^{0}C) min. flow at 15% approx. valve lift.

2) Bidder to furnish VWO flow rates (t/hr) for ASV-22 as per following table:

	Conditions	VWO flow (t/hr) at (100% lift)
CASE-1	➢ Upstream pressure = 271.3 kg/cm2(a) ➢ Upstream temperature = 573 deg.C ➢ Downstream pressure = 22 kg/cm2 (a)	
CASE-2	➢ Upstream pressure = 247 kg/cm2(a) ➢ Upstream temperature = 565 deg.C ➢ Downstream pressure = 22 kg/cm2 (a)	

SIZING DATA SHEET- A-2

AUXILIARY STEAM PRV (ASV-26)

SL. NO.	Parameters	Condition-3A NR AT 40% LOAD	Condition-3B NR AT 100% LOAD	Mechanical design
1.0	**Inlet of PRV (ASV-26)**			
1.1	Pressure (kg/cm^2 (a))	24.04	60.61	74.5
1.2	Temp. (^OC)	350.4	344.7	360
1.3	Flow (T/Hr)	16.91	16.91	--
2.0	**Outlet of PRV (ASV-26)**			
2.1	Pressure (kg/cm^2 (a))	16	16	
2.2	Temp. (^OC)	**Bidder To Calculate**		

3.0 DATA SHEETS- A

AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION

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Tag No.: **ASV-22** (LBG10AA101) Qty.: **ONE PER UNIT** Data Sheet No. PES-145-06-DS1-0

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	**TSGENCO-5X800 MW YADADRI TPS**	.....
	SERVICE	**COMBINED TYPE MAIN STEAM TO AUX. STEAM PRDS (1x100% HC PRDS)**	.....
	LOCATION	[•] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [•] MODULATING	.....
	PIPE SIZE (inlet / outlet)	**Ø 219.1x 34 | Ø 508 x 9.53**	.....
	PIPE MATERIAL (inlet / outlet)	**SA 335 P91 | SA 335 P22**	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[] GLOBE [•] ANGLE | [] TOP [•] CAGE | ONE	.....|.....|.....|...
	BODY SIZE: PORT SIZE: DESIGN CV		.....|.....|.....
	END CONNECTION & RATING (ANSI)	[•] BWE [] SWE [] FLANGED	...
	BODY MATERIAL	[] A216 WCB [] A217 WC6 [•] SA182 F91 [] SS [] A217 C5 [] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [•] GRAFOIL [•] DOUBLE [] SINGLE	.....
	BONNET TYPE	[] STD [•] EXTENDED [] FINNED	.....
	TRIM FORM	[] LINEAR [ ] EQ. %[] QUICK OPEN (ON/OFF)	.....
	TRIM MATERIAL: SEAT | PLUG	SS316 (ST) | SS316 (ST)	.....
	: CAGE | GUIDE BUSH	SS316 (ST) | SS316 (ST)	
	FLOW	[] BELOW SEAT [] ABOVE SEAT	.....|.....
	OUTLET VELOCITY	[] < 7 M/SEC (WATER) [•] < 150 M/SEC (STM)	.....|.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [•] V [] VI	.....
	NOISE LEVEL (dBA)	LESS THAN 85 dBA (AT ONE METER DISTANCE)	.....|.....
	VACUUM SERVICE	[] YES [•] NO	.....
	ANTI CAVITATION TRIM	[] YES [•] NO	.....
			.....
			.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	**PNEUMATIC PISTON TYPE**	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	|	.....|.....
	*TRAVEL TIME FOR OPEN TO CLOSE AND CLOSE TO OPEN	LESS THAN 10 SECS.	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [•] TO CLOSE	.....
	*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 CONVERTOR	PART OF SMART POSITIONER	
	JUNCTION BOX	[•] REQUIRED [] NOT REQUIRED	
	HAND WHEEL (SIDE MOUNTED)	[•] REQUIRED	
	LOCAL POSITION INDICATOR	[•] REQUIRED	

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Tag No.: **ASV-22** Qty.: **ONE PER UNIT** Data Sheet No. PES-145-06-DS1-0

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	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)								…… …… …… ……
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 for High Capacity Aux. PRDS							
	VALVE TYPE						[] CAVITATION [] FLASHING [•] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2(A) **271.3** * BODY DESIGN : PRESS (KG/CM2(A) | TEMP (DEG C) 271.3 | **573** * IBR FORM III-C [•] REQUIRED [] NOT REQUIRED						……		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							……		

Note:

(1) Valve actuators shall be capable of operating at 70 Degree C ambient continuously.

(2) The design of all valve bodies shall conform to the requirements of ANSI (USA) for dimensions, material thickness and material specification for their respective pressure classes.

(3) Separate moisture separator unit for ensuring dryness of air entering I/P is to be supplied with each control valve.

(4) SS name plate shall be fixed on the control valve and it will have all details like KKS Tag no. / SI. No. / Body material size / Press. Rating / Trim material / Trim type / action on air failure / diaphragm air pressure at full open and closed condition.

(5) Bidder can offer superior material than as asked in the Data sheet above, however acceptance of the same shall be subject to BHEL/Customer approval,without any price implication.

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Tag No.: **ASV-20** (LBG20AA101) Qty.: **ONE PER UNIT** Data Sheet No. PES-145-06-DS1-0

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	**TSGENCO-5X800 MW YADADRI TPS**	.....
	SERVICE	**COMBINED TYPE MAIN STEAM TO AUX. STEAM PRDS (1x30% IC PRDS)**	.....
	LOCATION		.....
	DUTY	[•] INDOOR [] OUTDOOR	.....
		[] ON/OFF [•] MODULATING	.....
	PIPE SIZE (inlet / outlet)	**Ø 168.3x 27.5#** | **Ø 323.9 x 9.53**	..... | .....
	PIPE MATERIAL (inlet / outlet)	**SA 335 P91** | **SA 335 P22**	
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[] GLOBE [•] ANGLE | [] TOP [•] CAGE | ONE	..... | ..... | ..... | ...
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	END CONNECTION & RATING (ANSI)	[•] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCB [] A217 WC6 [•] SA182 F91 [] SS	.....
		[] A217 C5 [] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [•] GRAFOIL [•] DOUBLE [] SINGLE	.....
	BONNET TYPE	[] STD [] EXTENDED [•] FINNED	.....
	TRIM FORM	[] LINEAR [] EQ. % [] QUICK OPEN (ON/OFF)	.....
	TRIM MATERIAL: SEAT | PLUG	SS316 (ST) | SS316 (ST)	
	: CAGE | GUIDE BUSH	SS316 (ST) | SS316 (ST)	..... | .....
	FLOW	[] BELOW SEAT [] ABOVE SEAT	..... | .....
	OUTLET VELOCITY	[] < 7 M/SEC (WATER) [•] < 150 M/SEC (STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [•] V [] VI	..... | .....
	NOISE LEVEL (dBA)	LESS THAN 85 dBA (AT ONE METER DISTANCE)	.....
	VACUUM SERVICE	[] YES [•] NO	.....
	ANTI CAVITATION TRIM	[] YES [•] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	**PNEUMATIC PISTON TYPE**	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR OPEN TO CLOSE AND CLOSE TO OPEN	LESS THAN 10 SECS.	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [•] TO CLOSE	.....
	*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 CONVERTOR	PART OF SMART POSITIONER	
	JUNCTION BOX	[•] REQUIRED [] NOT REQUIRED	
	HAND WHEEL (SIDE MOUNTED)	[•] REQUIRED	
	LOCAL POSITION INDICATOR	[•] REQUIRED	

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Tag No.: **ASV-20** Qty.: **ONE PER UNIT** Data Sheet No. PES-145-06-DS1-0

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	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 2% ± 1% ± 0.5% ± 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 for High Capacity Aux. PRDS							

VALVE TYPE	[] CAVITATION [] FLASHING [•] HIGH DP
* MAX SHUT OFF PRESS (KG/CM2(A) **271.3** * BODY DESIGN : PRESS (KG/CM2(A) | TEMP (DEG C) 271.3 | **573** * IBR FORM III-C [•] REQUIRED [] NOT REQUIRED	....|..... .....
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg	.....

Note:

(1) Valve actuators shall be capable of operating at 70 Degree C ambient continuously.

(2) The design of all valve bodies shall conform to the requirements of ANSI (USA) for dimensions, material thickness and material specification for their respective pressure classes.

(3) Separate moisture separator unit for ensuring dryness of air entering I/P is to be supplied with each control valve.

(4) SS name plate shall be fixed on the control valve and it will have all details like KKS Tag no. / SI. No. / Body material size / Press. Rating / Trim material / Trim type / action on air failure / diaphragm air pressure at full open and closed condition.

(5) Bidder can offer superior material than as asked in the Data sheet above, however acceptance of the same shall be subject to BHEL/Customer approval,without any price implication.

(6)# Bidder can offer ASV-20 valve smaller than the pipe sized mentioned above subject to meeting all the functional and technical requirements. However, Bidder is required to clearly indicate the same in their offer.

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Tag No.: **ASV-26** (LBG20AA101) Qty.: **ONE PER UNIT** Data Sheet No. PES-145-06-DS1-0

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	**TSGENCO-5X800 MW YADADRI TPS**	.....
	SERVICE	**COLD REHEAT STEAM TO AUXILIARY STEAM PR. REDUCING VALVE (LC PRV)**	.....
	LOCATION	[•] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [•] MODULATING	.....
	PIPE SIZE (inlet / outlet)	**Ø 114.3x6.02 | Ø 219.1 x 12.7**	.....
	PIPE MATERIAL (inlet / outlet)	**SA 106 Gr. C | SA 106 Gr. C**	..... | .....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[•]GLOBE [] ANGLE |[] TOP [•]CAGE| ONE	..... | ..... | ..... | .....
	BODY SIZE: PORT SIZE: DESIGN CV		..... | ..... | .....
	END CONNECTION & RATING (ANSI)	[•] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[] A216 WCC [•] A217 WC9 [] SS [] A217 C5 [] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [•] GRAFOIL [•]DOUBLE []SINGLE	.....
	BONNET TYPE	[] STD [•] EXTENDED [] FINNED	.....
	TRIM FORM	[] LINEAR [•] EQ. %[] QUICK OPEN ON/OFF)	.....
	TRIM MATERIAL: SEAT | PLUG	SS316 (ST) | SS316 (ST)	
	: CAGE | GUIDE BUSH	SS316 (ST) | SS316 (ST)	..... | .....
	FLOW	[] BELOW SEAT [] ABOVE SEAT	..... | .....
	OUTLET VELOCITY	[] < 7 M/SEC (WATER) | | [•] < 150 M/SEC (STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [•] V [] VI	..... | .....
	NOISE LEVEL (dBA)	LESS THAN 85 dBA **(AT ONE METER DISTANCE)**	.....
	VACUUM SERVICE	[] YES [•] NO	.....
	ANTI CAVITATION TRIM	[] YES [•] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	**BIDDER TO SPECIFY**	..... | .....
	CLOSE AT : OPEN AT (KG/CM2g)	|	..... | .....
	*TRAVEL TIME FOR OPEN TO CLOSE AND CLOSE TO OPEN	LESS THAN 10 SECS.	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[•] TO OPEN [] STAYPUT [] TO CLOSE	.....
	*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 CONVERTOR	PART OF SMART POSITIONER	
	JUNCTION BOX	[•] REQUIRED [] NOT REQUIRED	
	HAND WHEEL (SIDE MOUNTED)	[•] REQUIRED	
	LOCAL POSITION INDICATOR	[•] REQUIRED	

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-417-142-N101	
		SECTION I	
		REV. NO. 00	DATE 15.06.2021

Tag No.: **ASV-26** Qty.: **ONE PER UNIT** Data Sheet No. PES-145-06-DS1-0

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	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)			± 2% ± 1% ± 0.5% ± 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 for Low Capacity PRV							
	VALVE TYPE						[] CAVITATION [] FLASHING [•] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2(A) 74.5 BODY DESIGN : PRESS (KG/CM2(A) | TEMP (DEG C) 74.5 | **360** * IBR FORM III-C [•] REQUIRED [] NOT REQUIRED						.....		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							.....		

Note:

(1) Valve actuators shall be capable of operating at 70 Degree C ambient continuously.

(2) The design of all valve bodies shall conform to the requirements of ANSI (USA) for dimensions, material thickness and material specification for their respective pressure classes.

(3) Separate moisture separator unit for ensuring dryness of air entering I/P is to be supplied with each control valve.

(4) SS name plate shall be fixed on the control valve and it will have all details like KKS Tag no. / SI. No. / Body material size / Press. Rating / Trim material / Trim type / action on air failure / diaphragm air pressure at full open and closed condition

(5) Bidder can offer superior material than as asked in the Data sheet above, however acceptance of the same shall be subject to BHEL/Customer approval,without any price implication.

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-417-142-N101	
		SECTION I	
		REV. NO. 00	DATE 15.06.2021

Tag No.: **CDV-138**(LAF20AA101) Qty.: **ONE PER UNIT** **(One against Each Tag)** Data Sheet No. PES-145-06-DS1-0

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	**TSGENCO-5X800 MW YADADRI TPS**	.....
	SERVICE	**SPRAY TO COMBINED PRDS CONTROL VALVE (1x100%)**	.....
	LOCATION	[•] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [•] MODULATING	.....
	PIPE SIZE (inlet / outlet)	**Ø 88.9 x5.49 | Ø 88.9 x5.49**	.....
	PIPE MATERIAL (inlet / outlet)	**SA 106 Gr. B | SA 106 Gr. B**	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING: NO. OF PORTS	[•]GLOBE [] ANGLE |[] TOP [•] CAGE |ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV		.....|.....|.....
	END CONNECTION & RATING (ANSI)	[•] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[•] A216 WCB [] A217 WC6 [] SS [] A217 C5	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [•]GRAFOIL [•]DOUBLE []SINGLE	.....
	BONNET TYPE	[] STD [•] EXTENDED [] FINNED	.....
	TRIM FORM	[] LINEAR [] EQ. %[] QUICK OPEN ON/OFF)	.....
	TRIM MATERIAL: SEAT | PLUG	SS316 (ST) | SS316 (ST)	
	: CAGE | GUIDE BUSH	SS316 (ST) | SS316 (ST)	.....|.....
	FLOW	[] BELOW SEAT [] ABOVE SEAT	.....|.....
	OUTLET VELOCITY	[•] < 7 M/SEC (WATER) | [] < 150 M/SEC(STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [•] V [] VI	.....|.....
			.....
	NOISE LEVEL (dBA)		.....
	VACUUM SERVICE	LESS THAN 85 dBA (AT ONE METER DISTANCE)	.....
	ANTI CAVITATION TRIM	[] YES [•] NO	.....
		[] YES [•] NO	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	**PNEUMATIC DOUBLE ACTING PISTON TYPE**	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	|	.....|.....
	*TRAVEL TIME FOR OPEN TO CLOSE AND CLOSE TO OPEN	LESS THAN 10 SECS.	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [•] TO CLOSE	.....
	*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 CONVERTOR	PART OF SMART POSITIONER	
	JUNCTION BOX	[•] REQUIRED [] NOT REQUIRED	
	HAND WHEEL (SIDE MOUNTED)	[•] REQUIRED	
	LOCAL POSITION INDICATOR	[•] REQUIRED	

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-417-142-N101	
		SECTION I	
		REV. NO. 00	DATE 15.06.2021

Tag No.: **CDV-138** Qty.: **ONE PER UNIT** **(One against Each Tag)** Data Sheet No. PES-145-06-DS1-0

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	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 2% ± 1% ± 0.5% ± 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 for High Capacity Aux. PRDS							

VALVE TYPE	[] CAVITATION [] FLASHING [] HIGH DP
* MAX SHUT OFF PRESS (KG/CM2(A) 46 * BODY DESIGN : PRESS (KG/CM2(A) | TEMP (DEG C) 46 | 60 * IBR FORM III-C [] REQUIRED [•] NOT REQUIRED	....|..... .....
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg	.....

Note:

(1) Valve actuators shall be capable of operating at 70 Degree C ambient continuously.

(2) The design of all valve bodies shall conform to the requirements of ANSI (USA) for dimensions, material thickness and material specification for their respective pressure classes.

(3) Separate moisture separator unit for ensuring dryness of air entering I/P is to be supplied with each control valve.

(4) SS name plate shall be fixed on the control valve and it will have all details like KKS Tag no. / SI. No. / Body material size / Press. Rating / Trim material / Trim type / action on air failure / diaphragm air pressure at full open and closed condition

(5) Bidder can offer superior material than as asked in the Data sheet above, however acceptance of the same shall be subject to BHEL/Customer approval,without any price implication.

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-417-142-N101	
		SECTION I	
		REV. NO. 00	DATE 15.06.2021

Tag No.: **CDV-11**(LAF30AA101) Qty.: **ONE PER UNIT** **(One against Each Tag)** Data Sheet No. PES-145-06-DS1-0

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	**TSGENCO-5X800 MW YADADRI TPS**	.....
	SERVICE	**SPRAY TO COMBINED PRDS CONTROL VALVE (1x30%)**	.....
	LOCATION	[•] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [•] MODULATING	.....
	PIPE SIZE (inlet / outlet)	**Ø 33.4 x4.55 | Ø 33.4 x4.55**	.....
	PIPE MATERIAL (inlet / outlet)	**SA 106 Gr. B | SA 106 Gr. B**	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING: NO. OF PORTS	[•]GLOBE [] ANGLE |[] TOP [•] CAGE |ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV		.....|.....|.....
	END CONNECTION & RATING (ANSI)	[] BWE [•] SWE [] FLANGED	.....
	BODY MATERIAL	[•] A216 WCB [] A217 WC6 [] SS [] A217 C5	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [•]GRAFOIL []DOUBLE [•]SINGLE	.....
	BONNET TYPE	[] STD [•] EXTENDED [] FINNED	.....
	TRIM FORM	[] LINEAR [•] EQ. PERCENTAGE	.....
	TRIM MATERIAL: SEAT | PLUG	[] QUICK OPEN (ON/OFF)	
	: CAGE | GUIDE BUSH	SS316 (ST) | SS316 (ST)	.....|.....
		SS316 (ST) | SS316 (ST)	.....|.....
	FLOW	[] BELOW SEAT [] ABOVE SEAT	.....
	OUTLET VELOCITY	[•] < 7 M/SEC (WATER) |	.....|.....
	REQUIRED LEAKAGE CLASS	[] II [] III [] IV [•] V [] VI	.....
	NOISE LEVEL (dBA)		.....
	VACUUM SERVICE	LESS THAN 85 dBA (AT ONE METER DISTANCE)	.....
	ANTI CAVITATION TRIM	[] YES [•] NO	.....
		[] YES [•] NO	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	**PNEUMATIC DOUBLE ACTING PISTON TYPE**	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	|	.....|.....
	*TRAVEL TIME FOR OPEN TO CLOSE AND CLOSE TO OPEN		.....
		LESS THAN 10 SECS.	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[] TO OPEN [] STAYPUT [•] TO CLOSE	.....
	*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 CONVERTOR	PART OF SMART POSITIONER	
	JUNCTION BOX	[•] REQUIRED [] NOT REQUIRED	
	HAND WHEEL (SIDE MOUNTED)	[•] REQUIRED	
	LOCAL POSITION INDICATOR	[•] REQUIRED	

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-417-142-N101	
		SECTION I	
		REV. NO. 00	DATE 15.06.2021

Tag No.: **CDV-138** Qty.: **ONE PER UNIT** **(One against Each Tag)** Data Sheet No. PES-145-06-DS1-0

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	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 2% ± 1% ± 0.5% ± 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 for High Capacity Aux. PRDS							

VALVE TYPE	[] CAVITATION [] FLASHING [] HIGH DP
* MAX SHUT OFF PRESS (KG/CM2(A) 46 * BODY DESIGN : PRESS (KG/CM2(A) | TEMP (DEG C) 46 | 60 * IBR FORM III-C [] REQUIRED [•] NOT REQUIRED	....|..... .....
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg	.....

Note:

(1) Valve actuators shall be capable of operating at 70 Degree C ambient continuously.

(2) The design of all valve bodies shall conform to the requirements of ANSI (USA) for dimensions, material thickness and material specification for their respective pressure classes.

(3) Separate moisture separator unit for ensuring dryness of air entering I/P is to be supplied with each control valve.

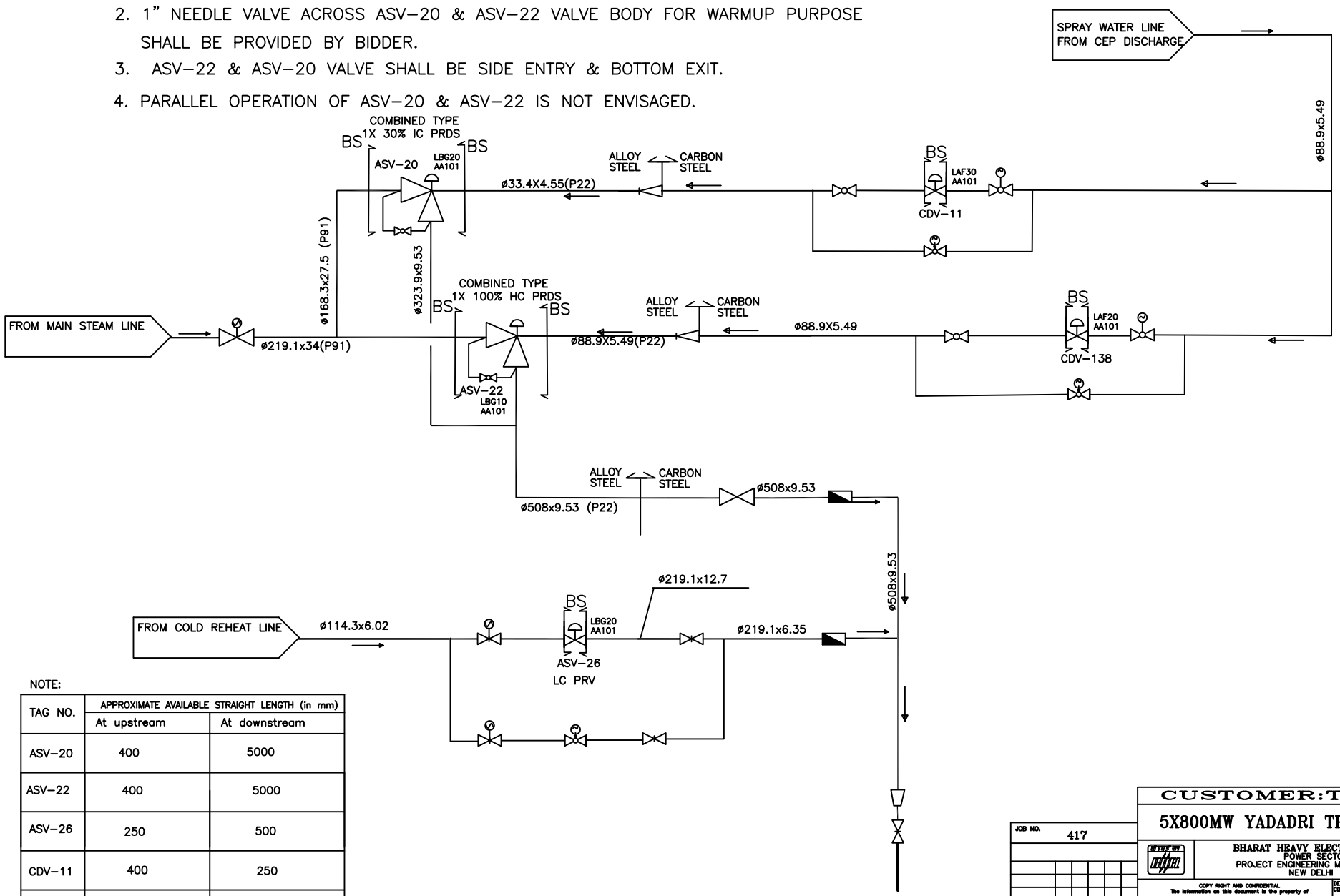
(4) SS name plate shall be fixed on the control valve and it will have all details like KKS Tag no. / SI. No. / Body material size / Press. Rating / Trim material / Trim type / action on air failure / diaphragm air pressure at full open and closed condition

(5) Bidder can offer superior material than as asked in the Data sheet above, however acceptance of the same shall be subject to BHEL/Customer approval,without any price implication.

NOTE

1. EQUIPMENTS IN BIDDER'S SCOPE HAVE BEEN MARKED AS [BS]
2. 1" NEEDLE VALVE ACROSS ASV-20 & ASV-22 VALVE BODY FOR WARMUP PURPOSE SHALL BE PROVIDED BY BIDDER.
3. ASV-22 & ASV-20 VALVE SHALL BE SIDE ENTRY & BOTTOM EXIT.
4. PARALLEL OPERATION OF ASV-20 & ASV-22 IS NOT ENVISAGED.

4.0 TENDER DRAWING



NOTE:

TAG NO.	APPROXIMATE AVAILABLE STRAIGHT LENGTH (in mm)	
	At upstream	At downstream
ASV-20	400	5000
ASV-22	400	5000
ASV-26	250	500
CDV-11	400	250
CDV-138	450	300

CUSTOMER: TSGENCO

5X800MW YADADRI TPS, NALGONDA

JOB NO. 417

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

DEPT CODE		NAME	SIGN	DATE
H	DRN			
	DESN	AKS	Sd/-	15.06.2021
	CHD	RKV	Sd/-	15.06.2021
	APPD	CM	Sd/-	15.06.2021

TITLE: TECHNICAL SPEC. for AUXILIARY PRDS

C&M | DEPT. | SCALE NTS | DRAWING NO. PE-TS-417-142-N102
SIGN
DATE
SHEET 01 OF 01 | REV. 00

5.0 CUSTOMER SPECIFICATION

1.00.00 **GENERAL**

1.01.00 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

1.02.00 Where high stroking speed , high actuation forces and accurate positioning is critical for the operation of the plant, as in case of HP or LP bypass valves, Separator Drain Valves , hydraulic actuators with electro-hydraulic interface shall be offered.

2.00.00 **GENERAL TECHNICAL REQUIREMENTS**

2.01.00 Bidder shall exercise caution in selecting severe service control valves like BFP recirculation, HP & LP bypass, superheater & reheater attemperator, PRDS for Boiler & Turbine, Feed control station ,Soot blower steam pressure, Fuel oil heating and pressurizing ,minimum economizer flow control ,DM make up (emergency / normal), control valves whose down stream are connected to vacuum such as HP/LP heater emergency level control, condenser make up water, separator level control , CEP minimum flow control etc. For such critical applications, Bidder shall offer valves which are proven for similar application. Above valves shall have leakage class equal or better than CLASS-V with metal-to-metal seating.

2.02.00 Valve with ANSI leakage CLASS-IV shall be provided for all applications except for the control valves indicated above.

2.03.00 Bidder shall provide redundant control valves for some services such as 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.

2.04.00 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 motorized isolating valve, inching duty motorized bypass valve and manual drain valves. Each redundant control valve shall have its upstream motorized and down-stream motorised 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.

2.05.00 Wherever, steam conditioning calls for , Pressure reducing & desuperheating, combined PRDS type valves shall be offered.

2.06.00 Control Valve shall be furnished with IBR certification wherever required .

2.07.00 Valve Body / End Connections

2.07.01 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.

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

2.07.03 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.

2.07.04 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.

2.07.05 Bonnet joints for all control valves shall be of flanged and bolted type.

2.07.06 Flanged valve shall be rated at no less than class 300 lbs

2.07.07 The direction of flow shall be clearly engraved on the body . Valve tag no, , description or purpose, stroke time shall be painted on all control valve body with black letters on white background in Bold letters.

2.07.08 Valve Body Materialial shall match the process conditionrequirement as per ANSI. . General guideline shall be as follows

SR. NO.	SERVICE		MATERIAL
1.	Non corrosive, non-flashing and non cavitating service for fluid temperature up to 275ºC	:	Cast carbon steel ASTM A216 Gr. WCB , Trim material - 316 SS stellited faced GUIde posts and bushings.
2.	Non corrosive, non-flashing and non cavitating service for fluid temperature above 275ºC	:	Cast alloy steel ASTM A217 Gr. WC9 Trim material - 316 SS stellited faced GUIde posts and bushings.
3.	Severe flashing / cavitating services	:	Alloy steel ASTM A217 Gr. WC9 , Trim material - 440C
4.	Low flashing / cavitating services	:	Alloy steel ASTM A217 Gr. WC6 ,Trim material - 17-4 PH SS
5.	DM water application (condenser hotwell normal, emergency make up etc.)	:	316 stainless steel

2.07.09 Bidder may supply valves with body and trim materials with superior quality than specified material and in such cases Bidder shall furnish the comparison of offered material properties ,such as cavitation resistance , , hardness , tensile strength , strain energy , corrosion and erosion resistance etc. , with specified material for Owner's approval.

2.08.00 Valve Size

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 characterised valves and between 70 to 80 percent opening for equal percentage characterised 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 exit outlet velocity as defined in ISA handbook does not exceed 8 m / sec for liquid services , 150 m/sec for steam services anf 50/% of sonic velocity for flashing services The sizing procedure followed shall be as per latest edition of ANSI/ISA or equivalent standard.

2.09.00 Valve Top work

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

2.09.02 Extended bonnet/ bonnet when maximum temperature fluid is greater than 280^0 C shall be provided and high temperature packing shall also be used for high temperature application.

2.09.03 The gland material shall be chosen to suit the operating temperature. PTFE may be chosen for lower temperature application (232ºC maximum) and for high temperature application graphited asbestos glands are to be provided. For vacuum services,. All valves connected to vacuum on downstream side shall be provided with packing suitable for vacuum applications eg. double vee type chevron packing.

2.10.00 Valve Trim

2.10.01 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.

2.10.02 Balanced trim valves shall be offered for high shut-off pressure or high pressure drop condition to reduce the size of the actuators.

2.10.03 For flashing services and two stage mixtures, the trim material shall be 17-4 PH SS or equivalent.

2.10.04 If cavitating condition is foreseen, Bidder shall offer multistage or labyrinth trims 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.

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

2.10.06 Plug shall be one-piece construction cast , forged or machined from solid bar stock .Plug shall be screwed or pinned to valve stems or shall be integral with the valve stems.

2.11.00 Noise Level

The equivalent sound level measured at 1.5M above nearest floor level in elevation and 1 M horizontally from the control valve expressed in decibels to a reference of 0.0002 microbar shall not exceed 85 dBA. The noise abatement shall be achieved by valve body & trim design and not by use of silenecers. Valve Actuators

2.12.00 Actuator

2.12.01 Spring-diaphragm type actuators shall generally be used. Piston type actuators shall be offered in case of high shut-off pressure & quick response requirement. Hydraulic actuation system shall be provided for Critical valves as described elsewhere in the specification.

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

2.12.03 Diaphragms shall be designed for 200% maximum operating pressure.

2.12.04 Nylon reinforced neoprene is preferred as diaphragm material.

2.12.05 Valve actuators shall be capable of operating at 80^0 C ambient, continuously.

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

2.12.07 Air connection size shall be 1/4" NPT (F) unless otherwise dictated by process response time. Integral tubing shall be stainless steel.

2.12.08 Bidder shall indicate the stroking time of the valve assemblies with ositioned and ensure that the stroke time shall meet the process and equipment dynamics and shall be better than 10 seconds.

2.12.09 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.

2.12.10 Hydraulic actuation system

The system shall consist of , but not limited to , Hydraulic cylinder , proportional valve with blocking unit , SMART positioner with position transmitter , SOVs , safety bypass unit , safety control unit , Hydraulic supply unit and local controller cubicle with controller unit

2.13.00 Valve Positioners

2.13.01 All regulating service valves shall be offered with HART protocol based Smart Electro Pneumatic Positioners to ensure accuracy and repeatability of response.

2.13.02 Positioners shall have integral non contact type position transmitter, input and output gauges, local keypad & display and 4-20 mA DC output to DDCMIS in CCR.

2.13.03 Positioners shall be capable of functioning under hot, humid and vibrating conditions.

2.13.04 Positioner casings shall be dust tight, corrosion resistant and weatherproof to IP 65 .and explosion proof in hazardous areas.

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

2.13.06 Remote calibration from control room shall be possible through HART management station.

2.14.00 Performance

2.14.01 Performance of the complete assembly of the control valves shall be better than +/- 1% of FS for linearity , +/- 0.5 % of FS for hysteresis , 1% for accuracy.

2.15.00 Valve Accessories

2.15.01 Accessories shall include side mounted hand wheels, open & close , intermediate (as applicable) limit switches for both regulating and On off valves ,, junction boxes with 20 % spare terminals , Air filter regulators , airlock relays , volume chambers etc. Solenoid valve (SOV) wherever required shall be furnished. Each limit switch shall have not less than 2 NO & 2 NC contacts with contact rating 5A , 240 V AC / 0.5 A , 220 V DC . SOV shall have SS bar stock body , SS316 Trim , SS coil enclosure , Class H insulation Air filter regulator shall have sintered bronze filter element with maximum 5 microns filter size & 2 inch dial size pressure gauges. .Protection class of all Limit switches , junction boxes , SOV etc. shall have protection class IP 65 and explosion proof for hazardous areas.

2.15.02 Air distribution line to all final control elements like control valves, pneumatic dampers (both regulating / on-off type) , SOV operated valves shall be through SS manifolds and SS isolating valves only. These valves shall be properly tagged also with KKS tag no. and description of final control element / instrument for which they are intended.

2.16.00 Test and Examination

All valves shall be tested in accordance with the Quality Assurance programme agreed between the Owner and Bidder , which shall meet the requirements of IBR and other applicable codes mentioned elsewhere in the specification . The test shall include but not be limited to Non destructive test , Hydrostatic shell test prior to seat leakage test , Seat leakage test , Valve closure test , Functional test of fully assembled valves including actuators and accessories. CV test etc. For all control valves Cv test shall be witnessed by Owner.

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	DOCUMENT NO.: PE-TS-417-145-I104	
		VOLUME	
		SECTION	
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Tag No.: **Applicable to all Tag Nos.** Qty.: **As required** Data Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR)
(TO BE FILLED BY PURCHASER)

POSITIONER	PROJECT MFR. & MODEL No. BYPASS: GAUGES : ENCLOSURE CLASS INPUT SIGNAL OUTPUT SIGNAL	TSGENCO- 5X800MW YADADRI TPS. VENDOR DATA [] YES : [√] THREE : IP-65 4-20 mA TO SUIT ACTUATOR
AIR FILTER REGULATOR	MFR. & MODEL No. BOWL MATERIAL AIR SUPPLY PRESS (Kg/Cm2) OUTPUT PRESS (Kg/Cm2) OUTPUT GAUGE TYPE ACCURACY FILTER ELEMENT / ACCESSORIES MAT. FILTER SIZE ENCLOSURE TYPE MATERIAL	VENDOR DATA METALLIC 5.0 to 8.0 TO SUIT ACTUATOR [√] REQUIRED [] NOT REQUIRED CONSTANT BLEED TYPE ±0.1% PHOSPHER BRONZE / SS 5 MICRONS WEATHERPROOF & WATERPROOF SS
AIR LOCK	MFR. & MODEL No. SET PRESS (Kg/Cm2) SUPPLY PRESS (Kg/Cm2) RESET TYPE VENT PLUG	VENDOR DATA VENDOR DATA 3.0 to 5.0 AUTO [√] REQUIRED
LIMIT SWITCH	MFR. & MODEL No. OPEN : INT : CLOSE CONTACT TYPE RATING (AC/DC) ENCLOSURE CLASS	VENDOR DATA 1 NO. : --- : 1 No. SPDT 2 NO + 2 NC 5A 240V AC and 0.2A 220V DC [√] IP65
POSITION TRANSMITTER	MFR. & MODEL No. TYPE SUPPLY OUTPUT RATING ACCURACY ENCLOSURE CLASS	**IN BUILT SMART POSITIONER** [√] ELECTRONIC (2-WIRE) CONTACTLESS (LVDT TYPE) [] OTHER 24V DC [√] 4-20 ma [] 0-100 Ohms +/- 1% FS [√] IP65
SOLENOID VALVE	MFR. & MODEL No. RATING OPERATION | QTY COIL INSULATION CLASS ENCLOSURE CLASS MANUAL OPERATION	VENDOR DATA [√] 24V DC [] 220V DC [] 240V AC [] STAYPUT [√] INTERLOCK | [√] 1 [] 2 CLASS-H [√] IP65 [] NEMA 4 YES / INBUILT

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	DOCUMENT NO.: PE-TS-417-145-I104	
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Tag No.: **Applicable to all Tag Nos.** Qty.: **As required** Data Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR)
(TO BE FILLED BY PURCHASER)

SOLENOID VALVE	BODY MATERIAL TRIM MATERIAL ENCLOSURE MATERIAL	SS BAR STOCK SS 316 STAINLESS STEEL
HANDWHEEL	ORIENTATION	[] TOP MOUNTED [√] SIDE MOUNTED
VOLUME BOOSTER		BIDDER TO SPECIFY
JUNCTION BOX	MFR. & MODEL No. NO. OF WAYS SIZE CABLE GLANDS: (SIZE / QUANTITY) ENCLOSURE CLASS	VENDOR DATA THIRTY SIX AS REQUIRED AS REQUIRED AS REQUIRED IP-65
SS TUBING & FITTING PER CV.	SS TUBING & FITTINGS	12 METER FROM INST. AIR HEADER ISOLATING VALVE TO THE CONTROL VALVE
DIAPHRAGM	MATERIAL	NYLON REINFORCED NEOPRENE

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-417-142-N101	
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D. SPECIFICATION FOR APRDS

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-417-142-N101	
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1.0 SCOPE

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

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

2.0 CODES AND STANDARDS

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

Indian Boiler Regulation	:	IBR
ASME	:	B31.1/BPVC
Allowable Seat leakage	:	FCI-70.2
Pressure & Temperature ratings	:	ANSI-B16.34
Enclosure class	:	IEC-144 / NEMA / IS-13947
Control Valves Sizing	:	ISA S-75

3.0 TECHNICAL REQUIREMENTS

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

3.1 Control Valve

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

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

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

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

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

2-4 micro inches RMS. Packing material requiring lubrication will not be acceptable.
Type of bonnet shall be according to the service condition. Extension bonnets shall be provided when the maximum temperature of the flowing fluid is greater than 280 or unless otherwise specified.

3.1.5 The valve end connection as specified in Data Sheet-A shall conform to ANSI B16.25 for Butt Weld connection and ANSI B16.11 for socket weld connection. Tolerances on end to end, center to center, center to face shall be in accordance with ASME B16.10. The end connections shall be Socket Welded for sizes below 50NB and Butt Welded for sizes 50NB and above.

3.1.6 The valve seat leakage shall be as per FCI-70.2. The leakage class shall be as per Data Sheet-A.

3.1.7 The valve body shall have the direction of flow embossed on all valves.

3.1.8 The sizing shall conform to the requirements of ISA S75.01. Valve shall be capable of handling 120% of required maximum flow with meeting below mentioned requirements:

Valve with Linear characteristic.	-	Normal Flow (Design Point)	:	70-75% valve lift.
	-	Max. Flow	:	90% valve lift.
	-	Min. Flow	:	>10% valve lift.
Valve with Equipercentage Characteristic	-	Normal Flow (Design Point)	:	75-85% valve lift.
	-	Max. Flow	:	90% valve lift.
	-	Min. Flow	:	>10% valve lift.
ON/OFF Quick open Characteristic	-	1.2 times the CV calculated on the basis of maximum flow condition.		

3.1.9 Calculation for valve sizing, velocity and noise shall be subject to purchaser's approval during contract stage. However responsibility of proper selection and design for the duties specified lies with the vendor. Any modifications required to be done on the valves or actuators & accessories to achieve satisfactory performance of the control system shall be done without any commercial & delivery implication.

3.1.10 The valve outlet velocities shall be limited to the following values, unless otherwise specified in the Data sheet-A.

i)	Liquid service	<=	8 Meters/Sec.
ii)	Steam service	<=	150 Meters/Sec.

3.1.11 For cavitation service, the trim design shall be of multistage pressure drop type, so as to avoid cavitation altogether, instead of keeping cavitation away from valve parts

3.1.12 The equivalent weighted sound level measured at 1.5 metre above floor level in elevation and 1 metre horizontally from the control valve expressed in decibels to a reference of 0.0002 microbar shall not

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

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

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

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

3.2.1 **Pneumatic Actuator**

The actuator shall be designed for a thrust of 150% of valve's shut-off pressure at an air line supply pressure of 5-8 Kg/Sq. cm.
The pneumatic actuators shall be employed for modulating or open/close duty, as specified in Data Sheet-A. The bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drops, shut off pressure and valve travel.
The pneumatic spring opposed diaphragm actuator or piston actuator as the case may be for modulating duty shall be capable of positioning the associated valve at desired opening for all the operating conditions specified.

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

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

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

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

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

3.3.1 **Handwheel**

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

3.3.2 **Local Position Indicator**

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

3.3.3 **Position Transmitter**

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

3.3.4 **Air Filter Regulator**

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

3.3.5 **Air Lock Relay**

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

3.3.6 **Solenoid Valves**

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

3.3.7 **Limit Switch Assembly**

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

3.3.8 **I/P Converter**

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

3.3.9 **Smart positioner**

Microprocessor based Electronic (Smart)Positioner			
1	Electrical	a) Input Demand Signal	4-20 mA
		b) Power Supply	Loop Powered from the output card of Control System (12-30 V DC)
		c) HART Protocol	Compatibility for Remote Calibration & Diagnostics (Superimposed HART signal on input Signal (4-20 mA)
		d. Valve position sensing	Position sensing, 4-20 mA output signal to be provided for control system.
2	Environment	a) Operating temp.	(-)30 To 80 Deg. C
		b) Humidity	0-95 %
		c) Protection class	IP-65 Minimum
3	Software for Configuration and Diagnostics	Software	Windows based software. Software shall meet the requirements for Configuration, Diagnostics, Calibration and Testing of the actuator. It shall be easily upgradable with some hardware and compatible with any HART management system/AMS. Valve positioning timing, actuator leakage, and valve wear and tear, fault alarm to be offered as a minimum.
		Diagnostic/Test features	Advanced diagnostic features like Stroke counter or Travel counter, Leakage in actuators, Valve Signature analysis, Step Response test, Valve friction /Jamming detection etc. to be provided.
4	Test reports/ Certificates	Factory Valve Signature Tests Reports (Pressure versus Valve travel and Travel versus I/P signal) are to be provided.	
		Test certificates as per manufacture standard/Relevant standard are to be submitted.	
5	Configuration/ Calibration	Remote & Local Calibration, Auto & Manual Calibration shall be possible.	
6	Operating Range	Full range/ Split range.	
7	Modes	Valve Action	Direct / Reverse Valve Action
		Flow Characterization	Possible to fit Valve Characteristic Curves- Linear , Equal percentage etc.
8	Fail Safe/Fail Freeze	Fail Safe/Fail Freeze feature is to be provided as per datasheet. (In case the fail freeze feature is not intrinsic to the positioner, Bidder shall achieve the	

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		same externally through solenoid valve Connected in the pneumatic circuit).	
9	Pneumatic	Air capacity	Sufficient to handle the valves & actuators selected/ Boosters to be supplied, if required.
		Air pressure	To suit the air supply pressure/quality available.
		Process connection	¼" NPT
10	Performance	characteristic deviation	<=0.5 % of span. (<0.75%)
		ambient temp effect	<=0.01 %/ deg c or better.
		dead band	adjustable to 0.1to 10%
		scan time	10ms
		resolution	<=0.05%
		sensitivity/linearity	0.3-0.4% of FS
		repeatabity	0.32% of FS
		auto tune	yes
11	EMC & CE compliance	Required to International Standard like EN/IEC.	EN50081-2 & EN50082 or equivalent.
12	Accessories	In-built Operator Panel	Display with push buttons for configuration and display on the positioner itself (Password protected/Hardware lock).
		Pressure Gauge Block & Position Indicators.	For supply & output pressures, Air Filter Regulator, integral type position transmitter, in built mechanical position indicator and other accessories shall be provided on as required basis for making system complete.
		Electrical Cable Entry	1/2" NPT, side or bottom entry to avoid water ingress.
		Valves Mounting Assembly	For Sliding Stem/Rotary/Single acting/Double acting actuators on as required basis.

3.3.10 **Junction Box**

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

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

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

4.0 TESTING AND INSPECTION

4.1 The testing and inspection of the equipment/items shall be in line with the approved QAP

4.2 The cost of all tests as per the approved QAP will be deemed to have been included in the bid.

4.3 In case, the bidder is supplying the valve from outside India, the third party inspection shall be arranged and considered by the bidder in their offer.

5.0 SPARES AND CONSUMABLES

5.1 **Start-up/Commissioning Spares**

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

S.No.	ITEM DESCRIPTION	QUANTITY REQUIRED (per unit)
1	Gaskets	One (1) set with each control valve Tag
2	Gland Packings	One (1) set with each control valve Tag
3	SS Tubing (as applicable)	12 Meters of ¼ " SS Tubing, with 1 set of Fittings for each CV

5.2 **Mandatory Spares**

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

6.0 DRAWINGS AND DOCUMENTS

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

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

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

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

a) All Sizing Calculations (CV, Noise Level, Valve Outlet Velocity, Actuator sizing etc.)
b) General Assembly (GA) drawings indicating all important details (edge preparation details, dimensions, weight etc) for layout.

c) Data sheet-B completely filled-up.
d) Hook-up diagram of Control Valve with Actuator & Accessories.
e) Quality Plan duly signed & stamped.
f) Relevant Catalogs with detailed technical information.

6.2.2 Suggestive MDL:

SL. NO.	DOCUMENT NO.	DESCRIPTION	REMARKS
1.	PE-V1-417-142-N102	DATA SHEETS	It shall contain BOM, datasheets, calculation, Hook-up diagram.
2.	PE-V1-417-142-N104	GA DRAWINGS	It Shall GA drawings, part list, Edge preparation details.
3.	PE-V1-417-142-N108	QUALITY PLAN	
4.	PE-V1-417-142-N109	O & M MANUAL	

6.3 **Final documentation:**

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

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

7.0 MARKING AND PACKING

7.1 **Marking**

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

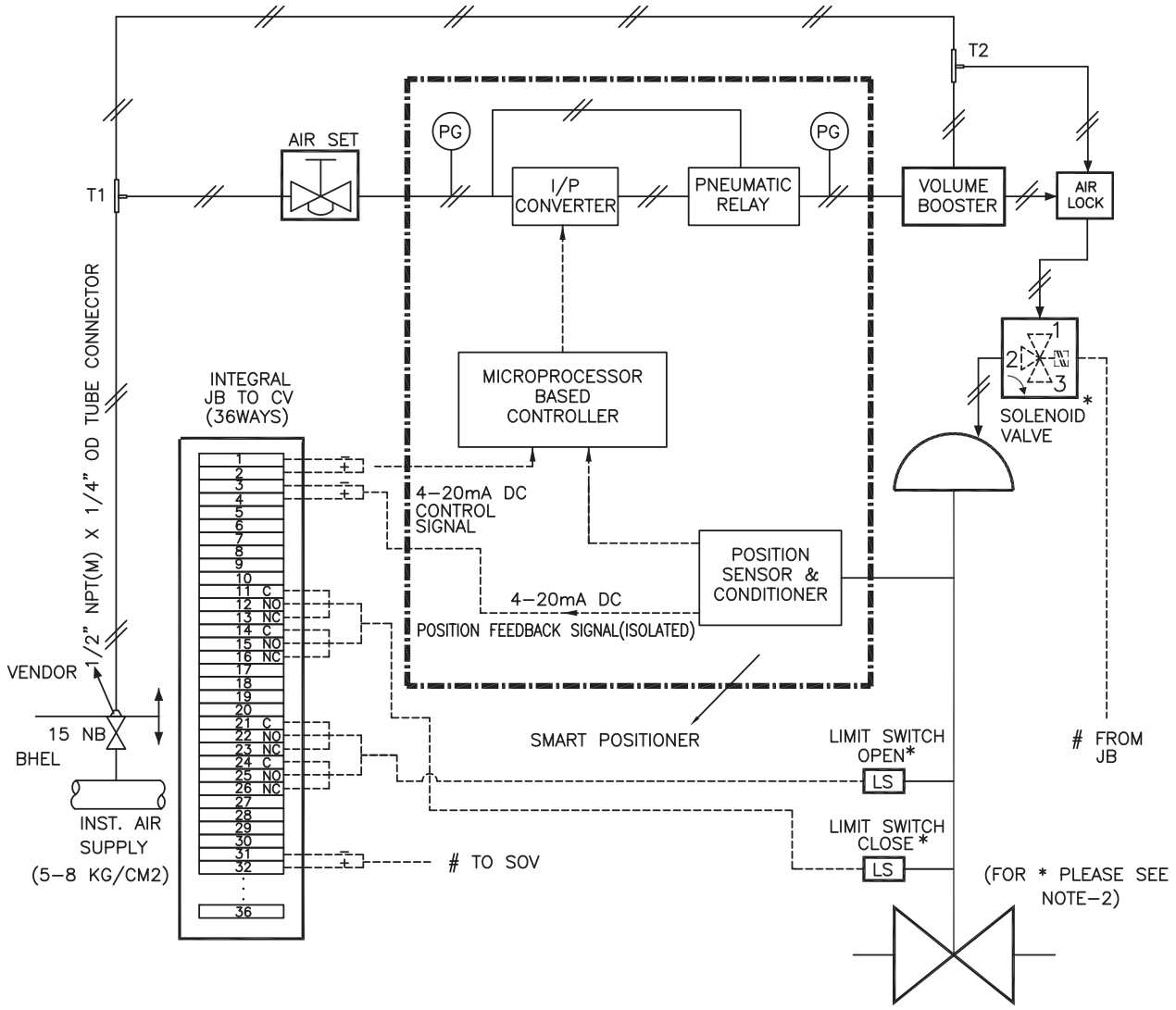
- ✓ *Address of consignee*
- ✓ *Purchase order no.*
- ✓ *Description of items or title of packing list*
- ✓ *Weight*
- ✓ *Dimension of the Box*
- ✓ *Marking showing upright position*
- ✓ *Marking showing sling position*
- ✓ *Marking showing umbrella (i.e. for machines/components to be stored under covered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

7.2 **Packing**

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

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

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



NOTES :-

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

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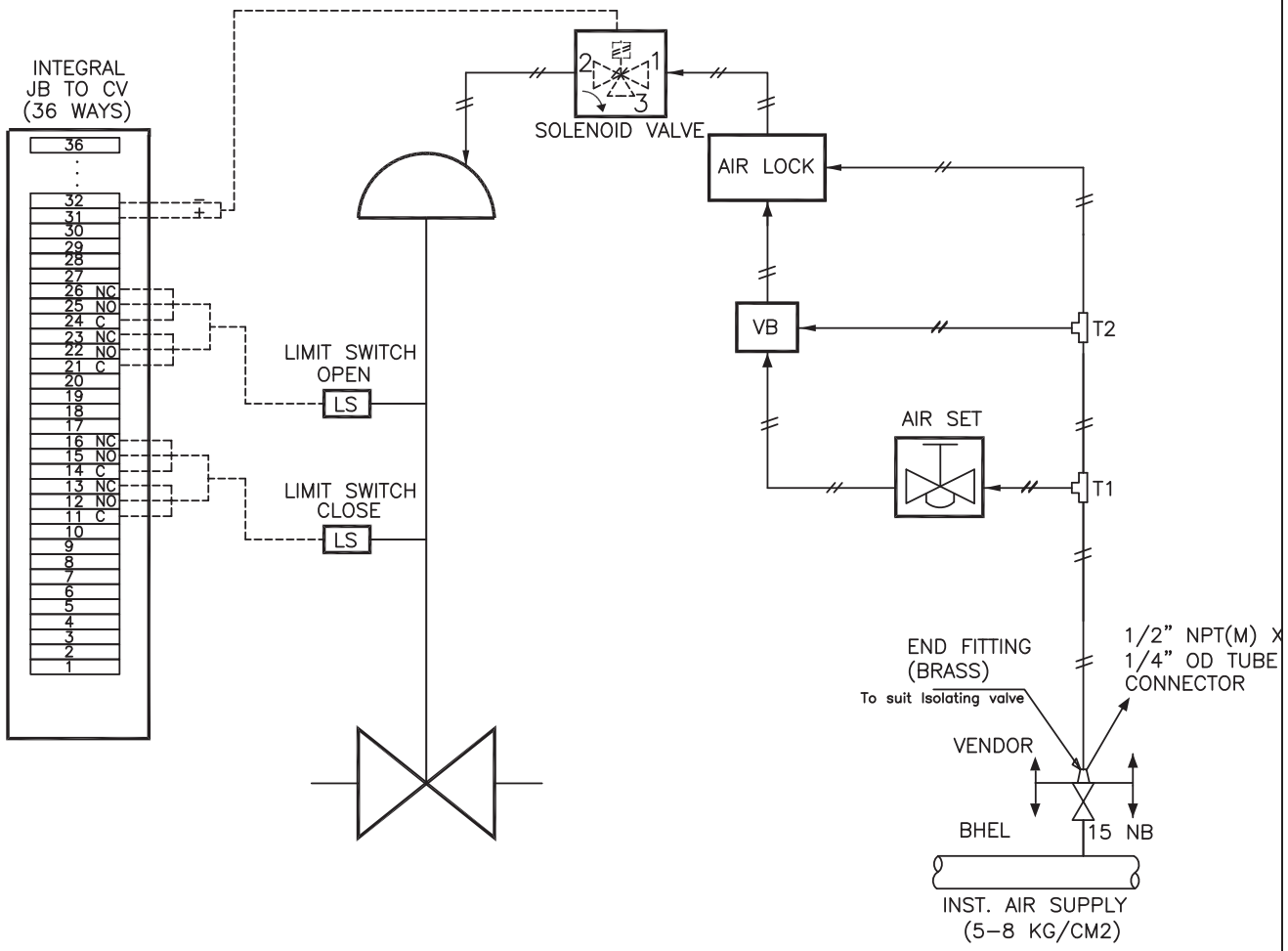
L1

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



NOTES :–

1. POSITION OF EACH VALVE ON SUPPLY AIR FAILURE / ELECTRIC SIGNAL FAILURE SHALL BE AS PER SPECIFICATION / DATA SHEET.
2. SOLENOID VALVES PORTS CONDITION:
   PORT 1 AND 2 SHALL BE CONNECTED UNDER DE–ENERGISED CONDITION.
   PORT 2 AND 3 SHALL BE CONNECTED UNDER ENERGISED CONDITION.
3. MOUNTING ACCESSORIES AS REQUIRED.
4. JB TERMINALS SHALL BE CAGE CLAMP TYPE SUITABLE FOR 2.5 SQ. MM COPPER WIRE. EXTERNAL CONNECTION, OF PLUG IN TYPE OR THROUGH CABLE GLAND, SHALL BE AS PER DATA SHEET.
5. ALL APPLICABLE ACCESSORIES SHALL BE PROVIDED AS INDICATED IN THE INDIVIDUAL CONTROL VALVE DATA SHEET / ACCESSORIES DATA SHEET.
6. 12 METERS 1/4" ~~PVC COATED COPPER /~~ SS TUBING (AS PER ACCESSORIES DATA SHEET) & 1 SET OF FITTINGS TO BE SUPPLIED FOR EACH CONTROL VALVE FOR CONNECTION TO ISO VLV AT INST AIR HEADER ON ONE END AND TO AIR LOCK RELAY/AIR FILTER REGULATOR ON THE OTHER END. ALL THE BRASS / SS FITTINGS SHALL BE DOUBLE COMPRESSION TYPE.

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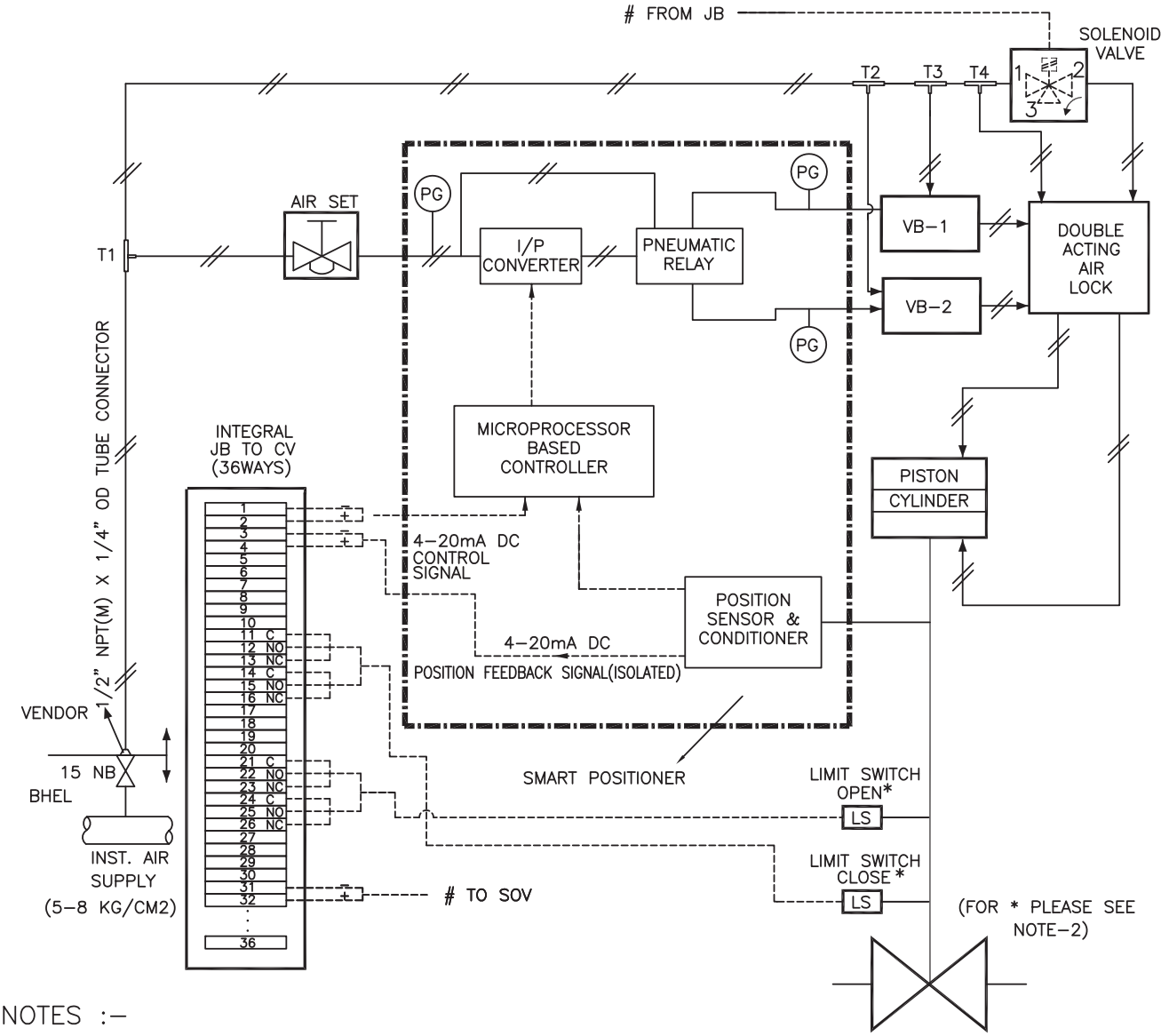
STANDARD CONTROL VALVE HOOK-UP DIAGRAM
(DOUBLE ACTING PISTON ACTUATOR WITH SMART POSITIONER)



NOTES :–

1. POSITION OF EACH VALVE ON SUPPLY AIR FAILURE / ELECTRICAL SIGNAL FAILURE SHALL BE AS PER SPECIFICATION / DATA SHEET. AIR LOCK SHALL BE PROVIDED ACCORDINGLY.
2. SOLENOID VALVE & LIMIT SWITCHES WILL BE PROVIDED ONLY FOR CONTROL VALVES IF INDICATED IN RESPECTIVE DATA SHEETS.
3. SOLENOID VALVES PORTS CONDITION:
   PORT 1 AND 2 SHALL BE CONNECTED UNDER DE–ENERGISED CONDITION.
   PORT 2 AND 3 SHALL BE CONNECTED UNDER ENERGISED CONDITION.
4. PRESSURE GAUGES REQUIRED FOR AIR SUPPLY & OUTPUT(S).
5. MOUNTING ACCESSORIES AS REQUIRED.
6. POSITION FEEDBACK SIGNAL SHALL BE 2 WIRE 4–20mA ISOLATED SIGNAL.
7. JB TERMINALS SHALL BE CAGE CLAMP TYPE SUITABLE FOR 2.5 SQ. MM COPPER WIRE. EXTERNAL CONNECTION, OF PLUG IN TYPE OR THROUGH CABLE GLAND, SHALL BE AS PER DATA SHEET
8. ALL APPLICABLE ACCESSORIES SHALL BE PROVIDED AS INDICATED IN THE INDIVIDUAL CONTROL VALVE DATA SHEET / ACCESSORIES DATA SHEET.
9. 12 METERS I/4" ~~PVC COATED COPPER /~~ SS TUBING (AS PER ACCESSORIES DATA SHEET) & 1 SET OF FITTINGS TO BE SUPPLIED FOR EACH CONTROL VALVE FOR CONNECTION TO ISO VLV AT INST AIR HEADER ON ONE END AND TO AIR LOCK RELAY/AIR FILTER REGULATOR ON THE OTHER END. ALL THE BRASS / SS FITTINGS SHALL BE DOUBLE COMPRESSION TYPE.
10. VOLUME BOOSTER (ALONG WITH TEE–T2 AND RELATED TUBING & CONNECTORS) SHALL BE PROVIDED IF REQUIRED. AIR CONNECTION TO VOLUME BOOSTER FROM TEE–T2 & TEE–T3 SHALL BE PROVIDED.

BHEL	STANDARD	DRG. No.	PES–145–06B		
	TITLE:– CONTROL VALVE HOOK–UP DIAGRAM	REV. No.	0	DATE	08.12.14
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9.0 STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-417-145-I 006**
VOLUME
SECTION
REV. NO. 01 DATE: 17.04.19
SHEET 2 OF 8

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	**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 / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	S	S	M,B	Any Forging>=40 mm thick or >= 50mm dia shall be UT checked irrespective of rating.
		2. Heat Treatment	MA	Review of H.T. Chart	Each H.T.	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	S/M	M	B	IBR Certification (if applicable) to be verified by BHEL
		3. Internal quality of castings	MA	RT for Body & UT for Bonnet(NDT)	100%	ASME B 16.34	ASME B 16.34	Test Report / FILM	S/M	M	B	Only for rating ANSI 900 and above. Applicable for Body and Bonnet only. For Lower rating only if called for in specification.
		4. Surface Quality	MA	1. Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	S/M	S/M	M,B	

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
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$ P - Agency Performing the Test.; W - Agency Witnessing the Test.; V - Agency Verifying the Test.
M - MANUFACTURER; S - SUBVENDOR; B - BHEL; C- CUSTOMER/ CUSTOMER TPIA

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STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-417-145-I 006**
VOLUME
SECTION
REV. NO. 01 DATE: 17.04.19
SHEET 3 OF 8

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. MT/PT	100%	ASME B 16.34	ASME B 16.34	Test Certificate	S	M	B	After Machining on machined surface only
		5. Pressure test for shell	MA	Hyd. Test	100%	ISA-S-75.19/ ASME B 16.34	ISA-S-75.19/ ASME B 16.34	Test Certificate	M	M	B	For Body & Bonnet after machining
1.2	Diaphragm	1. Surface Quality	MA	Visual	100%	Mfr. standard	Mfr. standard	Test Certificate	S/M	S/M	M,B	
		2. Hardness	MA	Measurement	100%	Mfr. standard	Mfr. standard	Test Certificate	S/M	S/M	M,B	
		3. Endurance / Life cycle	MA	Cyclic test 10,000 cycles	One / Type	10,000 cycles/ Mfr. standard.	No damage	Test Certificate	S/M	S/M	M,B	
1.3	Spring	1. Composition	MA	Chemical-Analysis	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	S	S	M,B	
		2. Mech. Properties	MA	Mech. Test	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	S	S	M,B	Mech. Test shall be as per IS Standard.
		3. Performance	MA	1. Stiffness ratio	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	S	S	M,B	
				2. Scragging	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	S	S	M,B	
				3. Cyclic test (Endurance)	One / type	10,000 cycles	Material spec. / Mfr. standard	Test Certificate	S	S	M,B	

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STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-417-145-I 006**
VOLUME
SECTION
REV. NO. 01 DATE: 17.04.19
SHEET 4 OF 8

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. Dimension (Measurement)	One sample/ Lot	Mfr. standard	Appd Drg	Record	S	S	M,B	
1.4	Electrical items [Limit switches, Solenoids, Position Transmitter(if provided externally)]	1. Routine Test	MA	HV, IR, Continuity function	100%	Rele. Standards	Rele. Standards	Test Certificate	S	S	M,B	In case TC is not available, Actual test shall be conducted
		2. Degree of protection	MA	IP/NEMA Tests	One sample / type	Approved Data sheet	Approved Data sheet	Test Certificate	S	S	M,B	
1.5	Pressure Gauges	1. Performance	MA	Review of calibration certificates	100%	Mfr. Standard	Mfr. Standard	Test Certificate	S	S	M,B	
		2. Marking	MA	Visual	100%	Mfr. standard	Mfr. standard	Records	S	S	M,B	
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	M	M	B	Butt weld ends shall be included.
		2. Dimensional checks	MA	Measurement	100%	Mfr. Standard	Mfr. Standard	Records	M	M	B	
		3. Hard facing (wherever applicable)	MA	Hardness Measurement	One sample/Lot	Mfr. Standard	Mfr. Standard	Records	M	M	B	

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STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

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SECTION
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SHEET 5 OF 8

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	
2.2	Lapping	Machining surface contact	MA	Blue Matching	One sample/lot	------	Proper Physical Contact	---	M	M	M	
3.0	**TESTS ON COMPLETED VALVE**											
3.1	Actuator Chamber	Leakage & Strength	MA	Pneumatic test	100%	Mfr. Standard	No Leakage	Test Certificate	M	B	B	Refer Note-4
3.2	Body	Leakage and Pressure test (Body Mount Leakage)	MA	Hydro test	100%	ISA - S-75.19	No Leakage	Test Certificate	M	B	B	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	M	B	B,C	Refer Note-4
4.0	**OPERATION TEST ON COMPLETED VALVE (Final inspection)**	1. Valve Travel	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	M	B	B,C	Refer Note-4
		2. Opening/Closing time	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	M	B	B,C	Refer Note-4
		3. Linearity/cam characteristic	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	M	B	B,C	Refer Note-4
		4. Repeatability	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	M	B	B,C	Refer Note-4
		5. Hysteresis	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	M	B	B,C	Refer Note-4
		6. Sensitivity	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	M	B	B,C	Refer Note-4
		7. Accuracy (Overall)	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	M	B	B,C	Refer Note-4

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STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-417-145-I 006**
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SHEET 6 OF 8

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	Agency $ W	Agency $ V	Remarks
		8. Control Valve characteristics / CV Test	MA	♦Measurement (Press. vs. discharge and discharge vs. opening 0-100% in steps of 10%)	One per type	As per specs/ Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Certificate	M	B,C	B	♦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%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Report	M	B	B,C	On assembled valve Refer Note-4
		10. Overall dimensions	MI	Visual and dimensional	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Records	M	B	B,C	Refer Note-4
		11. Pre defined valve position in case of air failure	MA	Visual	100%	As per spec & Appd drg	As per spec & Appd drg	Test Certificate	M	B	B,C	
		12. Cleanliness, painting, stamping (for direction of flow), Tag No.	MA	Visual and dimensional	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Certificate	M	B	B	
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	S/M	S/M	B	Overall leakage including tubing
5.2	Air filter regulator	1. Normal air consumption	MA	Measurement	Each type	Mfr. Standard	No leakage	Test Certificate	S/M	S/M	B	
		2. Overall leakage	MA	Visual (soap solution)	100 %	Mfr. Standard	No leakage	Test Certificate	S/M	S/M	B	

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STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-417-145-I 006**
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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
5.3	Air lock relay	Performance Test	MA	Leakage test	100%	Mfr. Standard	No leakage	Test Certificate	S/M	S/M	B	
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	M	B	B	
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	M	M	M,B	
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	S	S	M,B	
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	M	M	B	
		4. Hysterisis	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	M	M	B	
5.6	Smart Positioner (As Applicable)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	M	M	M,B	
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	S	S	M,B	
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	M	M	B	
		4. Hysterisis	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	M	M	B	

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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
		5. Calibration with Hand Held Communicator	MA	Measurement	Each type	Approved data sheet / Mfr. Standard	Approved data sheet / Mfr. Standard	Test Certificate	M	B	B	
6.0	**PAINTING**	Soundness of Painting	MA	Visual and Measurement	100%	BHEL specn. / Mfr. Standard	BHEL specn. / Mfr. Standard	Inspection Report	M	M	B	Refer Note-2
7.0	**PACKING**	Soundness of Packing against transit damage	MA	Visual	100%	Mfr. Standard	Mfr. Standard	Inspection Report	M	M	M	Refer Note-3

NOTES:

1. 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 applicable.
4. The quantum of check shall be 100% for manufacturer and 10% for BHEL/BHEL nominated inspection agency.
5. IBR certificates in Form III-C shall be submitted if called for in the specification/datasheet.
6. Copies of all TC's (Test Certificates) for materials duly correlated with Heat Nos., TC's for electrical items and mechanical tests(Leak/Operation),C.O.C.(Certificate of Conformance) shall be submitted to BHEL for verification and acceptance.

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10.0 COMPLIANCE CERTIFICATE

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

a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions with regard to same.

b) There is no other deviations w.r.t. specification other than those furnished in the 'Schedule of Technical Deviation/ Clarification'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn. The acceptance of the deviations is not binding on BHEL/ Customer.

c) Bidder shall submit stamped QP on compliance basis in the event of order based on the guidelines given in the specification. In case, the bidder is supplying the item from outside India, the third party inspection shall be arranged and considered by the bidder in their offer.

d) Any drawing/ document/ data-sheet/ calculation/ Quality plan/ Instrumentation etc. submitted along with the offer shall be considered for reference only, same shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.

e) The offered materials shall be either equivalent or superior to those specified in the specification. For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

f) Bidder to confirm that any calculation/format required during the contract (in the event of order) to ascertain any calculated/selected value shall be furnished.

g) Selection of valves and actuators are bidder's responsibility. Any change in selection of type of valve / sizing / percentage opening, calculations, QP, etc., if desired by BHEL / customer during approval of the documents after award of contract, without major changes in process parameters as per tender specification, shall be carried out by bidder without any commercial implication and time delay.

h) All sub - vendors shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-417-142-N101	
		SECTION II	
		REV. NO. 00	DATE 13.01.2020

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

11.0 DATA SHEET

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^2g)	
	*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-417-142-N101	
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DATA SHEET

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

PERFORMANCE OF VALVE	HYTERSIS	
	LINEARITY	
	SENSITIVITY	
	ACCURACY (Overall)	

SERVICE CONDITION*	**SL.+ NO.**	**LOAD**	**FLOW (T/HR)**	**INLET PR. (KG/CM^2 (A)**	**OUTLET PR. (KG/CM^2 (A)**	**TEMP DEG. C**	**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-417-142-N101	
		SECTION II	
		REV. NO. 00	DATE 13.01.2020

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

11.0 DATA SHEET

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

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

COMPANY SEAL
NAME
SIGNATURE
DATE

12.0 SCHEDULE OF TECHNICAL DEVIATION/ CLARIFICATION

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