

CUSTOMER: TANGEDCO

PROJECT: 2X800 MW UPPUR STPP -BTG

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

SPECIFICATION No: **PE-TS -425-142-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-425-142-N101	
		SECTION	CONTENTS (I & II)
		REV. NO.	00
		DATE	18.05.18

CONTENTS

	<u>TITLE</u>	<u>PAGE NO.</u>
	<u>SECTION-I</u>	2-53
A	Scope of enquiry	
B	Project Information	
C	Specific Technical Requirements	
1.0	Brief System Description	
2.0	Sizing Data sheets (A-1)	
3.0	Data Sheets (A) for APRDS	
4.0	Accessories datasheet and Hook up diagram	
5.0	Tender Drawing	
6.0	Customer Specification	
	<u>SECTION-II</u>	54-84
	Specification for APRDS (CV & DESUPERHEATER)	
1.0	Scope	
2.0	Codes And Standards	
3.0	Technical requirements	
4.0	Testing And Inspection	
5.0	Spares And Consumables	
6.0	Drawings And Documents	
7.0	Marking And Packing	
	Quality Plan for Control Valve & Desuperheater	
	Compliance Certificate	
	Data Sheet-C for Control Valves & Desuperheater	
	Schedule of Technical Deviation/ Clarification	



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

SPEC. NO.: PE-TS-425-142-N101

SECTION I

REV. NO. 00

DATE 18.05.18

SCOPE OF ENQUIRY



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

SPEC. NO.: PE-TS-425-142-N101

SECTION I

REV. NO. 00

DATE 18.05.18

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



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

SPEC. NO.: PE-TS-425-142-N101

SECTION I

REV. NO. 00

DATE 18.05.18

PROJECT INFORMATION

SPECIFICATION FOR BTG EPC CONTRACT

VOLUME II – GENERAL & SCHEDULES

CHAPTER 1

PROJECT SYNOPSIS

1.0 GENERAL BACKGROUND AND SALIENT FEATURES

1.1 Introduction

Tamilnadu Generation and Distribution Corporation owns the proposed green-field 1600 MW (2 units of 800 MW each) Coal Based Thermal Power Station. The Project Site is located in Uppur, Valamavoor and Thiruppalaikudi villages of Thiruvadanai Taluk, Ramanathapuram District.

1.2 Location

The proposed site for main power plant is located at Uppur in Ramnathpuram District of Tamil Nadu.

The nearest Railway station is Thiruppalaikudi Railway Station, 3Kms from site

ECR Connecting Ramanathapuram and Pattukottai is the nearest road access.

The nearest airport is at Madurai at a distance of 140 km.

The nearest port is Tuticorin located at a distance of 130 km.

1.3 Type of Plant

The proposed 2 x 800 MW Super-Critical Power Project consists of coal fired steam generator connected to a reheat type steam turbine generator along with all the required auxiliaries. Circulating cooling water system is envisaged for condenser cooling.

The description and salient technical data of the Steam Generator, Steam Turbine Generator, Auxiliary systems, Electrical, Control & Instrumentation, Civil etc. are explained elsewhere in the specification:

1.4 PROJECT INFORMATION



2 x 800 MW Supercritical Coal Based Uppur
Thermal Power Project
Spec. No. SE/E/T&H(P)/OT No.01 /2015-16

Vol. II: 1



1.1	Owner	:	Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO)	
1.2	Project Title	:	2 x 800 MW Uppur Thermal Power Project	
1.3	Owner’s Engineer	:	Desein Private Limited; New Delhi	
1.4	Project Site Location	:	Place	Uppur
			State	Tamil Nadu
			Country	India
1.5	Nearest Railway Station	:	Ramanathapuram at 28 KM away	
1.6	Nearest City	:	Ramanathapuram	
1.7	Nearest Highway	:	ECR Connecting Ramanathapuram and Pattukottai	
1.8	Nearest Airport	:	Domestic air port at Madurai (140 KM)	
1.9	Nearest Sea Port	:	Tuticorin Port (130 KM)	
1.10	Site Elevation	:	+ 4.5 m	
1.11	CLIMATOLOGICAL DATA	:		
i.)	HIGHEST TEMPERATURE RECORDED	:	37.8°C	
ii.)	MINIMUM TEMPERATURE RECORDED	:	22.3°C	
iii.)	DRY BULB TEMPERATURE (DBT) FOR DESIGN PURPOSE	:	30 ± 10°C 50°C (for electrical equipment)	
iv.)	RELATIVE HUMIDITY FOR DESIGN PURPOSE	:	75 ± 15%	
v.)	ANNUAL RAINFALL	:	827 mm (avg.)	
1.12	Source of Water (Distance from site)	:	Sea	
1.13	Primary Fuel & Source	:	Imported Coal (Indonesia and S. Africa)	
1.14	Startup Fuel & Source	:	HFO/ L.D.O. (Domestic)	
1.15	Earthquake Data	:	Zone III as defined in IS: 1893-2002	

1.5 Access to Site

Site is well connected and located along ECR Connecting Ramanathapuram and Pattukottai. Site is well connected by rail also.

1.6 Plant Rating, Capacity, Availability, PLF



2 x 800 MW Supercritical Coal Based Uppur
Thermal Power Project
Spec. No. SE/E/T&H(P)/OT No.01 /2015-16





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

SPEC. NO.: PE-TS-425-142-N101

SECTION I

REV. NO. 00

DATE 18.05.18

SPECIFIC TECHNICAL REQUIREMENTS



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

SPEC. NO.: PE-TS-425-142-N101

SECTION I

REV. NO. 00

DATE 18.05.18

BRIEF SYSTEM DESCRIPTION

- 1.1 Auxiliary steam system is designed to provide steam for the turbine auxiliaries, boiler auxiliaries and system during start-up, low loads and normal running of unit.
- 1.2 The system comprises of One "High capacity PRDS" with tapping from Main steam line to meet auxiliary steam requirements during unit start-up, low loads and the other "Low Capacity PRV" with tapping off steam from CRH line to meet auxiliary steam requirements during normal running. Spray water required for desuperheating will be tapped off from CEP discharge.
- 1.3 The HCPRDS will reduce the pressure and temperature of the steam tapped off from main steam line to 16 kg/cm² (abs) & 290°C. The LCPRV shall reduce the pressure of steam tapped from CRH line to 16 kg/cm² (abs) and temperature in the range of 290°C to 320°C, depending upon the CRH parameters at corresponding load.
- 1.4 DESH-I is provided to lower the temperature of the Aux. steam from 290°C to 210°C by spray water from CEP discharge for HFO pipe tracing and tank heating and it is controlled through the control valve CDV-145.
- 1.5 APRDS system Comprises of:

S No	Description	Quantity/unit	Total for station
1	Combined Type High Capacity Pressure Reducing & De-superheating Valve (On MS line)*	1 no.	2 NOs
2	Low Capacity PRV (on CRH Line)	1 no.	2 NOs
3	Spray Control Valve for HC-PRDS	1 no.	2 NOs
4	Spray Control Valve for DESH-I	1 no.	2 NOs
5	Low Temperature Desuperheater (DESH-1)	1 no.	2 NOs

- 1.6 Spares, consumable and specified tools & tackles:

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



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

SPEC. NO.: PE-TS-425-142-N101

SECTION I

REV. NO. 00

DATE 18.05.18

iv) **Mandatory Spares List:**

Sl. No.	DESCRIPTION	UNIT
2.15	AUXILLARY STEAM PRESSURE REDUCING & DESUPERHEATING SYSTEM	
A.	High Capacity PRDS system (MS)	
1.	Desuperheater liner	1 Set
2.	Steam pressure reducing cum desuperheating valve	1 No.
a)	Stem	1 No.
b)	Disc	1 No.
c)	Body seat rings	2 Nos.
d)	Gland packings	2 Nos.
e)	Pressure seal rings	2 Nos.
f)	gaskets	2 Nos.
3.	Spray water lines control valves	
a)	Valve trim including cage, plug, stem, seat rings, guide bushings, stem packing	1 No.
B.	Low Capacity PRDS System (CRH)	
1.	Steam pressure reducing valve	1 No.
a)	Stem	1 No.



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

SPEC. NO.: PE-TS-425-142-N101

SECTION I

REV. NO. 00

DATE 18.05.18

b)	Disc	1 No.
c)	Body seat rings	2 Nos.
d)	Gland packings	2 Nos.
e)	Pressure seal rings	3 Nos.
f)	gaskets	2 Nos.
2.	Spray water lines control valves	
a)	Valve trim including cage, plug, stem, seat rings, guide bushings, stem packing	1 No.

- v) Commissioning Spares: As applicable for the project
(For Minimum requirement refer section II)

Stat-up & Commissioning spares:

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



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

SPEC. NO.: PE-TS-425-142-N101

SECTION I

REV. NO. 00

DATE 18.05.18

SIZING DATA SHEET- A-1

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

S.No.	Parameters	Cond.-1	Cond.-2	Cond.-3	Cond.-4	Cond.-7	Mech. Design
1.0	Inlet of Combined APRDS (ASV-22)						
1.1	Pressure (kg/cm ² (a))	51	91	107	107	279	296.7
1.2	Temp. (°C)	330	447	408	581	603	608
1.3	Flow (T/Hr)	Bidder To Calculate					
2.0	Outlet of combined APRDS (ASV-22)						
2.1	Pressure (kg/cm ² (a))	16	16	16	16	16	21
2.2	Temp. (°C)	290	290	290	290	290	320
2.3	Flow (T/Hr)	128.21	148.47	77.47	77.47	200	-
3.0	Inlet of Spray Control Valve (CDV-138)						
3.1	Pressure (kg/cm ² (a))	36.6	36.6	34.2	34.2	34.2	52
3.2	Temp. (°C)	37.0	37.0	37.7	37.7	37.7	60
3.3	Flow (T/Hr)	BIDDER TO CALCULATE					

Note:

- Case- 1 is the capability check for ASV-22 valve.
- CV of ASV-22 valve shall be selected in such a way that at vwo condition it should not pass more than 650 TPH steam when Upstream parameters are 296.7 kg/cm² A and 603 deg C and downstream pressure is 21 kg/cm² A.
- Bidder shall inform the flow at VWO condition also when upstream parameters are 279 kg/cm² A and 603 Deg C and downstream pressure is 21 kg/cm² A.
- High capacity steam pressure reducing valve (ASV-22) minimum flow at 10 % valve lift shall correspond to the passing capability of low capacity steam pressure reducing valve (ASV-26) at 95% valve lift.



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

SPEC. NO.: PE-TS-425-142-N101

SECTION I

REV. NO. 00

DATE 18.05.18

SIZING DATA SHEET- A-2

AUXILIARY STEAM PRV (ASV-26)

S.No.	Parameters	Cond.-1	Cond.-2	Cond.-3	Cond.-4	Mech. Design
1.0	Inlet of PRV (ASV-26)					
1.1	Pressure (kg/cm ² (a))	25.15	61.0	61.0	61.0	75.8
1.2	Temp. (°C)	310.8	361.2	361.2	361.2	380
1.3	Flow (T/Hr)	4.40	4.40	17.10	25.0	-
2.0	Outlet of PRV (ASV-26)					
2.1	Pressure (kg/cm ² (a))	16	16	16	16	21
2.2	Temp. (°C)	Bidder To Calculate				
2.3	Flow (T/Hr)	4.40	4.40	17.10	25.0	-

Note :

1. CV of ASV-26 valve shall be selected in such a way that at vwo condition it should not pass more than 160 TPH steam when Upstream parameters are 75.8 kg/cm2 A and 365 deg C and downstream pressure is 21 kg/cm2 A.



**TECHNICAL SPECIFICATION FOR
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DESUPERHEATING STATION**

SPEC. NO.: PE-TS-425-142-N101

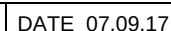
SECTION I

REV. NO. 00

DATE 18.05.18

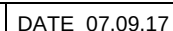
DATA SHEETS- A

AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION

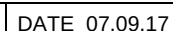


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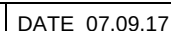
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	TANGEDCO - 2x800 MW UPPUR STPP **COMBINED TYPE MAIN STEAM TO AUX. STEAM PRDS (HC PRDS) [•] INDOOR [] OUTDOOR [] ON/OFF [•] MODULATING Ø 219.1x 47 | Ø 457 x 9.53 SA 335 P92 | SA 335 P22	..... ..... ..... ..... .....|.....
BODY*	MODEL NO. 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 (MULTITURN, MULTISTAGE, MULTIPATH RADIAL TRIM) TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) VACUUM SERVICE ANTI CAVITATION TRIM	BIDDER TO SPECIFY [] GLOBE [•] ANGLE | [ ] TOP [•] CAGE | ONE [•] BWE [] SWE [] FLANGED [] A216 WCB [] A217 WC6 [•] SA182 F92 [] SS [] A217 C5 [] A351 CF8M [] PTFE [•] GRAFOIL [] DOUBLE [•] SINGLE [] STD [] EXTENDED [•] FINNED [] LINEAR [•] EQ. PERCENTAGE [] QUICK OPEN (ON/OFF) SS316 (ST) | INCONEL 718 SS316 (ST) | INCONEL 718 [] BELOW SEAT [] ABOVE SEAT [] < 7 M/SEC (WATER) [•] < 150 M/SEC (STM) [] II [] III [] IV [•] V [] VI LESS THAN 85 dBA (AT ONE METER DISTANCE) [] YES [•] NO [] YES [•] NO	..... .....|.....|.....|... .....|.....|..... ..... ..... ..... ..... ..... ..... .....|..... .....|..... ..... .....|..... ..... ..... ..... .....|..... .....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE AND } CLOSE TO OPEN *VALVE POSN. ON SIGNAL AIR FAILURE *VALVE POSN. ON SUPPLY AIR FAILURE	PNEUMATIC DOUBLE ACTING PISTON TYPE 0.2 | 1.0 LESS THAN 10 SECS. [] TO OPEN [] STAYPUT [•] TO CLOSE [•] STAYPUT	.....|..... .....|..... ..... ..... ..... .....
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTOR JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR	[•] REQUIRED [] NOT REQUIRED [•] REQUIRED [] NOT REQUIRED [•] REQUIRED [] NOT REQUIRED [•] REQUIRED [] NOT REQUIRED PART OF SMART POSITIONER [•] REQUIRED [] NOT REQUIRED PART OF SMART POSITIONER [•] REQUIRED [] NOT REQUIRED [•] REQUIRED [•] REQUIRED	



- (1) Pneumatic double acting piston 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



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 SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	TANGEDCO - 2x800 MW UPPUR STPP COLD REHEAT STEAM TO AUXILIARY STEAM PR. REDUCING VALVE (LC PRV) [•] INDOOR [] OUTDOOR [] ON/OFF [•] MODULATING Ø 114.3x6.02 | Ø 219.1 x 12.7 SA 106 Gr. B | SA 106 Gr. C	..... ..... ..... ..... .....|.....
BODY*	MODEL NO. 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(MULTITURN, MULTISTAGE, MULTIPATH RADIAL TRIM) TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) VACUUM SERVICE ANTI CAVITATION TRIM	BIDDER TO SPECIFY [•]GLOBE [] ANGLE [] TOP [•]CAGE| ONE [•] BWE [] SWE [] FLANGED [] A216 WCC [•] A217 WC9 [] SS [] A217 C5 [] A351 CF8M [] PTFE [•] GRAFOIL []DOUBLE [•]SINGLE [] STD [•] EXTENDED [] FINNED [] LINEAR [•] EQ. PERCENTAGE [] QUICK OPEN (ON/OFF) SS316 (ST) | SS316 (ST) SS316 (ST) | SS316 (ST) [] BELOW SEAT [] ABOVE SEAT [] < 7 M/SEC (WATER) | [•] MAC NO. < 1/3 (FLASHING) | [•] < 150 M/SEC (STM) [] II [] III [] IV [•] V [] VI LESS THAN 85 dBA (AT ONE METER DISTANCE) [] YES [•] NO [] YES [•] NO	..... .....|.....|.....|..... .....|.....|..... ..... ..... ..... ..... ..... ..... .....|..... ..... ..... ..... ..... ..... ..... ..... ..... .....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE AND CLOSE TO OPEN *VALVE POSN. ON SIGNAL AIR FAILURE *VALVE POSN. ON SUPPLY AIR FAILURE	PNEUMATIC DOUBLE ACTING PISTON TYPE 1.0 | 0.2 LESS THAN 10 SECS. [•] TO OPEN [] STAYPUT [] TO CLOSE [•] STAYPUT	.....|..... .....|..... ..... ..... ..... .....
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTOR JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR	[•] REQUIRED [] NOT REQUIRED [•] REQUIRED [] NOT REQUIRED [•] REQUIRED [] NOT REQUIRED [•] REQUIRED [] NOT REQUIRED PART OF SMART POSITIONER [•] REQUIRED [] NOT REQUIRED PART OF SMART POSITIONER [•] REQUIRED [] NOT REQUIRED [•] REQUIRED [•] REQUIRED	



Data Sheet No. PES-145-06-DS1-0

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 HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 1%			..... ..... ..... .....		
SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALCULATED CV	% VALVE LIFT	VALVE O/L VELOCITY
		Refer Sizing Data for Low Capacity PRV							
	VALVE TYPE						☐ CAVITATION ☐ FLASHING ☒ HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2(A) 75.8 BODY DESIGN : PRESS (KG/CM2(A) | TEMP (DEG C) 75.8 | 380 * IBR FORM III-C [•] REQUIRED ☐ NOT REQUIRED						..... .....|..... .....		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						.....		

Note:

- (1) Pneumatic double acting piston 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

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-423-142-N101	
		SECTION I	
		REV. NO. 00	DATE 07.09.17

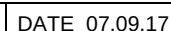
Tag No.: **CDV-138**(LAF20AA101)

Qty.: **ONE PER UNIT**
(One against Each Tag)

Data Sheet No. PES-145-06-DS1-0

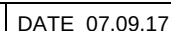
DATA SHEET – A & B

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	TANGEDCO - 2x800 MW UPPUR STPP SPRAY TO COMBINED PRDS CONTROL VALVE ☒ INDOOR ☐ OUTDOOR ☐ ON/OFF ☒ MODULATING Ø 88.9 x5.49 | Ø 88.9 x5.49 SA 106 Gr. B | SA 106 Gr. B	.....
	SERVICE		.....
BODY*	LOCATION		.....
	DUTY		.....
	PIPE SIZE (inlet / outlet)		.....
	PIPE MATERIAL (inlet / outlet)		.....|.....
	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	.....
	PACKING: MATERIAL SINGLE / DOUBLE	☐ A351 CF8M	.....
PNEUMATIC ACTUATOR	BONNET TYPE	☐ PTFE ☒ GRAFOIL ☐ DOUBLE ☒ SINGLE	.....
	TRIM FORM(MULTITURN, MULTISTAGE, FLOW TRIM)	☐ STD ☒ EXTENDED ☐ FINNED	.....
	TRIM MATERIAL: SEAT | PLUG	☐ LINEAR ☒ EQ. PERCENTAGE	.....
	: CAGE | GUIDE BUSH	☐ QUICK OPEN (ON/OFF)	.....|.....
	FLOW	17-4PH-SS | 17-4PH-SS	.....|.....
	OUTLET VELOCITY	17-4PH-SS | 17-4PH-SS	.....|.....
	REQUIRED LEAKAGE CLASS	☐ BELOW SEAT ☐ ABOVE SEAT	.....
	NOISE LEVEL (dBA)	☒ < 7 M/SEC (WATER) | ☐ < 150 M/SEC	.....|.....
	VACUUM SERVICE	(STM)	.....
	ANTI CAVITATION TRIM	☐ II ☐ III ☐ IV ☒ V ☐ VI	.....
ACCESSORIES		LESS THAN 85 dBA (AT ONE METER DISTANCE)	.....
		☐ YES ☒ NO	.....
		☐ YES ☒ NO	.....
	MODEL NO. & SIZE	PNEUMATIC DOUBLE ACTING PISTON TYPE	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)		.....|.....
	*TRAVEL TIME FOR OPEN TO CLOSE	0.2 | 1.0	.....
	AND CLOSE TO OPEN		.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	LESS THAN 10 SECS.	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	☐ TO OPEN ☐ STAYPUT ☒ TO CLOSE	.....
		☒ 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	

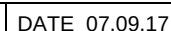


Data Sheet No. PES-145-06-DS1-0

- (1) Pneumatic double acting piston 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



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 SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	TANGEDCO - 1x800 MW NORTH CHENNAI STPP SPRAY TO DESH-1 HFO TANK HEATING & STEAM TRACING CONTROL VALVE [•] INDOOR [] OUTDOOR [] ON/OFF [•] MODULATING Ø 33.4 x4.55 | Ø 33.4 x4.55 SA 106 Gr. B | SA 106 Gr. B	..... ..... ..... ..... .....|.....
	MODEL NO. 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(MULTITURN, MULTISTAGE, FLOW TRIM) TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) VACUUM SERVICE ANTI CAVITATION TRIM	BIDDER TO SPECIFY [•] GLOBE [] ANGLE [] TOP [•] CAGE | ONE [] BWE [•] SWE [] FLANGED [] A216 WCB [•] A217 WC6 [] SS [] A217 C5 [] A351 CF8M [] PTFE [•] GRAFOIL [] DOUBLE [•] SINGLE [] STD [•] EXTENDED [] FINNED [] LINEAR [•] EQ. PERCENTAGE [] QUICK OPEN (ON/OFF) 17-4PH-SS | 17-4PH-SS 17-4PH-SS | 17-4PH-SS [] BELOW SEAT [] ABOVE SEAT [•] < 7 M/SEC (WATER) | [] < 150 M/SEC (STM) [] II [] III [] IV [•] V [] VI LESS THAN 85 dBA (AT ONE METER DISTANCE) [] YES [•] NO [] YES [•] NO	..... .....|.....|.....|..... .....|.....|..... ..... ..... ..... ..... ..... ..... .....|..... .....|..... ..... .....|..... ..... ..... .....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE } AND CLOSE TO OPEN *VALVE POSN. ON SIGNAL AIR FAILURE *VALVE POSN. ON SUPPLY AIR FAILURE	PNEUMATIC DOUBLE ACTING PISTON TYPE 0.2 | 1.0 LESS THAN 10 SECS. [] TO OPEN [] STAYPUT [•] TO CLOSE [•] STAYPUT	.....|..... .....|..... ..... ..... ..... .....
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTOR JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR	[•] REQUIRED [] NOT REQUIRED [•] REQUIRED [] NOT REQUIRED [•] REQUIRED [] NOT REQUIRED [•] REQUIRED [] NOT REQUIRED PART OF SMART POSITIONER [•] REQUIRED [] NOT REQUIRED PART OF SMART POSITIONER [•] REQUIRED [] NOT REQUIRED [•] REQUIRED [•] REQUIRED	



Data Sheet No. PES-145-06-DS1-0

- (1) Pneumatic double acting piston 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

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-423-142-N101	
		SECTION I	
		REV. NO. 00	DATE 07.09.17

DESUPERHEATER DATA SHEET D-1
DATA SHEET FOR DESUPERHEATER DESH-1

S.NO.	DESCRIPTION	UNITS	DATA FOR LOW CAP. PRDS DESUPERHEATER
1.0	TAG NO.		DESH-1
2.0	TYPE		VARIABLE ORIFICE / VENTURI TYPE
3.0	STEAM PARAMETERS		(INLET OF DESUPERHEATER)
3.1	FLOW	T/HR	REFER SIZING DATA SHEET A-3
3.2	PRESSURE	Kg/cm ² (a)	BIDDER TO DECIDE BASED ON SIZING DATA
3.3	TEMPERATURE	°C	BIDDER TO DECIDE BASED ON SIZING DATA
4.0	STEAM PARAMETERS (OUTLET OF DESUPERHEATER)		REFER SIZING DATA SHEET A-3
5.0	SPRAY WATER PARAMETERS		(INLET OF DESUPERHEATER)
5.1	FLOW	T/HR	REFER SIZING DATA SHEET A-3
5.2	PRESSURE	Kg/cm ² (a)	BIDDER TO DECIDE BASED ON SIZING DATA
5.3	TEMPERATURE	°C	REFER SIZING DATA SHEET A-3
6.0	END DETAILS		(STEAM INLET / OUTLET)
6.1	TYPE / MATCHING PIPE	mm x mm	BW / 114.3 x 6.02
7.0	END DETAILS		(SPRAY WATER INLET)
7.1	TYPE / MATCHING PIPE		SW/ 33.4 x 4.55
8.0	MATERIALS OF CONSTRUCTION		
8.1	BODY		A216 WCB
8.2	PIPE		SA 106GRB
8.3	SPRAY NOZZLE WITH ASSEMBLY		SS 316 (Spray Nozzle design pressure shall be equal to Design Spray Water Pressure)
9.0	DESIGN PARAMETERS		
9.1	DESIGN PRESSURE	Kg/cm ² (g)	20
9.2	DESIGN TEMPERATURE	°C	320

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



**AUX. PRDS CONTROL VALVE DATASHEET &
ACCESSORIES
(WITH PNEUMATIC ACTUATOR)
For
TANGEDCO - 2x800 MW UPPUR STPP**

SHEET 1 OF 3

**ACCESSORIES DATA SHEETS
&
HOOK UP DIAGRAM
FOR CONTROL VALVES**

	Control Valves Accessories (Pneumatically Operated)	DOCUMENT NO: PE-TS-145-1104	
		DOCUMENT NO.:	
		VOLUME	
		SECTION	
		REV. NO. 01	DATE: 20.11.2017
		SHEET 48 OF 55	

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

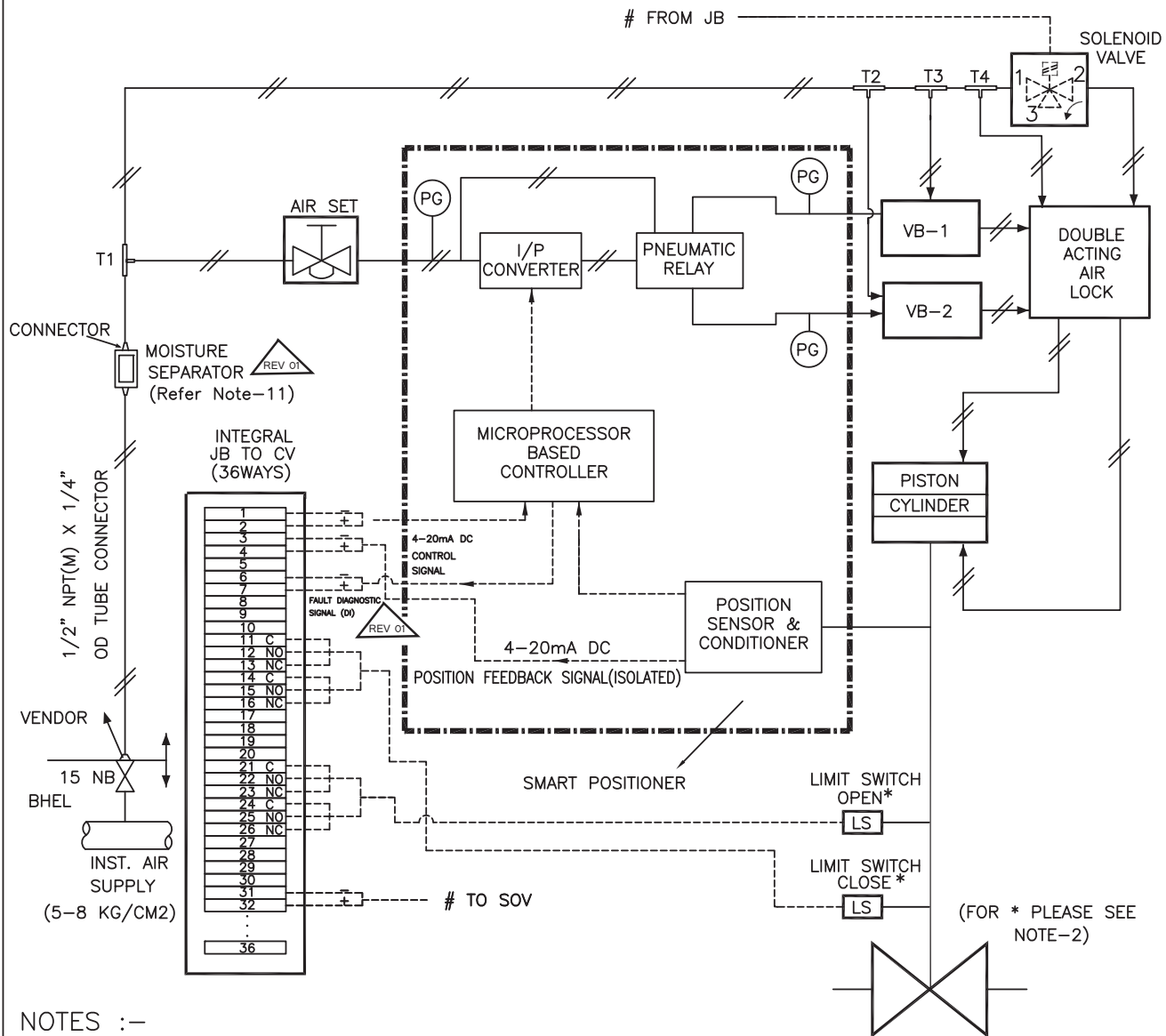
Data Sheet No. PES-145-06-DS1-1

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

DATA SHEET – A & B for ACCESSORIES

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED-UP BY BIDDER)		
POSITIONER	MFR. & MODEL NUMBER			☐ YES ☒ NO	☒ TWO OR THREE (AS PER HOOK-UP)	☒ IP-65
	BYPASS	GAUGES	ENCL. CLASS			
	INPUT SIGNAL (Kg / Cm ²)			☒ 0.2 – 1.0 4-20 mA HART COMPATIBLE		
	OUTPUT SIGNAL (Kg / Cm ²)			TO SUIT ACTUATOR		
AIR FILTER REGULATOR	MFR. & MODEL NUMBER					
	AIR SUPPLY PRESS (Kg / Cm ² g)			☒ 5.0 – 8.0 ☐		
	OUTPUT PRESS (Kg / Cm ² g)			TO SUIT ACTUATOR		
	FILTER SIZE			5 MICRON		
	OUTPUT GAUGE			☒ REQUIRED ☐ NOT REQUIRED		
AIR LOCK	MFR. & MODEL NUMBER					
	SET PRESS (Kg / Cm ²)					
	SUPPLY PRESS (Kg / Cm ²)			☒ 5.0 – 8.0 ☐		
	RESET TYPE			AUTO		
	VENT PLUG			REQUIRED		
LIMIT SWITCH	MFR. & MODEL NUMBER					
	OPEN posn	INT posn	CLOSE posn	2 NO.	---	2 NO.
	CONTACT TYPE			SPDT 2 NO + 2 NC		
	RATING (AC / DC)			5A 240V AC AND 0.5A 220V DC		
	ENCLOSURE CLASS			☒ IP 65 ☐		
POSITION TRANSMITTER	MFR. & MODEL NUMBER			PART OF SMART POSITIONER		
	TYPE					
	SUPPLY					
	OUTPUT RATING					
	ACCURACY					
	ENCLOSURE CLASS					
SOLENOID VALVE	MFR. & MODEL NUMBER					
	RATING			☒ 24V DC ☐ 220V DC ☐ 240V AC ☐		
	TYPE			3-WAY (UNIVERSAL OPERATION TYPE)		
	OPERATION	QUANTITY		☐ Stayput ☐ Interlock ☐ 1 ☐ 2		
	COIL INSULATION CLASS			CLASS - H		
HANDWHEEL	ENCLOSURE CLASS			☒ IP 65 ☐ NEMA 4 ☐		
	ORIENTATION			☐ TOP MOUNTED ☒ SIDE MOUNTED		
JUNCTION BOX	NO. OF WAYS			☐ 24-WAYS ☐ AS REQUIRED ☒ 36-Ways		
	SIZE			AS REQUIRED		
	CABLE GLANDS (Size / Quantity)			AS REQUIRED (Double Compression Type).		
	ENCLOSURE CLASS			☒ IP 65 ☐		
	BODY MATERIAL			☒ FRP ☐ SS ☐ METAL SHEET		
I/P CONVERTER	INPUT SIGNAL	POWER SUPPLY		PART OF SMART POSITIONER		
	SPLIT RANGE					
	ENCLOSURE CLASS					
	LINEARITY					
	HYSTERISIS					
Cu./SS Tubing & Fittings / per CV	This is in addition to cu. Tubing and fittings which are integral part of CV			15 Meters of 1/4" SS 316 Tubing, with 1 set of Fittings for each CV for connection to IA Header on one end and accessories on another end of CV.		
PAINTING	COLOUR/SHADE			☒ RED ☐ GREEN ☐		
	THICKNESS (DFT) – in microns					
	TYPE			☒ EPOXY ☐ ENAMEL ☐		
						COMPANY SEAL
						NAME
						SIGNATURE

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. 15 METERS 1/4" SS 316 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.
11. SEPARATE MOISTURE SEPARATOR TO BE PROVIDED WITH EACH CONTROL VALVE. NECESSARY HARDWARE & SUITABLE CONNECTOR FOR MOUNTING THE MOISTURE SEPARATOR TO BE PROVIDED BY THE BIDDER.
12. ALL REQUIRED ACCESSORIES i.e. SOLENOID OR ANY OTHER HARDWARE REQUIRED TO ACHIEVE STAYPUT AT CONTROLLER SIGNAL FAILURE SHALL BE PROVIDED.
13. DI FOR FAULT SIGNAL OF THE SMART POSITIONER SHALL BE PROVIDED.



DOCUMENT NO : PE-TS-425-145-I104

TITLE:—

CONTROL VALVE HOOK-UP DIAGRAM

DRG.
No.

PES-145-06B

REV.
No.

01

DATE 20.11.2017

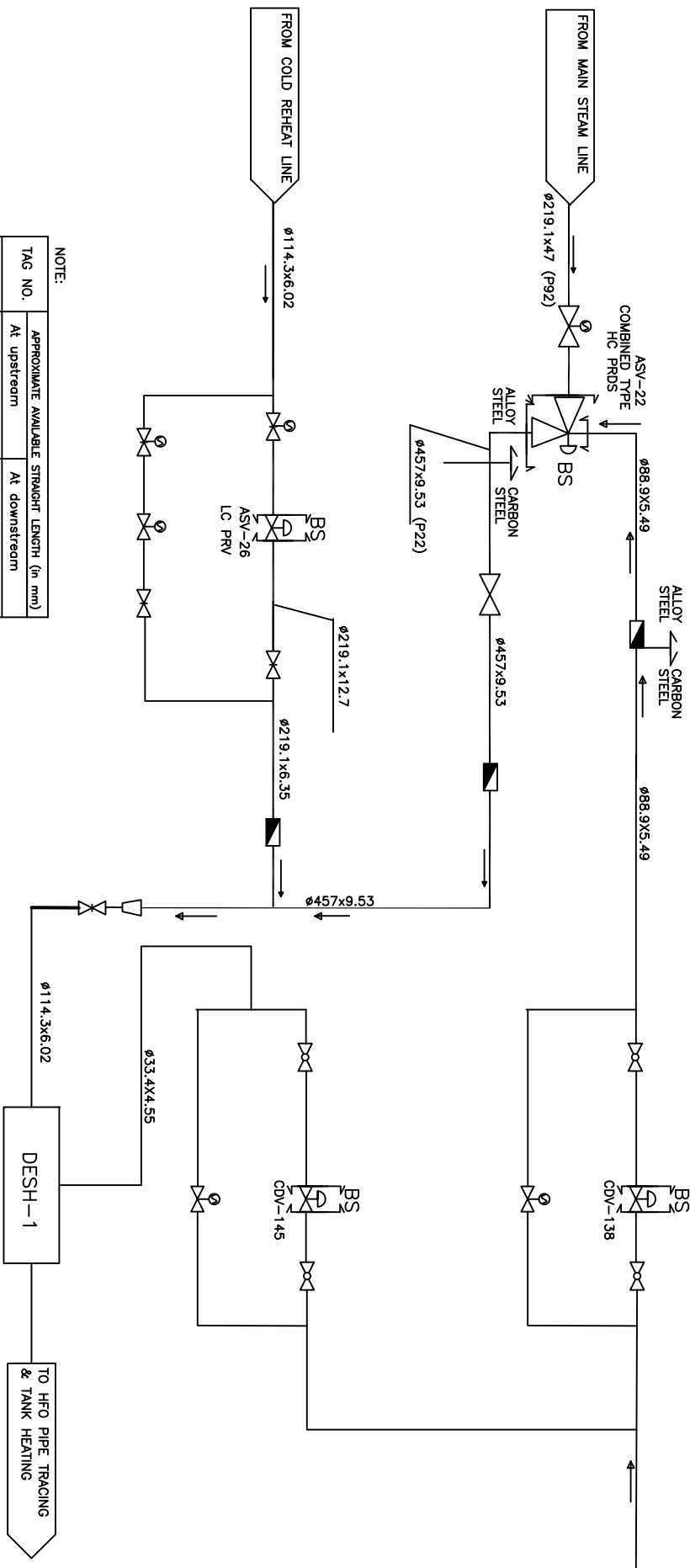
SHEET

51

OF

55

Diagram showing a spray water line from CEP discharge. The line is labeled "SPRAY WATER LINE FROM CEP DISCHARGE" and has an arrow pointing downwards.



TAG NO.	APPROXIMATE AVAILABLE STRAIGHT LENGTH (in mm)	
	At upstream	At downstream
ASV-22	700	5000
ASV-26	350	400
CDV-138	350	250
CDV-145	250	200

CUSTOMER: TANDECO									
2X800MW UPPUR STPS									
JOB NO.		4425							



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

SPECIFICATION NO.: PE-TS-425-N101

SECTION I

REV. NO. 00

DATE : 18.05.18

CUSTOMER SPECIFICATION

CHAPTER-11**CONTROL VALVES WITH ACTUATORS****11.00.00 CONTROL VALVES, ACTUATORS AND ACCESSORIES****11.01.00 GENERAL REQUIREMENTS**

- 11.01.01 This section covers the design and construction requirements of Control Valves, their Actuators and Accessories. Except as otherwise specified herein, the Control Valves and accessory equipment furnished under this specification shall be designed, constructed and tested in accordance with the latest applicable requirements of code for Pressure Piping ANSI B31.1, the ASME Boiler and pressure vessel code, Indian Boiler Regulation (IBR) and other standards referenced herein as well as in accordance with all applicable requirements of the "Federal Occupational Safety and Health Standards, USA", or acceptable equal standards.
- 11.01.02 The design of Control Valves shall comply with relevant codes and standards, account for relevant design criteria viz. environmental conditions, power and air supply, established reliability (reliability target and life expectancy), design of enclosures as specified in Sections earlier.
- 11.01.03 All Control Valves and accessories furnished under the Section shall be of Owner approved make, fully meeting the qualifying requirements.
- 11.01.04 Each pneumatic control valve station shall be provided with pneumatic main control valve and pneumatic bypass control valve or Inching type motorised bypass valve as per process requirement and subject to owner approval. In addition each control valve shall also have upstream motorised valve. Downstream motorised valve shall also be provided as per process requirement and as finalized during detailed engineering. Pressure Gauge shall be provided up stream and down stream of each control valve station.
- 11.01.05 Self actuated pressure reducing valve are not acceptable. Bidder shall provide the pneumatic controlled control valve only.

11.02.00 CONTROL VALVE CONSTRUCTION AND SIZING**11.02.01 General**

1. Valve Construction shall be in accordance with the requirements specified herein. (Bidder to also refer NIT drawing # 114-18-0100).
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.



CONTROL VALVES WITH ACTUATOR

3. The valve sizing shall be suitable for obtaining maximum operating conditions with valve opening at approximately 80% of total travel. Valves shall be open not less than 15 % of full opening for minimum flow condition and shall be capable of handling at least 120% of the required maximum flow at full open condition. Actual pressure drop is indicated in the specification sheets. Permissible pressure drop shall be calculated and used by the Bidder for sizing calculations. Valve sizing shall be in compliance with the latest edition of ISA Handbook on control valves, ISA standards "ANSI/ISA-75.01.01, Flow Equations for Sizing of Control Valves" with due consideration for the measures to avoid choked flow. Bidder shall ensure that the valve outlet velocity does not exceed 8 meters/second for liquid services, 150 m/second for steam services and 50% of sonic velocity for flashing services by selecting proper body size for the required Cv.
4.
 - a. The Bidder shall provide valves designed to prevent cavitations, wire drawing, flashing on the downstream side of valve and in downstream piping, when operating through full range under the specified conditions.

 For cavitating services, valves with anti cavitation trims shall be offered. This shall ensure cavitation prevention by multiple stages of pressure drops. Detailed calculations shall be furnished by bidder to establish cavitations occurrence or otherwise for various process conditions each service wise.

 For flashing services such as heater drains, control valve design shall be specially effected to ensure suitability for the adverse high pressure drops and minimise its detrimental effects on control valve parts.

 Bidder shall furnish detailed catalogue, calculations, write ups to establish compliance to these stipulations with the selection of each valve. No price implications during engineering stage would be admissible to comply with these stipulations and intents of specification.
 - b. The Liquid pressure recovery factor (FL) shall be 0.995 or better for severe flashing/cavitation services used with any medium i.e steam, water etc.
 - c. The Liquid pressure recovery factor (FL) shall be 0.985 or better for low flashing/cavitation services and all other services used with any medium i.e. steam, water etc.
5. Control Valves for Application such as HP/LP heaters emergency level control, SH spray & RH Spray control, Emergency makeup to Hotwell, Deaerator drain to condenser hotwell & heavy oil heating, APRDS, HFO & LDO and Pressurizing control system, condenser normal make up control valve, Soot Blower control valves, valve gland sealing supplying pressure control valve, GSC minimum flow, Condensate spill to condensate reserve tank, BFP minimum recirculation valve, Separator level and Drain Control Valve, Boiler recirculation control valve and CEP



CONTROL VALVES WITH ACTUATOR

minimum recirculation flow control and any other application approved by owner shall have permissible leakage rate as per leakage class V (ANSI/FCI).

All SH/RH block valves, shut off valve of LDO & HFO and HP/LP bypass control valve shall have leakage class MSS-SP-61.

All other control valves shall be designed for tight shut-off against pressure, the valves shall have maximum permissible leakage rate as per ISA RP 39.6 Leakage Class IV (0.01% of rated valve capacity) or specified other wise.

6. The valve design shall take into account noise abatement considerations. The design objective will be to limit the generation of valve induced noise to 85 dBA at 1 Meter from the valve surface and at a height of 1.5 meter from any equipment except for TG, HP & LP bypass valves, air motors, safety valves and regulating drain valves under actual operating conditions.

The noise level for TG, regulating drain valves and for air motors shall not exceed 90 dBA and 95 dBA respectively, and that for safety valves and associated vent pipes shall not exceed 105 dBA. Noise level of HP & LP bypass valves shall not exceed 115 dBA during valve operation.

The noise abatement shall be obtained by valve body and trim design and piping arrangement and not by the use of silencers.

If necessary, suitable noise reduction covers shall be provided. Compliance to noise level shall be demonstrated by the bidder.

7. The Bidder shall be responsible for proper sizing of the valve and selection of appropriate model and materials of constructions for meeting the operating requirements specified herein and details subsequently furnished during the detailed engineering stage.
8. The valve travel time shall be less than 10 second for non critical services valves.
9. Rangeability should be 50 to 1 (min.) for non critical services valves and 100 to 1 (min.) for critical service valves.
10. Each Control Valve's Linearity, Hysteresis, Accuracy shall be $\leq \pm 1\%$ and Sensitivity shall be $\leq \pm 0.5\%$.

Bidder shall furnish the Control Valve data sheets and sizing calculations with the proposal which will be subjected to owner approval during detailed engineering. The bidder shall furnish all valves as per Owner approved data sheets and drawings.

11.02.02 Valve Construction

1. All valves shall be of globe body design and straightway pattern. Straightway pattern valves shall be either single or double ported as specified.



CONTROL VALVES WITH ACTUATOR

Double ported and single ported valves shall have high lift cage guided plugs, unless otherwise specified.

2. Where specified, valves with cage guided plugs and quick change trim shall be supplied. The quick change trim shall consist of a cage and seat ring clamped in the valve body by the valve bonnet and sealed with a spiral wound stainless steel asbestos gasket. The trim shall be removable through the top after bonnet removal without any cutting or welding of the valve. Where applicable, plugs shall be designed to include pressure balancing for cage guided valves.
3. Direct acting and self-contained pilot type valves may have low lift plugs.
4. Cast iron valves are not acceptable.
5. Bonnet joints for all control valves shall be of the flanged and bolted type or other construction acceptable to the Owner. Bonnet joints shall be designed for easy disassembly and for assurance of correct valve stem alignment. Bonnet joints of the internal threaded or union type will not be acceptable.
6. Plugs shall be of one-piece construction either cast, forged, or machined from solid bar stock. Plugs shall be screwed and pinned to valve stems or shall be integral with the valve stems.
7. When Teflon packing is used, the lower valve stem which passes through the stuffing box shall be polished to at least 2×10^{-4} millimeters r.m.s.
8. Valves gland packing shall normally be Teflon on liquid and gas services up to 100 kg/cm^2 and 230 Deg.C Teflon impregnated asbestos shall be used above 230 Deg.C and graphite impregnated asbestos with lubrication shall be used for steam services.
9. All valves shall be arranged so that the plugs may be removed from the valve bodies from the bonnet side.
10. Each valve shall have an arrow permanently fixed on the valve body to indicate the correct direction of flow.
11. Each valve shall have a stainless steel name plate permanently fastened to the yoke which shall be visible when the valve is in service. The name plate shall include
 - a. Tag No. and Valve Serial No.
 - b. Body material, size and pressure rating
 - c. Trim material, size characteristics
 - d. Action on air failure
 - e. Spring range
 - f. Stem travel
 - g. Valve action, etc.



Manufacturer recommended materials for cage guided valves may be substituted for materials specified provided they satisfy the specified service conditions. Also where substitutions are made, the manufacturer shall guarantee performance of recommended materials to be equal to or better than the specified materials for conditions specified.

Bidder may offer valve with body and trim material better than the specified material and in such case, bidder shall furnish the comparisons of properties including cavitations resistance, corrosion resistance, temp. resistance, erosion resistance, hardness etc. of the offered material vis a vis specified material for owner approval.

11.02.04 **End Preparation**

1. Valve body ends shall be butt-welded type.
2. Flanged ends shall be of a pressure class equal or greater in pressure-temperature rating to the body design pressure and temperature indicated on the control valve. Unless otherwise specified, steel flanges shall be raised face type. Flanged ends for valves shall be in accordance with ANSI B 16.5.
3. Welded end for control valves where specified shall be socket-weld per ANSI B 16.11 for control valves of sizes 50 mm (2") and below and Butt welded connections per ANSI B16.25 for control valves 65 mm (2-1/2") and above. The end preparation for butt welded control valves shall be matched to the corresponding details for the piping on which the valve is installed.
4. All end preparations shall be as per Owners requirements indicated during Contract stage.



CONTROL VALVES WITH ACTUATOR

11.02.05 **Miscellaneous Parts**

1. Extension bonnets shall be used on all valves when the maximum temperature of the flowing fluid is greater than 275 deg. C or when specifically required in the control valve.
2. Stem travel indicators shall be provided on all valves.

11.03.00 **VALVE OPERATIONS**

- 11.03.01 All control valves shall be furnished with pneumatic spring opposed diaphragm, spring less diaphragm, or piston operators as specified herein.
- 11.03.02 The bidder shall be responsible for proper selection and sizing of valve operators in accordance with the pressure drop and maximum shut-off pressures.
- 11.03.03 Valve operators and stems shall be adequate to handle the unbalanced forces occurring under the specified flow conditions or the maximum differential pressure specified. An adequate allowance of stem force, at least 0.15 kg/sq. cm per linear millimeter of seating surface, shall be provided in the selection of the operator to assure tight seating unless otherwise specified. The operators shall be designed to produce the required stem force with supply air pressure of 3.5 kg/sq. cm maximum unless otherwise specified.
- 11.03.04 Diaphragms shall be moulded synthetic rubber and diaphragm housing shall be of pressed steel construction. Diaphragms shall not be fabricated of natural rubber.
- 11.03.05 Piston operators shall use cast pistons and cylinders with O-ring seals. Operators shall be supplied with name plates which indicate the diaphragm air pressure at full open and full closed positions. for single seated valves the pressures shall be listed for maximum differential and for zero differential across the valve.
- 11.03.06 Pistons and cylinders shall be cast aluminum. Piston rod and extension shall be chrome plated stainless steel. Cylinder seal bushings shall be brass and seal rings shall be nitrile. Yoke shall be cast iron.
- 11.03.07 Valve operators shall be capable of operating at 60 °C continuously.

11.04.00 **CONTROL VALVE ACCESSORIES & DEVICES**

The following accessory equipment shall be provided for control valves:

- 11.04.01 **Air Locks:** Air locks shall be designed to shut off the diaphragm loading air line if the supply air pressure to the associated pilot or Positioner fails. Air locks shall be of the automatic reset type and shall be furnished with alarms.
- 11.04.02 **Hand Wheels:** Hand Wheels shall be provided. Hand wheels shall be side mounted unless specified to be top mounted. However the mounting shall be as decided during engineering to offer maximum accessibility.



CONTROL VALVES WITH ACTUATOR

- 11.04.03 **Limit Switches:** Each control Valves shall be provided with limit switches for monitoring of end position in DDCMIS/DCS/PLC. Switches shall have not less than two normally open and two normally closed contacts in both open and close directions. Electrical rating of the limit switch contacts shall be 240V AC, 5 amp or 220V DC, 0.5 amp. Limit switches should be National Acme Co., or Honeywell micro switch type or Owner approved equal. The enclosures of the limit switches shall be as per NEMA-4 Standard. Limit switches shall be constructed to withstand the temperatures encountered in the actual service. Explosion proof construction shall be furnished where required by applicable code or these specifications. Limit switches shall be factory mounted on the valves with provisions for adjusting the mounting. The Bidder shall stroke the valves to check limit switch operation prior to shipment.

Limit/micro switches can be offered as an integral part of Smart valve positioner.

- 11.04.04 **Smart Valve Positioner:** Control valve actuators for modulating and throttling services shall be provided with HART protocol based smart electro pneumatic valve Positioner to ensure accuracy & repeatability of response. The valve Positioner shall be designed suitable for vibration and service conditions of a steam electric power station.

The Positioner shall have the following features:

- a) Shall provide a pneumatic output signal of range 0.2 to 1.0 kg/cm² or as desired for the actuator.
- b) Shall have integral type position transmitter, input & output gauges, local keypad, display, 4-20 mA input and 4-20 mA output for position indication in DDCMIS/CCR/PLC. Compatibility for Remote Calibration & Diagnostic (Super imposed HART signal on input signal (4-20mA). 1 no. digital input shall be provided to control system for fault diagnostic.
- c) Shall be suitable for direct mounting on control valve assembly both for rotary & linear valves.
- d) Shall be capable of functioning under hot, humid & vibrating conditions.
- e) Shall have dust tight, corrosion resistant & weather proof IP 65 metal (Die Cast Aluminium/SS316) casing.
- f) Shall be operated at signal range of 4-20 mA for full travel of the valve. Split range operation in few case may be required. This facility shall also be available in positioner.
- g) Shall have in built mechanical position indicator.
- h) Shall have fail safe & fail freeze function as per loop process requirement. (In case the fail freeze feature is not intrinsic to the positioner, Bidder shall achieve the same externally through solenoid valve connected in the pneumatic circuit).
- i) Shall have in built auto tune facility.
- j) In built advanced diagnostic/ test feature like stroke counter or travel counter, leakage in actuator, valve signature analysis, Step response time, valve friction/Jamming detection etc to be provided.
- k) Window based software. Software shall meet the requirements for configuration, diagnostic, calibration and testing of the actuator.
- l) Remote & Local Calibration, Auto & manual Calibration shall be provided.
- m) EMC & CE Compliance – EN 50081-2 & EN 50082 or equivalent.



CONTROL VALVES WITH ACTUATOR

- n) Factory Valve Signature Tests Reports (Pressure Vs Valve travel and Travel Vs I/P signals) are to be provided.
- o) In-built Operator panel having display with push buttons for configuration and display on the positioner itself (Password protected/Hardware lock).
- p) Performance –

Charateristic Deviation - $\leq 0.5\%$ of span.

Ambient Temp Effect - $\leq 0.01\%$ /deg C or better.

11.04.05 **Solenoid Valves:** Solenoid Valve will be provided for the following

- i. ON / OFF Duty type Control Valve
- ii. For over-riding the controller signal with Modulating type Control valves.
- iii. For control valve stay put position requirement on controller signal failure with Modulating type Control valves.
- iv. For construction and detailed specification of Solenoid valve, Chapter 3, Vol. V shall be referred by bidder.

11.04.06 **Diffusers** : Diffusers shall be provided as per service application requirements. The diffuser shall be designed to reduce the pressure drop across the control valve below the critical value and reduce the sound pressure level. Details of the diffusers shall be submitted.

11.04.07 **External Volume Chambers:** External volume chambers with adjustable bleed valves shall be provided for Control Valve. Volume chambers shall be furnished, mounted on the control valve yoke assembly.

11.04.08 **Position Transmitters:** Position transmitters shall be provided for control valves as a part of smart positioner. The signal shall be 4-20 mA DC range, 24 V DC. For non smart positioners applications and power cylinders, contact less position transmitter shall be provided by bidder.

11.04.09 **Tubing and Air Sets:** All pneumatic tubing required to interconnect devices assembled together shall be furnished complete with each control valve. The tubing shall be fully annealed soft temper copper/SS316 tubing conforming to ASTM B68 to B75 (USA). Swage lock flare less tubing fittings shall be used for tubing connections (Swage lock or approved equal).

The air pressure required will be different for Air lock relay and I to P converter/smart positioner. Hence one Air set pressure regulator for I to P converter/smart positioner and One more Air set pressure regulator for Air lock relay shall be provided.

Each device requiring an air supply shall be equipped with a combination filter-regulator. Devices mounted together on a valve yoke may be served by a single regulator, provided the supply pressure is satisfactory and the regulator capacity is not exceeded. Filter-regulators shall be mounted on the device served.



CONTROL VALVES WITH ACTUATOR

Filter- regulators shall be suitable for a 10 kg/sq. cm maximum inlet pressure. Filter-regulators shall have built-in housing blow down valves and a 2 inch pressure gauge. The filter shall be of size not more than 5 microns and shall be made of sintered bronze.

11.04.10 **Pressure Switch**

Pressure switch suitable for the above the pneumatic system shall be provided. The contact rating shall be 2 A for 240 AC, .2 A, 220 VDC 2 SPDT Contact. Enclosure IP 65.

11.04.11 **I/P Converter**

For non smart positioners applications and power cylinders i/p converters shall be required and owner approval shall be obtained for the use of i/p converter for such applications.

Electro-pneumatic, outdoor type, field mounted Linear. 4-20 MA DC input and 0.2 – 1.0 kg/Cm² output. Die cast aluminum casing with IP65 or equivalent enclosure class. Accuracy of $\pm 0.5\%$ of span or better and repeatability of $\pm 0.5\%$ of span or better will be provided. Easily accessible span and zero adjustment will be provided I/P converter shall be provided with all accessories and erection hardware. The I to P converters shall retain the pneumatic signal (last value) even in failure of control signal and shall have self volume boosters.

11.04.12 **Separate moisture separator unit** for ensuring dryness of air entering I/P as well as the power cylinder is to be supplied **with each control valve and control damper.**

11.05.00 **FOR FOLLOWING CRITICAL APPLICATION SPECIAL CONTROL VALVES ARE REQUIRED.:**

1. HP & LP Bypass Valves and Control System
2. BFP – Minimum Re-circulation Valve
3. Feed Water Control Valve
4. SH & RH spray Control Valves
5. APRDS System
6. Soot Blower control valve
7. Separator level and Drain Control Valve.
8. Boiler startup recirculation control valve.

11.05.01 **General Requirements for Critical Application Control Valves for -.**

- i) The valve accessories shall include hand wheels, limit switches, smart valve positioner (4-20mA DC type), electro pneumatic converter, Air lock relay, Solenoid valve and all other items required for the completeness and the accessories shall be explosion proof type as per hazardous area classification wherever applicable.
- ii) Control valves shall be furnished with IBR certification wherever required.
 1. **Noise:** The maximum allowable noise level shall be 85 dba or less at 1 m. distance from the downstream bare pipe surface. The specified noise level



CONTROL VALVES WITH ACTUATOR

shall be attained without the use of orifices, mufflers, diffusers. No credit for thermal or acoustical insulations shall be taken.

2. **Valve Trim:** Valve shall have quick change type trim utilizing top entry. No components shall be screwed or welded into the body. The valve shall have equal pressure distribution around the plug to avoid chattering / vibration.

Trim of severe/critical service valve shall be of multi stage & multi path design with sufficient no. of discrete pressure drop stage to eliminate the chance of erosion, cavitations, noise, vibration through out the control range of valve.

3. **Leakage Class:** The valve shall have minimum class-V leakage for all steam applications including RH/SH spray, APRDS (Pressure control & spray control), Soot blower control valve, HP/LP bypass spray control valves, BFP minimum recirculation valve, Low Load feed water control valve, Separator level & Drain control valve and Boiler startup recirculation control valve.

In case of HP/LP Bypass control valve application, the leakage class should be MSS-SP 61 (block valve leakage).

4. **Actuator:** Actuator type should be pneumatic double acting piston/ Electro-Hydraulic.

11.06.00 **Specific Requirements / Specifications for Different Valves:**



CONTROL VALVES WITH ACTUATOR

Auxiliary steam system is to be designed to provide steam for turbine auxiliaries, Boiler auxiliaries and fuel oil heating system during start-up, low loads and normal running of units.

The system comprises of one auxiliary steam stations capable of meeting 'High capacity' and 'Low capacity requirements' by a single system to meet auxiliary steam requirements during unit start-up, Low loads and for fuel oil system and during normal running. Spray water required for desuperheating will be tapped off from boiler feed pump discharge.

The above stations will reduce the pressure and temperature of the steam tapped off from main steam line. A suitable desuperheater should be considered for reducing the temperature.

Equipment To Be Provided by Bidder:

Combined high capacity and low capacity Auxiliary PRDS comprising of:

a) Control Valves and accessories:

- | | |
|-----------------------------|---|
| a) Pressure reducing valve: | Having multiturn, multistage, multipath radial trim valve as per specification. |
| b) Spray control station: | Dedicated to Desuper-heater. The spray water control station should have multiturn, multistage, and flow trim & the same should be a combination of pressure and temperature control valve and a high rangeability desuperheater. |

Each control valve shall be supplied with the accessories as specified in the approved data sheets.

Desuperheater:

1. Direct mixing type desuperheater :

The desuperheater shall be completed with spray nozzle along with necessary attachments.

Spares, Consumables and Special Tools and Tackles:

Commissioning spares and consumables:

The bidder shall supply spares and consumables for all the above valves and desuperheaters required during start-up. A list of all spares and consumables to be supplied shall be submitted along with the bid.

Specific Technical Requirements for Control Valves, Actuators and Accessories:

CONTROL VALVES WITH ACTUATOR

Seat ring and trim fitment should not have any part screwed or welded. It should be easily replicable type.

The valve trim should be multistage, multipath design having sufficient numbers of discrete pressure reductions (turns/stages) to ensure elimination of vibration, cavitations, erosion and noise effects.

Pressure reduction/drop achieved by valve designs incorporating single or multistage orificed cage, diffusers are not acceptable.

Bidder should work out number of pressure drop turns in the trim of the valve and should provide calculations of trim exit velocity.

Flow Vs. valve opening characteristics: the trim is to be so designed that the minimum flow indicated in the bid specifications of the valve is achieved with minimum lift of 8mm. of valve plug from 'close' position. Subsequent characteristics should be 'Equal Percentage' i.e. corresponding to the parabolic characteristics. Characterising the cam of the positioner to mimic the required flow characteristics is not acceptable.

Rangeability should be 100 to 1(minimum). Valve should be able to throttle even below 5% opening without trim erosion during cold startup up to 15% load.

Each pressure reducing element should have a uniform pressure distribution around the plug to avoid mechanical vibrations(pressure equalizing rings/ grooves).

To prevent flow induced vibrations and the line trace damage to seat, the flow direction should be over the plug for water and under the plug for steam.

During throttle opening of the control valve, flow should be diverted away from the body seat.

The valves shall have minimum ANSI B-16-104 class-V leakage class in metal to metal seating for all applications with minimum seating force of 125kgf per linear mm of seat ring circumference. Soft seat is not acceptable. Vendor shall confirm that the proposed valve shall maintain tight shutoff leakage class even after 3 years of field service.

The bidder should indicate how this will be achieved in their valves and actuators. Actuators should be pneumatic double acting piston type. Diaphragm type actuators are not acceptable.

Bidder to indicate the closing force on the seat in kgf/mm of seat circumference applied for actuator.

Trim exit velocity in both minimum and maximum flow conditions should be less than 30M/Sec. in case of water and 22.5M/sec in case of flashing water conditions. Calculation sheet should be attached demonstrating satisfactory compliance of this requirement.



CONTROL VALVES WITH ACTUATOR

Noise level at 1 meter distance from the valve should be less than 85dB without insulation, Orifices, silencers mufflers etc. Calculation sheet to be attached for each valve offered.

Critical cavitations index (Kc) for all control valves should be 1 (one). This is specific requirement to avoid even remote possibility of cavitational damage to valve internals.

To avoid problems associated with the piston rings provided in valves of balanced design, unbalanced design for port size upto 25mm. is required. Bidder to indicate the compliance clearly.

Material of the HC PRV valve internals should be as under or better:-

Guide : Inconel 718
 Plug/stem : Inconel 718
 Seat ring : SS 316 stellited

Material of LCPRV valve internals should be as under or better:

Guide : SS316 stellited.
 Plug/stem : SS316 stellited.
 Seat ring : SS 316 stellited

Material of spray control valve should be as under or better:

Guide : 17-4PH-SS, Plug/stem : 17-4PH-SS, Seat ring : 17-4PH-SS

Valve actuators:

- i) Piston actuators shall be used for all valves.
- ii) Valve actuators shall be capable of operating at 70 Degree C ambient continuously.
- iii) Castings shall be of the type to suite individual area environments.
- iv) All fix connection size shall be 1/4" NPT (Female)
- v) Bidder shall guarantee that the size of the actuator is adequate to meet the operating thrust requirement for the control valve under extreme condition. Bidder shall indicate the stroking time of the valve assemblies with positioner.

Accessories:

Control valve actuators shall be equipped with air supply filter regulator, gauges and valve positioners alongwith boosters for typical applications wherever required, local poison indicator with scale and pointer, position transmitter, limit switch and hand wheel, air look relay, solenoid valve etc.

Performance:

All control valves shall confirm to MSS-SP-61 leakage class.



11.07.00 TESTING AND COMMISSIONING:

11. 07.01 All valves shall be tested in accordance with the quality assurance programme agreed between the owner and the bidder as specified in chapter 14 which shall meet the requirements of IBR and other applicable codes mentioned in chapter 1 clause- 1.09.00. The tests shall include but not be limited to the following.

Valves for high pressure high temperature applications shall be subjected to 100% radiography examination test. Results shall be owner approved prior to dispatch. All castings and forging shall be visually inspected. The casting shall be radio graphically examined. Ultrasonic examination, liquid penetration examination, magnetic particle examination etc. as applicable shall be performed as per applicable standards and codes. The mechanical and chemical testing shall also Be performed in accordance with applicable ASTM material specification.

11.07.02 Non-destructive examinations shall be performed as required by ANSI B81.1 (Power Piping) and ANSI B16.34 (Steel Valves).

11. 07.03 Hydrostatic Test:

- i) Valve shall be subjected to hydrostatic shell test in accordance with ANSI-B16.34 prior to seat leakage test. If the valves are reworked on the pressure parts for any reason after hydrostatic test, they must be retested.
- ii) Valves shall be hydrostatically tested in manufacturers works in accordance with code requirements. All hydrostatic testing and inspection shall be completed before any paint is applied to valve body. Certificates of inspection shall be executed in accordance with the latest codes and required codes shall be forwarded to the engineer.

All gaskets used for test shall be of the same material and design as specified for the finished product. Where mechanical gasket joints are broken following tests, new gaskets shall be furnished with the equipment, and the joints shall be retested.

11. 07.04 Leakage Test:

- i) Unless otherwise noted in the specification sheets, valve closure test and seat leakage tests shall be performed in accordance with ANSI B16 – 104/FCI-70.2, Leakage Class IV/class V as the case may be.
- ii) The leakage from packing shall be zero or bubble tight. For valve designs which are not covered by ANSI B16.104/FCI-70.2, the bidder shall submit the expected leakage rate with his proposal for review by Owner / Technical Specialist.
- iii) If valves are disassembled after the completion of the valve closure and seat leakage tests, these tests shall be repeated.

11. 07.05 Hysteresis Test :



CONTROL VALVES WITH ACTUATOR

The hysteresis test shall be run on completely assembled valves. The stuffing box shall be fully packed and made up hand tight. The allowable value of hysteresis specified by the bidder shall be achieved.

11.07.06 Tests for special class valves:

All valves supplied with the special class ratings per ANSI B16.34 "Steel Valves" (except flanged valves) shall be subject to the required examinations as per paragraph 8.3 of ANSI B16.34. the acceptance criteria shall be same as these given in Annexure B,C,D and E of ANSI B16.34 for the applicable examinations expect for the following.

Magnetic particle examination of castings, the linear indication shall not exceed 3/16 inch in length.

11.07.07 Functional Tests:

The fully assembled or completed valves including the operators control devices and accessories shall be functionally tested to demonstrate the operability of the valve and the operation. This may be done by cycling the valves 3 or 4 times from open to close position. The same controller can be used to test each valve. Control valve FI (Liquid pressure recovery factor) in operation test on completed valve shall also be included final inspection.





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

SPEC. NO.: PE-TS-425-142-N101

SECTION II

REV. NO. 00

DATE 18.05.18

SPECIFICATION FOR APRDS



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

SPEC NO.: PE-TS-425-145-I801

DOCUMENT NO.

VOLUME II B

SECTION A

ISSUE NO. 2

REV. NO. 00

DATE 19.02.2018

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

Hand wheel shall have open/ close direction.

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

JB shall be 36 ways as per enclosed hook-up diagram.

The material of filter for Air Filter Regulator shall be ceramic/Sintered bronze.

Bidder to indicate pick-up & drop out voltage for all solenoid valves.

Protection class for Limit switches, I/P converter and Position transmitter shall be IP-65 only.

All JBs and valves shall be with double compression type Ni plated brass cable glands.

16. Solenoid valve class of protection shall be IP-65

All local cabling up to JBs shall be in Conduit (Flexible/Rigid).

The smart positioner provided with Control Valves shall be compatible with Universal Hart Calibrator.

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

Air Filter Regulator (AFR)

Constant bleed type AFR with an accuracy of + 1.0 % inlet pressure range of 5-10 kg/ cm² and suitable spring ranges (AFR) for use with positioners in control valves, control damper, E/P convertors and shut off valves with sintered phosphor bronze filter element; Filtering particles above five microns. IP 65 Weather and water proof enclosure. Material of accessories will be SS316. Body material of filter regulator shall be Die Cast Aluminum or SS316

Solenoid Valves

Solenoid Valve coils insulation class shall be Class-H high-temperature or Class-F construction as applicable and shall be designed for continuous duty. Three-way solenoid valves shall be designed for universal operation so that the supply air may be connected to any port. Solenoid enclosures shall be NEMA-4)/ (Explosion proof for NEC Class-1/2, Division 1 area)/ flame proof (IEC-79.1, Part I) as applicable). Body material of solenoid valve shall be Brass or SS316 with epoxy paint as decided during engineering by owner. Material of wetted parts shall be SS316 only. Leakage class shall be class VI (Bubble tight). All solenoid shall be with varistor/RC circuit for EMI suppression, LED indication, surge Solenoid valve shall operate on 24 V DC, UPS 230 V AC or 220 V DC.

Air locks

Air locks shall be designed to shut off the diaphragm loading air line if the supply air pressure to the associated pilot or Positioner fails. Air locks shall be of the automatic reset type and shall be furnished with alarms.

Hand Wheels

Hand Wheels shall be provided. Hand wheels shall be side mounted unless specified to be top mounted. However the mounting shall be as decided during engineering to offer maximum accessibility.

Limit Switches

Each control Valves shall be provided with limit switches for monitoring of end position in DDCMIS/DCS/PLC. Switches shall have not less than two normally open and two normally closed contacts in both open and close directions. Electrical rating of the limit switch contacts shall be 240V AC, 5 amp or 220V DC, 0.5 amp. Limit switches should be National Acme Co., or Honeywell micro switch type or Owner approved equal. The enclosures of the limit switches shall be as per NEMA-4 Standard. Limit switches shall be constructed to withstand the temperatures encountered in the actual service. Explosion proof construction shall be furnished where required by applicable code or these specifications. Limit switches shall be factory mounted on the valves with provisions for adjusting the mounting. The Bidder shall stroke the valves to check limit switch operation prior to shipment. Limit/micro switches can be offered as an integral part of Smart valve positioner.

Tubing and Air Sets

All pneumatic tubing required to interconnect devices assembled together shall be furnished complete with each control valve. The tubing shall be fully annealed soft temper copper/SS316 tubing conforming to ASTM B68 to B75 (USA). Swage lock flare less tubing fittings shall be used for tubing connections (Swage lock or approved equal).

Smart Valve Positioner

Control valve actuators for modulating and throttling services shall be provided with HART protocol based smart electro pneumatic valve Positioner to ensure accuracy & repeatability of response. The valve Positioner shall be designed suitable for vibration and service conditions of a steam electric power station.

The Positioner shall have the following features:

- a) Shall provide a pneumatic output signal of range 0.2 to 1.0 kg/cm² or as desired for the actuator.
- b) Shall have integral type position transmitter, input & output gauges, local keypad, display, 4-20 mA input and 4-20 mA output for position indication in DDCMIS/CCR/PLC. Compatibility for Remote Calibration & Diagnostic (Super imposed HART signal on input signal (4-20mA). 1 no. digital input shall be provided to control system for fault diagnostic.
- c) Shall be suitable for direct mounting on control valve assembly both for rotary & linear valves.
- d) Shall be capable of functioning under hot, humid & vibrating conditions.
- e) Shall have dust tight, corrosion resistant & weather proof IP 65 metal (Die Cast Aluminium/SS316) casing.
- f) Shall be operated at signal range of 4-20 mA for full travel of the valve. Split range operation in few case may be required. This facility shall also be available in positioner.
- g) Shall have in built mechanical position indicator.
- h) Shall have fail safe & fail freeze function as per loop process requirement. (In case the fail freeze feature is not intrinsic to the positioner, Bidder shall achieve the same externally through solenoid valve connected in the pneumatic circuit).
- i) Shall have in built auto tune facility.
- j) In built advanced diagnostic/ test feature like stroke counter or travel counter, leakage in actuator, valve signature analysis, Step response time, valve friction/Jamming detection etc to be provided.
- k) Window based software. Software shall meet the requirements for configuration, diagnostic, calibration and testing of the actuator.
- l) Remote & Local Calibration, Auto & manual Calibration shall be provided.
- m) EMC & CE Compliance – EN 50081-2 & EN 50082 or equivalent.

Junction Boxes

Type of :	Flame proof/weather proof
Enclosure	IP-65/Explosion Proof as per area classification.
Material :	6 mm min. thick FRP with protective Coating 3 mm min. thickness Die cast aluminum for Flame proof/Explosion proof area.
Cable entry :	Bottom or Side
Cable glands :	Double compression type – Nickel plated brass with PVC hoods.
Mounting :	Indoor/Outdoor
No. of terminals :	As required with standardization with 20% spare of each size & type.
Terminals :	Phoenix/Wago (screw less cage clamp type spring loaded)
Grounding :	Two terminals for body and shield ground
Door :	Hinged, lockable type.
Accessories :	Suitable mounting clamps and other accessories shall be in scope of bidder. The brackets, bolts, nuts, screws, glands, lugs required for erection shall be of brass, included in bidder scope of supply. High voltage & insulation resistance test shall also be conducted. M6 Ni plated Brass earthing stud shall be provided (external 2 nos. internal 1 no.)
Gasket (Normal):	Neoprene/Polyurethane thickness 6.0 mm. Silicon for High Temperature area.
Colour :	In General same as provided for control panels, and for special services, To be decided during detailed engineering & subject to owner's approval.



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

SPECIFICATION NO. **PE-TS-425-145-I801**

DOCUMENT NO.

VOLUME **II-B**SECTION **D**

ISSUE NO. 2

REV. NO. 00

DATE : 19.02.18

SECTION-D

EQUIPMENT SPECIFICATION (PES-145-06)



SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)

SPECIFICATION NO.: PE-TS-425-145-I801

DOCUMENT NO.: PES – 145 - 06

VOLUME II B

SECTION D

ISSUE NO. 2

REV. NO. 00

DATE : 19.02.18

1.0 SCOPE

- 1.1 This specification covers the Design, Manufacture, Inspection and Testing at the manufacturer's works, proper packing for transportation and delivery to site of Control valve (with Pneumatic/Electric Actuator as identified in the datasheet-A) for use in Utility/Captive Power Station/Combined Cycle Station.
- 1.2 Expander/Reducer between valve body & pipe shall be in BHEL's scope of supply. However, any other expander/reducer required shall be in bidder's scope of supply.

2.0 CODES AND STANDARDS

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

Indian Boiler Regulation (IBR)		
Allowable Seat leakage	:	FCI-70.2
Pressure & Temperature ratings	:	ANSI-B16.34
Enclosure class	:	IEC-144 / NEMA / IS-13947
Control Valves Sizing	:	ISA S-75
Electric Motor operated Actuators	:	IS-9334

3.0 TECHNICAL REQUIREMENTS

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

3.1 Control Valve

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

- 3.1.1 The control valve shall be of globe/angle body design, as per datasheet, with single port. Valve trim shall be cage guided balanced type for valve sizes $\geq 3"$ and above. The valve trim shall be suitable for quick replacement without any cutting or welding. Anti-cavitation trims shall be provided for valves with cavitation service and hardened trims for flashing services.
- 3.1.2 The trim material and body material has been specified in the Datasheet-A. Bidder to offer body material and trim material combination as per the datasheet. Wherever there is a deviation from the datasheets, bidder to furnish the documentary proof for confirming superior trim material/body material selection along with their offer. BHEL/Customer reserves the right to accept/reject any variation in the specification.
- 3.1.3 Asbestos shall not be used for the packing or any other component.
- 3.1.4 The valve bonnet and packing shall be suitable for the service conditions as in Data Sheet-A. Gland sealed type bonnets are not acceptable. Double packing is mandatory for applications involving vacuum service. For valves where downstream is subjected to vacuum, flow action shall be "flow to close" (over the seat). Bonnets having Teflon packing shall have valve stem finished to 2-4 microns. Packing material requiring lubrication will not be acceptable.



SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)

SPECIFICATION NO.: PE-TS-425-145-I801

DOCUMENT NO.: PES – 145 - 06

VOLUME II B

SECTION D

ISSUE NO. 2

REV. NO. 00

DATE : 19.02.18

Type of bonnet shall be according to the service condition. Extension bonnets shall be provided when the maximum temperature of the flowing fluid is greater than 280 or unless otherwise specified. Cast Steel (CS) yokes shall be offered for CEP Minimum Recirculation valve/GSC minimum recirculation control valve. Cast Iron (CI) yokes are not acceptable for this service.

- 3.1.5 The valve end connection as specified in Data Sheet-A shall conform to ANSI B16.25 for Butt Weld connection, ANSI B16.11 for Socket Weld connection and ANSI B16.5 for flanged ends. Tolerances on end to end, center to center, center to face shall be in accordance with ASME B16.10. The end connections shall be Socket Welded for sizes up to 50 NB and Butt Welded for sizes above 50 NB.
- 3.1.6 The valve seat leakage shall be as per FCI-70.2. The leakage class shall be as per Data Sheet-A.
- 3.1.7 The valve body shall have the direction of flow embossed on all valves.
- 3.1.8 The sizing shall conform to the requirements of ISA S75.01, and the valve capacity shall be selected so as to meet the following:
- | | | | | |
|--|---|---|---|--------------------|
| Valve with Linear Characteristic | - | Normal Flow (Design Point) | : | 70-75% valve lift. |
| | - | Max. Flow | : | 90% valve lift. |
| | - | Min. Flow | : | >10% valve lift. |
| Valve with Equipercentage Characteristic | - | Normal Flow (Design Point) | : | 75-85% valve lift. |
| | - | Max. Flow | : | 90% valve lift. |
| | - | Min. Flow | : | >10% valve lift. |
| ON/OFF Quick open Characteristic | - | 1.1 times the CV calculated on the basis of maximum flow condition. | | |
- The valve offered shall be capable of handling 120 % of the required maximum flow.
- 3.1.9 Calculation for valve sizing, velocity and noise shall be subject to purchaser's approval during contract stage. However responsibility of proper selection and design for the duties specified lies with the vendor. Any modifications required to be done on the valves or actuators & accessories to achieve satisfactory performance of the control system shall be done without any commercial & delivery implication.
- 3.1.10 The valve outlet velocities shall be limited to the following values, unless otherwise specified in the Data sheet-A.
- | | | | |
|------|------------------|----|--|
| i) | Liquid service | <= | 8 m/sec |
| ii) | Steam service | <= | 150 m/sec |
| iii) | Flashing service | <= | 50% of sonic velocity for flashing services. |
- 3.1.11 For flashing duty, trim design shall be such that the vapour bubbles are kept away from valve body.
- 3.1.12 For cavitation service, the trim design shall be of multistage pressure drop type, so as to avoid cavitation altogether, instead of keeping cavitation away from valve parts.
- 3.1.13 The equivalent weighted sound level measured at 1.5 metre above floor level in elevation and 1 metre horizontally from the control valve expressed in decibels to a reference of 0.0002 microbar shall not exceed 85 dBA (without pipe insulation). The offer shall include noise prediction calculations for each valve.



SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)

SPECIFICATION NO.: PE-TS-425-145-I801

DOCUMENT NO.: PES – 145 - 06

VOLUME II B

SECTION D

ISSUE NO. 2

REV. NO. 00

DATE : 19.02.18

- 3.1.14 In case of predicted noise level above 85 dBA, same shall be brought down to acceptable noise level i.e. below 85 dBA through Source treatment (proper valve trim & valve body selection). Path treatment (LNP/ Diffuser/ Cartridge/ Silencer etc.), if any shall be subject to Customer's/Owner's approval.
- 3.1.15 In case of wrong selection/mal operation of valve and for associated actuator during guarantee period, the vendor shall replace the valve suitably with a modified/new valve of design as approved by purchaser and all the expenses for replacement, rectification/modification including transportation both ways will be at vendor's expenses.
- 3.2 **ACTUATORS-** The control valves shall be operated either pneumatically (with pneumatic actuator) or electrically (with electric actuator).
For pneumatic actuator, clause nos. 3.2.1 through 3.2.6 to be followed.
- For electric actuator, please refer the technical specification for electric actuator (Refer Document No. PES-145-06D).
- 3.2.1 **Pneumatic Actuator**
- The actuator shall be designed for a thrust of 120% of valve's shut-off pressure at an airline supply pressure of 5 Kg/Sq. cm.
- The pneumatic actuators shall be employed for modulating or open/close duty, as specified in Data Sheet-A. The bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drops, shut off pressure and valve travel.
- The pneumatic spring opposed diaphragm actuator or piston actuator as the case may be for modulating duty shall be capable of positioning the associated valve at desired opening for all the operating conditions specified.
- 3.2.2 The pneumatic actuator for open/close duty shall be suitable for fast opening/closing of the associated valve.
- 3.2.3 The actuator design shall allow valve assembly to be mounted at 45° inclination on either side in the vertical plane.
- 3.2.4 The actuators shall be suitably sized to ensure that the associated valve travel time from full open to full closed position and vice versa is less than 10 seconds or as specified in the datasheet under the most stringent service conditions.
- 3.2.5 The actuator's hand wheel shall have OPEN & CLOSE direction marking and clockwise rotation as viewed from front shall close the valve.
- 3.2.6 Each actuator shall be provided with a mechanical pointer attached to stem, moving over a graduated scale with markings, for OPEN, 25%, 50%, 75%, CLOSE positions.
- 3.3 **Accessories for Control valve with Pneumatic Actuator**
- The bidder shall offer all the accessories as specified in the Data Sheet - A for the Pneumatic Actuators under modulating or OPEN/CLOSE duty. The accessories specified shall be supplied duly mounted on the valve actuator and piped with PVC covered copper/ SS tube and flare-less brass/ SS fittings etc. as per the hook up diagram (Refer drawing no. PES-145



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

SPECIFICATION NO.: PE-TS-425-145-I801

DOCUMENT NO.: PES – 145 - 06

VOLUME II B

SECTION D

ISSUE NO. 2

REV. NO. 00

DATE : 19.02.18

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

3.5 Sub-vendor list –

The sub-vendors shall be as per the list enclosed elsewhere in this specification. In case the bidder proposes sub-vendors other than those listed in the specification, the same shall be subject to BHEL's/Customer's approval.

4.0 TESTING AND INSPECTION

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

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

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

5.0 SPARES AND CONSUMABLES

5.1 Start-up/Commissioning Spares

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

5.2 Mandatory Spares

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

6.0 DRAWINGS AND DOCUMENTS

6.1 The bidder shall furnish the following documents along with the bid: 4 Sets

6.1.1 Data sheet-B, completely filled-up along with all enclosures.

6.1.2 Schedule of prices in attached format (VOL.-III).

6.1.3 Quality Plan duly signed & stamped.

6.1.4 All relevant Catalogs with detailed technical information.



SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)

SPECIFICATION NO.: PE-TS-425-145-I801

DOCUMENT NO.: PES – 145 - 06

VOLUME II B

SECTION D

ISSUE NO. 2

REV. NO. 00

DATE : 19.02.18

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

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

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

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

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

6.3 Final documentation:

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

6.3.1 Category I & IV approved CONTROL VALVE DOCUMENTS

6.3.2 Test certificates

6.3.3 Operation & maintenance manuals for Control Valve, Actuator and all accessories

7.0 MARKING AND PACKING

7.1 Marking

A stainless steel metal nameplate should be permanently fixed on each equipment giving its tag number and technical specifications.

7.2 Packing

All equipment / materials shall be suitably packed and protected for the entire period of dispatch, storage and erection against impact, abrasion, corrosion, incidental damage due to vermin, sunlight, high temperature, rain, moisture, humidity, dust, sea water spray (where applicable) as well as rough handling and delays in transit and storage in open. Guidelines for packing are enclosed (Refer specification no. PES-145-06C).

8.0 APPLICABLE DATA SHEET FORMS

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

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



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

SPEC NO.: PE-TS-425-145-I801

DOCUMENT NO.: PES-145-06C

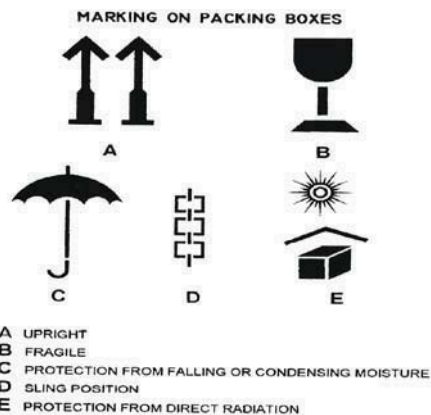
VOLUME II B

SECTION D

ISSUE NO. 2, REV. 00

Guidelines for Packing

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



The Following Details are to be marked on the Packing Cases

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



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

SPECIFICATION NO. **PE-TS-425-145-I801**

DOCUMENT NO.

VOLUME **II-B**SECTION **D**

ISSUE NO. 2

REV. NO. 00

DATE : 19.02.18

SECTION-D

SPECIFICATION FOR SMART POSITIONER (PES-145-06A)

	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)	SPECIFICATION NO.: PE-TS- 425-145-I801
		DOCUMENT NO.: PES-145-06A
		VOLUME. II B
		SECTION D
		ISSUE NO. 2 . REV.00

1.0 Electrical

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

2.0 Environment

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

3.0 Software For Configuration & Diagnostic

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

	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)	SPECIFICATION NO.: PE-TS- 425-145-I801
		DOCUMENT NO.: PES-145-06A
		SECTION D
		ISSUE NO. 2 . REV.00

Factory Valve Signature Tests Reports (Pr Vs Valve Travel And Travel Vs I/P Signal) Are To Be Provided.

Hardware PC For Configuration/Software (OPTIONAL)

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

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

4.0 Modes

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

5.0 Performance

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

	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)	SPECIFICATION NO.: PE-TS- 425-145-I801	
		DOCUMENT NO.: PES-145-06A	
		SECTION D	
		ISSUE NO. 2., REV.00	

Leak Test Yes

7.0 EMC & CE compliance

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

8.0 Accessories

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

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

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

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



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

SPEC. NO.: PE-TS-425-142-N101

SECTION II

REV. NO. 00

DATE 18.05.18

SPECIFICATION FOR DESUPERHEATER

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION		SPEC. NO.: PE-TS-425-142-N101
			SECTION II
			REV. NO. 00 DATE 18.05.18

1.0.0 GENERAL

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

2.0.0 CODES AND STANDARDS

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

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

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

3.0.0 DESIGN AND CONSTRUCTIONAL FEATURES

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

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

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

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

4.0.0 SHOP INSPECTION AND TEST

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

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

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

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION		SPEC. NO.: PE-TS-425-142-N101
			SECTION II
			REV. NO. 00 DATE 18.05.18

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

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

5.0.0 PERFORMANCE REQUIREMENTS

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

6.0.0 PAINTING

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



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

SPEC. NO.: PE-TS-425-142-N101

SECTION II

REV. NO. 00

DATE 18.05.18

7.0..0 PRESERVATION, MARKING AND PACKING

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

QUALITY PLAN FOR CONTROL VALVES(PNEUMATIC) (STATION C&I) (REGENERATIVE AREA)

REV.	DATED	ALTD	CHD	APPD	REV.	DATED	ALTD	CHD	APPD
03	05.01.18	MG	PJ	BS	02	13.09.17	MG -sd-	PJ -sd-	BS -sd-
A) REVISED IN LINE WITH CUSTOMER COMMENTS RCVD VIDE TRANSMITTAL NO M.010210 /TANGEDCO /2X800MW-UPPUR TPP/459 dated 27.09.2017					A) REVISED IN LINE WITH CUSTOMER COMMENTS RCD VIDE LETTER REF# SE/E9/A1/F.UPPUR - BTG/D.183/17, DT. 28.06.2017				

CUSTOMER	TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED
CUSTOMER'S CONSULTANT	TRACTEBEL ENGINEERING PVT LTD
PROJECT	2X800MW UPPUR STPP (STAGE-I, UNIT#1&2) IN RAMANATHAPURAM DISTRICT, TAMILNADU

JOB NO. 425 STATUS CONTRACT PRINT SCALE 	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">DEPT CODE</td> <td style="width: 10%;">NAME</td> <td style="width: 10%;">SIGN</td> <td style="width: 10%;">DATE</td> </tr> <tr> <td rowspan="3" style="text-align: center; vertical-align: middle;">I</td> <td>DSGN MG</td> <td>-sd-</td> <td>26.10.16</td> </tr> <tr> <td>CHD PJ</td> <td>-sd-</td> <td>26.10.16</td> </tr> <tr> <td>APPD BS</td> <td>-sd-</td> <td>26.10.16</td> </tr> </table>	DEPT CODE	NAME	SIGN	DATE	I	DSGN MG	-sd-	26.10.16	CHD PJ	-sd-	26.10.16	APPD BS	-sd-	26.10.16
DEPT CODE	NAME	SIGN	DATE													
I	DSGN MG	-sd-	26.10.16													
	CHD PJ	-sd-	26.10.16													
	APPD BS	-sd-	26.10.16													

REV.	DATED	ALTD	CHD	APPD	TITLE QUALITY PLAN FOR CONTROL VALVE (STATION C&I)					
01	22.02.17	MG -sd-	PJ -sd-	BS -sd-						
A) REVISED IN LINE WITH CUSTOMER COMMENTS RCD VIDE LETTER REF# SE/E9/A1/F.UPPUR - BTG/D.25/16, DT. 09.02.2017					DEPT.	SCALE	DRAWING NO.			
					SIGN		PE-QP-425-145-I006			
					DATE		SHEET	1	OF 08	REV 03



PEM :: C&I

2 X 800 MW UPPUR QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-425-145-I 006**

VOLUME IIB

SECTION C

ISSUE NO. 2 REV. NO. 03 DATE: 04.01.2018

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 ^s			Remarks
									P	W	V	
1.0	INCOMING MATERIAL											
1.1	Body & Bonnet casting / forgings, plug, valve stem, seat ring/cage.	1. Physical, Chemical properties	MA	Physical, Chemical tests	One/ Heat(HT Batch)	Approved drg. / data sheet /	Approved drg. / data sheet /	Test Certificate	3	---	2,1, 4	TC for body/bonnet from foundry only
		2. Heat Treatment	MA	Review of H.T. Chart	Each H.T.	Approved drg. / data sheet /	Approved drg. / data sheet /	Test Certificate	3/2	2	1,4	1.IBR Certification (if applicable) to be verified by BHEL. 2.Applicable for body /bonnet only
		3. Internal quality of castings	MA	RT for Body & UT for Bonnet	100%	ASME B 16.34	ASME B 16.34	Test Report / FILM	3/2	2	1,4	Applicable for body and bonnet for rating ANSI 900 and above.
		4. Surface Quality	MA	1. Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2	
				2. MT/PT	100%	ASME B 16.34	ASME B 16.34	Test Certificate	3	2	1,4	After Machining on machined surface only
		5. Pressure test for shell	MA	Hyd. Test	100%	ISA-S-75.19/ ASME B 16.34	ISA-S-75.19/ ASME B 16.34	Test Certificate	2	2	1,4	For Body & Bonnet after machining.
1.2	Diaphragm	1. Surface Quality	MA	Visual	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2	

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

RT- Radiographic Test
UT – Ultrasonic Test

PT – Dye penetrant Test
MT- Magnetic Test

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

1 - BHEL 4 -TANGEDCO
2 - Vendor
3 - Sub-vendor



PEM :: C&I

2 X 800 MW UPPUR QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: **PE-QP-425-145-I 006**

VOLUME IIB

SECTION C

ISSUE NO. 2 REV. NO. 03 DATE: 04.01.2018

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

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

RT- Radiographic Test
UT – Ultrasonic Test

PT – Dye penetrant Test
MT- Magnetic Test

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

1 - BHEL 4 -TANGEDCO
2 - Vendor
3 - Sub-vendor



SHEET 4 OF 8

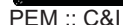
1 - BHEL 4 -TANGEDCO
2 - Vendor
3 - Sub-vendor

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



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	
		4. Repeatability	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1,4	Refer Note-4
		5. Hysteresis	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1,4	Refer Note-4
		6. Sensitivity	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1,4	Refer Note-4
		7. Accuracy (Overall)	MA	Measurement	100%	Mfr. Procedure	Approved drg. / data sheet	Test Report	2	1	1,4	Refer Note-4
		8. Control Valve characteristics / CV Test	MA	♦ Measurement (Press. vs. discharge and discharge vs. opening 0-100% in steps of 10%)	One per type	Mfr. Procedure	Approved drg. / data sheet	Test Certificate	2	--	1,4	♦ Size = Body & port size Or Body size & CV for non std port. Refer Note 1.
		9. Operation of limit switch & solenoids and other accessories	MA	Function	100%	Mfr. Procedure	Approved drg./ data sheet	Test Report	2	1	1,4	On assembled valve Refer Note-4
		10. Overall dimensions	MI	Visual and dimensional	100%	Approved drg. / data sheet	Approved drg./ data sheet	Records	2	1	1,4	Refer Note-4
		11. Pre defined valve position in case of air failure	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	1	1,4	
		12. Cleanliness, painting, stamping (for direction of flow), Tag No.	MA	Visual and dimensional, paint thickness	100%	Mfr. Procedure	Approved drg./ data sheet	Test Certificate	2	1	1,4	
		13. Surface Quality	MA	Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2,1,4	
LEGEND: * CR - Critical characteristics RT- Radiographic Test PT – Dye penetrant Test ^{\$} P - Agency Performing the Test. 1 - BHEL 4 -TANGEDCO MA - Major characteristics UT – Ultrasonic Test MT- Magnetic Test W - Agency Witnessing the Test. 2 - Vendor MI - Minor characteristics V - Agency Verifying the Test. 3 - Sub-vendor												



SHEET 6 OF 8

LEGEND: *	CR - Critical characteristics	RT- Radiographic Test	PT – Dye penetrant Test	\$ P - Agency Performing the Test.	1 - BHEL	4 -TANGEDCO
	MA - Major characteristics	UT – Ultrasonic Test	MT- Magnetic Test	W - Agency Witnessing the Test.	2 - Vendor	
	MI - Minor characteristics			V - Agency Verifying the Test.	3 - Sub-vendor	



QUALITY PLAN NO.: PE-QP-425-145-I 006			
VOLUME		IIB	
SECTION		C	
ISSUE NO. 2	REV. NO. 03	DATE: 04.01.2018	
SHEET	7	OF	8

LEGEND: *	CR - Critical characteristics	RT- Radiographic Test	PT – Dye penetrant Test	\$ P - Agency Performing the Test.	1 - BHEL	4 -TANGEDCO
	MA - Major characteristics	UT – Ultrasonic Test	MT- Magnetic Test	W - Agency Witnessing the Test.	2 - Vendor	
	MI - Minor characteristics			V - Agency Verifying the Test.	3 - Sub-vendor	

 PEM :: C&I	2 X 800 MW UPPUR QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)							QUALITY PLAN NO.: PE-QP-425-145-I 006					
								VOLUME IIB					
								SECTION C					
								ISSUE NO. 2		REV. NO. 03		DATE: 04.01.2018	
								SHEET 8		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		

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

S.No.	Accessories	Type of test
1.	Junction Box	Degree of protection test as per standard – IS 13947

8. FL test shall be conducted at FCRI/any govt. approved laboratory/ BHEL approved Laboratory.
9. The test mentioned at serial no. 4 the fully assembled or completed valves including the operators control devices and accessories shall be functionally tested to demonstrate the operationability of the valve and the operation. This may be done by cycling the valves 3 or 4 times from open to close position.

LEGEND:	* CR - Critical characteristics MA - Major characteristics MI - Minor characteristics	RT- Radiographic Test UT – Ultrasonic Test	PT – Dye penetrant Test MT- Magnetic Test	\$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.	1 - BHEL 4 -TANGEDCO 2 - Vendor 3 - Sub-vendor
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STANDARD QUALITY PLAN FOR STEAM DESUPERHEATER

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

SECTION II

ISSUE NO. 1 REV. NO. 00 DATE: 07.09.17

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

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

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

RT- Radiographic Test
UT – Ultrasonic Test

PT – Dye penetrant Test
MT- Magnetic Test

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

1 - BHEL
2 - Vendor
3 - Sub-vendor



STANDARD QUALITY PLAN FOR STEAM DESUPERHEATER

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

SECTION II

ISSUE NO. 1 REV. NO. 00 DATE: 07.09.17

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^s			Remarks
									P	W	V	
3.0	Final Inspection											
3.1	Assembly	Completeness and Marking		Visual	100%	Appd Specn./Data Sheet/Drg.	Appd Specn./Data Sheet/Drg.	IR	3/2	1	-	
		Dimensional		Measurement	100%	Appd Specn./Data Sheet/Drg.	Appd Specn./Data Sheet/Drg.	IR	3/2	1	-	
3.2	Pressure Test	Leak Proofness		Hydraulic Test	100%	-do-	-do-	IR	3/2	1	-	
4.0	Painting	Surface Prepn., Uniformity, Shade & Thick.		Visual, Measurement	100%	-do-	-do-	IR	3/2	-	1	
5.0	Packing	Soundness of Packing, Marking		Visual	100%	Appd Specn./Mfr.S tandard	Appd Specn./Mfr. Standard	IR	3/2	-	1	
Note:: IBR –Certificate in Form III C shall be submitted.												

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

RT- Radiographic Test
UT – Ultrasonic Test

PT – Dye penetrant Test
MT- Magnetic Test

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

1 - BHEL
2 - Vendor
3 - Sub-vendor



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

SPEC. NO.: PE-TS-421-142-N101

SECTION II

REV. NO. 00

DATE 18.12.17

SHEET 24

OF 28

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-425-142-N101

SECTION II

REV. NO. 00

DATE 18.05.18

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

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

DATA SHEET-B

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

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



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

SPEC. NO.: PE-TS-425-142-N101

SECTION II

REV. NO. 00

DATE 18.05.18

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

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

DATA SHEET-B

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

PERFORMANCE OF VALVE	HYTERSIS								
	LINEARITY								
	SENSITIVITY								
	ACCURACY (Overall)								
SERVICE CONDITION*	SL.+ NO.	LOAD	FLOW (T/HR)	INLET PR. (KG/CM² (A)	OUTLET PR. (KG/CM² (A)	TEMP DEG. C	CALCULA TED CV	% VALVE LIFT	VALVE O/L VELOCITY
VALVE TYPE									
* MAX SHUT OFF PRESS ((KG/CM ² g)									
* BODY DESIGN : PRESS ((KG/CM ² g) | TEMP (DEG. C)									
* IBR FORM III-C									
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.									
SEA WORTHY PACKING									

	TECHNICAL SPECIFICATION FOR AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-425-142-N101	
		SECTION II	
		REV. NO. 00	DATE 18.05.18

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

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

DATA SHEET-B

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

POSITIONER	MFR. & MODEL NUMBER		
	BYPASS GAUGE	SENC. 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		
	HYSTERESIS		
Cu. Tubing & Fittings / per CV	25 Meters of 1/4 " PVC coated Cu. Tubing, with 1 set of Fittings for connection to IA Header on one end and accessories on another end of CV		
PAINTING	COLOUR/SHADE		
	THICKNESS (DFT)		
	TYPE		
			COMPANY SEAL
			NAME
			SIGNATURE
			DATE

	TITLE DATA SHEET - C STEAM DESUPERHEATER				SPEC. NO.: PE-TS-425-142-N101																																																																											
					SECTION-II																																																																											
	SHEET 1 OF 2																																																																															
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	TITLE DATA SHEET - C STEAM DESUPERHEATER		SPECIFICATION NO: PE-TS-425-142-N101			
			SECTION-II		PART -A	
			SHEET	2	OF	2
INSTRUCTIONS TO BIDDER 1. This data sheet shall be read in conjunction with specification No. PES - 148 - 01 Section - D, Volume - II B. 2. Items which deviate from specification shall be marked with an asterisk (*) 3. This data sheet shall be submitted alongwith bid.						
SL.NO.	ITEM	UNIT	PARTICULARS			
11.0	NUMBER OF SPRAY NOZZLE / TURNDOWN RATIO					
12.0	SPRAY WATER NOZZLE CHARACTERISTICS					
13.0	SIZE OF ORIFICE	MM				
14.0	MIN. VELOCITY ACCEPTABLE IN THE DESUPERHEATER PIPE	M/SEC				
15.0	END CONNECTIONS TYPE & SIZE					
15.1	DESUPERHEATER INLET / OUTLET					
15.2	SPRAY WATER INLET					
16.0	MATERIAL OF CONSTRUCTION					
16.1	BODY					
16.2	SPRAY NOZZLE					
17.0	OVERALL DIMENSIONS	MM				
18.0	WEIGHT OF DESUPERHEATER	KG				
19.0	MOUNTING RECOMMENDATIONS (IF ANY)					
20.0	DESIGN CODE					
21.0	HYDRAULIC TEST PRESSURE	KG/CM ² G				
Name of Bidder / Vendor			Project			
Revision Number	0	1	2	3	BIDDER'S SEAL	
Signature of Bidder / Vendor / Authorised Representative						
Date						



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

SPEC. NO.: PE-TS-425-142-N101

SECTION II

REV. NO. 00

DATE 18.05.18

SCHEDULE OF TECHNICAL DEVIATION/ CLARIFICATION

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