2 X 800 MW ADANI MAHAN

TECHNICAL SPECIFICATION

FOR

CONTROL VALVES
WITH ACCESSORIES (FDV-14)

SPECIFICATION No. PE-TS-504-145-H801A
REV NO. 00

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

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	PE-TS-504-145-H801A Rev. No. 00 Date : 19.07.2024

INDEX

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	PE-TS-504-145-H801A Rev. No. 00 Date : 19.07.2024

SCOPE OF THIS PACKAGE COVERS THE FOLLOWING:

SL.NO	PARAMETERS	REQUIREMENT
1	Supply Including Design, Engineering, Manufacturing Of	
a)	Main Supply	YES
b)	Commissioning Spares	YES
2	Painting	YES
3	Inspection & Testing	YES
4	Packing	YES
5	Transportation & Delivery To Site	YES
6	Erection & Commissioning	NO
7	Supervision of Erection & Commissioning	NO
8	Performance Guarantee (PG) Test	NO
9	Mandatory Spares	YES
10	O & M Service	NO
11	O & M Spares	NO

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GENERAL TECHNICAL REQUIREMENT

1.0	It is not the intent to specify herein all the details of design and manufacturing. 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 BHEL, who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.
2.0	Bidder shall also ensure that the offered equipment shall comply with all applicable statutory and regulatory requirements.
3.0	In the event of any conflict between the requirements of two clauses of this specification, documents or requirements of different codes and standards specified, the more stringent requirement as per the interpretation of the owner shall apply.
4.0	Drawing/document submission shall be through web based Document Management System(DMS) of BHEL. Bidder would be provided access to the DMS for drawing/document submission. Bidder to ensure internet connectivity of min speed of 2Mbps at their end.
5.0	Drawings/ documents submitted by vendor at any stage shall be complete in all respects. Any incomplete drawing submitted shall be treated as non- submission with delays attributable to vendor. For any clarification/ discussion required to complete the drawings, the bidder shall depute his personnel to BHEL / Customer's Office as per the requirement for across the table submission/ finalizations of drawings.
6.0	Latest codes and standards shall be complied.
7.0	Valve actuators and stems shall be adequate to handle the unbalanced forces occurring under the specified flow conditions or the maximum differential pressure specified. Min allowance of 0.15 Kg/sq.cm. per linear millimetre of seating surface for stem force shall be provided in the selection of the actuator.
8.0	Trim and body material has been specified in the respective data sheet. However, any substitute material if recommended by the manufacturer shall be either equivalent or superior to those specified and can be provided if found technically acceptable without any commercial and delivery impact.
9.0	In case bidder is not able to offer the required characteristics due to design considerations, modified Trim (Mod.EQ percentage or Mod. linear) can be offered subject to BHEL acceptance.
10.0	Bidder shall submit Quality Plan in the event of order based on the Quality Plan enclosed herein. QP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing shall be marked in the QP at the contract stage.
11.0	In case, the bidder is sourcing the item/any component from outside India, the third party inspection shall be arranged by bidder at their cost and shall be deemed to be considered by the bidder in their offer without any delivery impact.

12.0	Any change in valve size, percentage opening etc., if desired by BHEL / customer during approval of the documents after award of contract, within the gamut of tender specification, same shall be carried out by bidder without any commercial and delivery impact.
13.0	Sub vendor list is attached. Any additional sub - vendors proposed by bidder during contract stage shall be subject to BHEL/ Customer approval in the event of order without any commercial and delivery impact.
14.0	Mandatory Spares :
14.1	Wherever the quantities have been indicated for each type, size, thickness, material, radius, range etc., these shall cover all the items supplied and installed and the breakup for these shall be furnished in the bid. In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the mandatory spare list
14.2	Any item which is quoted as “not applicable” in the spare list and is found to be “applicable” at a later date shall be supplied by the Bidder without any commercial implications.
14.3	Each spare shall be clearly marked and labeled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.
15.0	Installation diagram for the control valve shall be as per drawings attached in Compliance drawings.
16.0	Nameplates shall be manufactured from stainless steel or aluminium with a matte or satin finish, and engraved with black lettering of a minimum 6 mm height or as per equipment standard whichever is higher
17.0	Document approval by BHEL / Customer shall not absolve the supplier of their contractual obligations of completing the work as per specification requirement without any commercial and delivery impact.
18.0	Equipment must be safe, reliable and easy to maintain at all operating conditions
19.0	1) Bidder to note that, wherever downstream side of the valve is subjected to the Vacuum service, bidder to offer double Gland packing, and in that case, flow direction of working fluid shall be to close the valve. Separate indication for the same has not been made in the data sheets-A. 2) Facility to adjust the maximum travel of the stem & starting point of travel shall be incorporated. 3) Valve Body Sizes shall be quoted to take care of the specification requirements like parameters, and limitations of Fluid outlet velocities, Noise Level etc. However, Port (Trim) Sizes shall be selected to suit CV requirement for achieving percentage valve lift as per Technical Specification

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	PE-TS-504-145-H801A Rev. No. 00 Date : 19.07.2024

20.0	Common for all Control Valve: The control valves shall be designed as per the latest version of the following codes/Standards :-	
1.0	Control Valve Sizing	ISA 75.01
2.0	Control Valve capacity Test	ISA 75.02
3.0	Pressure / Temperature Rating	ANSI-B16.34
4.0	Seat Leakage	FCI 70.2/ ANSI B 16.104
5.0	Noise	IEC 60534-4
6.0	End Connection: Butt Weld	ANSI B16.25
7.0	End Connection: Socket Weld	ANSI B16.11
8.0	End Connection: Flanged End	ANSI B16.5
9.0	End To End Tolerance	ANSI B16.10
10.0	Enclosure Rating	IEC-144/NEMA/IS-13947
21.0	Design conditions for Control valve, Actuator and accessories except for Smart positioner. Refer Smart Positioner specification for design conditions.	Continuous operation under an ambient temperature : 0-60°C, Relative Humidity : 0-95%.
22.0	Valve Selection Criteria :	
22.1	Valve Opening at maximum flow conditions	not greater than 80% of total Valve stem travel
22.2	Valve Opening at minimum flow conditions	not less than 10% of total Valve stem travel
22.3	Stem travel from minimum flow to maximum flow	not less than 50% of total Valve stem travel
22.4	Flow capability	120% of maximum flow
23.0	Trim requirement for cavitation / flashing service	Anticavitation Trim/ Hardened Trim
24.0	Bonnet joints type	Flanged and Bolt
25.0	Type of Bonnet when fluid temperature is greater than 280 deg. C	Extended Bonnets
26.0	Plug Type	Plug shall be of one-piece construction cast, forged or machined from solid bar stock, BALANCED type.
27.0	Plug connection with stem	Plug shall be screwed and pinned to valve stems or shall be integral with the valve stems
28.0	Control Valve Guide type	High lift cage guided plugs
29.0	Trim type	Quick-change

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	PE-TS-504-145-H801A Rev. No. 00 Date : 19.07.2024

30.0	Noise abatement method	The noise abatement shall be achieved by valve body and low noise trim design and not by use of silencers. In case the noise level is more than 85dBA, even with low noise trim design, diffusers shall be provided.
31.0	Flow action for vacuum application	Above the Seat
32.0	Control valve accessories shall be fitted on the valve actuator. Junction box shall be mounted on the valve actuator.	
33.0	FOR JB's: a) 20% Spare terminals shall be considered. b) Neoprene gasket of thickness 6mm shall be considered. c) Body and shield grounding shall be considered.	
34.0	The actuator shall be designed for 150% thrust required for the valve (at shut-off pressure) at an airline supply pressure of 5.5 Kg/Sq. cm. All the actuators shall be supplied mounted on the valve with all the accessories integrally mounted. Diaphragms shall be designed for 200% maximum operating pressure. Nylon reinforced neoprene shall be used as diaphragm material. Valve actuators shall be capable of operating at 80 Deg. C ambient, continuously. Entire actuator assembly shall be painted with corrosion inhibiting paint. Bidder shall indicate the stroking time of the valve assemblies with positioner. All actuators shall be of failsafe design signifying that the spring direction will tend to move the valve (open or close) in a direction safe for the process. “Failure to Open” or “Failure to Close” shall be marked on the actuator.	

	TECHNICAL SPECIFICATION CONTROL VALVES 2x800MW ADANI MAHAN	PE-TS-504-145-H104 Rev. No. 02 Date : 26.07.2024

TECHNICAL DATA SHEET - A

TAG NO:	FDV-14	QTY	1 per Unit			
SL.NO	**DESCRIPTION**	**UOM**	**DETAILS**			
1.0	**DESIGN CODES & STANDARDS**					
1.1	CODE / STANDARD		REFER GENERAL TECHNICAL REQUIREMENT			
2.0	**DESIGN /SYSTEM PARAMETERS**					
2.1	SERVICE		LOW LOAD FEED CONTROL			
2.2	LOCATION		INDOOR			
2.3	DUTY		MODULATING			
2.4	PIPE SIZE					
a	INLET (OD X THK)	MM	355.6 x 67			
b	OUTLET (OD X THK)	MM	355.6 x 67			
2.5	PIPE MATERIAL					
a	INLET		SA 106 GR C			
b	OUTLET		SA 106 GR C			
2.6	VACUUM SERVICE		NO			
2.7	ANTI CAVITATION TRIM		YES			
2.8	LEAKAGE CLASS		IV			
2.9	NOISE LEVEL	dBA	<85			
2.10	VALVE OUTLET VELOCITY	M/SEC	< 7 M/SEC(WATER)			
2.11	SERVICE CONDITIONS		FLOW (T/HR)	INLET PR KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG. C
2.11.1	5% MCR (MIN.SPEED)		122	165	12	111
2.11.2	15% MCR		366	160	32	138
2.11.3	30% MCR		721	155	145	138
2.11.4	CHECK CASE		1000	140	20	111
2.11.5	MAX SHUT OFF PRESSURE ,TEMP (DEG C)	KG/CM2 (g)	525			
2.11.6	BODY DESIGN PRESSURE	KG/CM2 (g)	525			
2.11.7	DESIGN TEMPERATURE	DEG C	200			
2.12	IBR FORM-IIIC		REQUIRED			
2.13	PROCESS CONDITION		CAVITATION & HIGH DP			
3.0	**CONSTRUCTION FEATURES**					
3.1	VALVE BODY TYPE		GLOBE			
3.2	GUIDE		CAGE			
3.3	NO. OF PORTS		ONE			
3.4	TRIM FORM		EQ %			
3.5	PACKING	NOS	SINGLE			
3.6	PACKING TYPE					
3.7	END CONNECTION		BWE			
3.8	BONNET TYPE					
3.9	MATERIAL OF CONSTRUCTION					
a	VALVE BODY		A217WC9			
b	CAGE		17-4 PH SS			
c	GUIDE BUSH		17-4 PH SS			
d	PACKING		GRAFOIL			
e	PLUG		17-4 PH SS			
f	STEM		SS 316 STELLITED			
g	SEAT		17-4 PH SS			
h	YOKE		CARBON STEEL			
3.10	ACTUATOR TYPE					
a	TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN		LESS THAN 10 SEC,			
b	VALVE POSN. ON: ELECTRICAL SIGNAL FAILURE		TO OPEN			
c	VALVE POSN. ON: SUPPLY AIR FAILURE		STAYPUT			
3.11	SMART POSITIONER		REQUIRED			
a	POSITION TRANSMITTER		PART OF SMART POSITIONER			
b	E/P CONVERTER		PART OF SMART POSITIONER			
3.12	POSITION LIMIT SWITCH		REQUIRED			
3.13	AIR FILTER REGULATOR		REQUIRED			
3.14	AIR LOCK RELAY		REQUIRED			
3.15	SOLENOID VALVE		NOT REQUIRED			
3.16	JUNCTION BOX		REQUIRED			
3.17	HAND WHEEL (SIDE MOUNTED)		REQUIRED			
3.18	LOCAL POSITIONER INDICATOR		REQUIRED			
4.0	**PERFORMANCE PARAMETERS**					
4.1	LINEARITY		+/- 1%			
4.2	HYSTERESIS		+/- 1%			
4.3	SENSITIVITY		+/- 0.5%			
4.4	OVERALL ACCURACY		+/- 2%			
5.0	**INSPECTION/TESTING**		AS PER APPROVED QAP			

	TECHNICAL SPECIFICATION CONTROL VALVES 2x800MW ADANI MAHAN	PE-TS-504-145-H104 Rev. No. 02 Date : 26.07.2024

TECHNICAL DATA SHEET FOR CONTROL VALVE ACCESSORIES

SL.NO	CONTROL VALVE ACCESSORIES	DETAILS
1.0	**AIR FILTER REGULATOR/AIR SET**	
1.1	MATERIAL	SINTERED BRONZE
1.2	FILTER SIZE	5 MICRON
1.3	AIR SUPPLY PRESSURE (KG/CM2)	5.0 - 8.0
1.4	OUTPUT GAUGE	REQUIRED
1.5	AUTO DRAIN FEATURE	REQUIRED
2.0	**AIR LOCK**	
2.1	SET PRESSURE (KG/CM2)	BY BIDDER
2.2	AIR SUPPLY PRESSURE (KG/CM2)	5.0 - 8.0
2.3	RESET TYPE	AUTO
2.4	VENT PLUG	REQUIRED
3.0	**LIMIT SWITCH**	
3.1	LIMIT SWITCH POSITION	OPEN AND CLOSE
3.2	CONTACT TYPE	SPDT 2 NO + 2 NC
3.3	ENCLOSURE CLASS	IP-65
3.4	CONTACT RATING	5A 240V AC AND 0.5A 220V DC
4.0	**SOLENOID VALVE**	
4.1	SOV BODY MATERIAL	SS Bar Stock
4.2	OPERATION	INTERLOCK
4.3	VOLTAGE	24 V DC
4.4	TYPE	3 WAY (UNIVERSAL OPERATION TYPE)
4.5	COIL INSULATION CLASS	H
4.6	ENCLOSURE CLASS	IP-65
5.0	**JUNCTION BOX**	
5.1	MATERIAL	3 mm Sheet steel
5.2	NO OF WAYS	AS REQUIRED
5.3	ENCLOSURE CLASS	IP-65
5.4	CABLE GLAND TYPE	DOUBLE COMPRESSION TYPE
5.5	CABLE GLAND MATERIAL	Brass
5.6	CABLE GLAND QUANTITY (PER CV)	FOUR
5.7	TERMINAL BLOCK TYPE	CAGE CLAMP
6.0	**TUBING (ADDITIONAL TO INTEGRAL TUBING OF CONTROL VALVE ASSEMBLY)**	REFER NOTE - 9 OF HOOK UP DIAGRAM
7.0	**FITTINGS**	REFER NOTE - 9 OF HOOK UP DIAGRAM
8.0	**EXPANDER / REDUCER**	REFER NOTE - 11&12 OF HOOK UP DIAGRAM
9.0	**VALVE DIAGNOSTIC AND CONFIGURATION SOFTWARE**	REQUIRED

	TECHNICAL SPECIFICATION CONTROL VALVES 2x800MW ADANI MAHAN	PE-TS-504-145-H104 Rev. No. 02 Date : 26.07.2024

SPECIFICATIONS FOR MICROPROCESSOR BASED SMART POSITIONER

SL.NO	AREA	DESCRIPTION	DETAILS
1	Electrical	a) Input Demand Signal	4-20 mA for HART compatible
		b) Power Supply	Loop Powered from the output card of Control System.
		c) HART Protocol	Compatibility for Remote Calibration & Diagnostics (Super-imposed HART signal on input Signal 4-20 mA.)
		d. Valve position sensing	4-20 mA output signal for HART compatible
2	Environment	a) Operating temp.	(-)30 To 80 Deg. C
		b) Humidity	0-95 %
		c) Protection class	IP-65 Minimum
3	Software for Configuration and Diagnostics	Software	Software shall meet the requirements for Configuration, Diagnostics, Calibration and Testing of the actuator.
		Diagnostic/Test features	Advanced diagnostic features like Stroke counter or Travel counter, Leakage in actuators, Valve Signature analysis, Air Supply Failure, Step Response test, Valve friction /Jamming detection etc to be provided.
4	Test reports/ Certificates		Factory Valve Signature Tests Reports (Pr Vs Valve travel and Travel Vs I/P signal)
			Test certificates as per approved QAP
5	Configuration/ Calibration.		Remote & Local Calibration with Auto & Manual feature shall be provided.
6	Operating Range	Full range	
7	Modes	Valve Action	Direct / Reverse
		Flow Characterization	Possible to fit Valve Characteristic Curves based on Control valve data sheet
8	Fail Safe/Fail Freeze		Fail Safe/Fail Freeze feature is to be provided as per valve positioning on signal failure as per control valve data sheet
9	Pneumatic	Air capacity	Sufficient to handle the valves & actuators selected/ Boosters to be supplied, if required.
		Air pressure	To suit the air supply pressure (maximum 7 kg/sqcm) /quality available.
		Process connection	As per Hook Diagram
10	Performance	Characteristic deviation	<=0.5 % of span.
		Ambient temp effect	<=0.01 %/ deg C or better.
11	EMC & CE Compliance	Required to International Standard like EN/IEC.	EN50081-2 & EN50082 or equivalent.
12	Accessories	In-built Operator Panel	Display with push buttons for configuration and display on the positioner itself (Password protected/Hardware lock).
		Hand Held Hart Calibrator	Positioner shall be compatible with Universal HART Calibrator to be provided
		Press Gauge Block	Two/Three based on Single/Double acting actuator
		Electrical Cable Entry	1/2'"NPT, side or bottom entry to avoid water ingress
		Mounting	On actuator body

	TECHNICAL SPECIFICATION CONTROL VALVES 2x800MW ADANI MAHAN	PE-TS-504-145-H104 Rev. No. 02 Date : 26.07.2024

LIST OF MANDATORY SPARES FOR CONTROL VALVE

S No.	DESCRIPTIONS	QTY FOR STATION
1	**Control Valve**	
1.1	Pneumatic Diaphragm for Diaphragm actuated valve**	2(two) nos. for each type of Actuator
1.2	Actuator Seal Kit for Pneumatic Cylinder actuated valve	2(two) nos. for each type of Actuator
1.3	Gland Packing	1(one) set for each type of Control Valve
1.4	Plug, Seat, Cage, Stem etc.	1(one) set for each type of Control Valve
1.5	Retainer Ring, Seal Ring etc.	1(one) set for each type of Control Valve
1.6	Gasket	2(two) Sets. for each type of Control Valve
2	**Common Items for Control Valve & Power Cylinder**	
2.1	Control Valve/Power Cylinder Positioner complete Set	10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.
2.2	Complete Set of Solenoid Valve for Pneumatic type On/Off Valve/Power Cylinder	2Nos. for each type & ratings
2.3	Position Limit Switch for Pneumatic type On/Off Valve/Power Cylinder	10Nos. for each type & ratings
2.4	Air Lock Relay	10Nos. for each type
2.5	Signal Air Booster Unit	2Nos. for each type

Note** - Equivalent Item applicable for selected Actuator type shall be provided.

FORM NO. PEM-6666-0

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	SPECIFICATION NO. **PE-TS-504-145-H801A** REV NO. 00 DATE: 19.07.2024

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

DATA SHEET B

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

GENERAL*	PROJECT	
	SERVICE	
	LOCATION	
	DUTY	
	PIPE SIZE (inlet / outlet)	
	PIPE MATERIAL (inlet / outlet)	
BODY	MODEL NUMBER	
	TYPE OF BODY : GUIDING : NO. OF PORTS	
	BODY SIZE : PORT SIZE : DESIGN CV	
	END CONNECTION & RATING (ANSI)	
	BODY MATERIAL	
	PACKING MATERIAL SINGLE / DOUBLE	
	BONNET TYPE	
	TRIM FORM	
	TRIM MATERIAL : SEAT | PLUG	
	TRIM MATERIAL : CAGE | GUIDE	
	FLOW	
	OUTLET VELOCITY	
	REQUIRED LEAKAGE CLASS	
	NOISE LEVEL (dBA)	
	VACUUM SERVICE	
	ANTI CAVITATION TRIM	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	
	CLOSE AT : OPEN AT (Kg / Cm^2g)	
	*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN	
	*VALVE POSN. ON SIGNAL AIR FAILURE	
	*VALVE POSN. ON SUPPLY AIR FAILURE	
ACCESSORIES	POSITIONER(SMART)	
	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	

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	SPECIFICATION NO. **PE-TS-504-145-H801A**
		REV NO. 00
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DATA SHEET B

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(TO BE FILLED BY THE BIDDER AFTER THE AWARD OF CONTRACT)

PERFORMANCE OF VALVE	HYSTERSIS								
	LINEARITY								
	SENSITIVITY								
	ACCURACY (Overall)								
SERVICE CONDITION*	**SL.+ NO.**	**LOAD**	**FLOW (T/HR)**	**INLET PR. (KG/CM² (A)**	**OUTLET PR. (KG/CM² (A)**	**TEMP DEG. C**	**CALCULATED CV**	**% VALVE LIFT**	**VALVE O/L VELOCITY**
	VALVE TYPE								
	* MAX SHUT OFF PRESS (**(KG/CM²g)**								
	* BODY DESIGN : PRESS (**(KG/CM²g)**			**| TEMP (DEG. C)**					
	* IBR FORM III-C								
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.									

FORM NO. PEM-6666-0

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	SPECIFICATION NO. **PE-TS-504-145-H801A** REV NO. 00 DATE: 19.07.2024

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

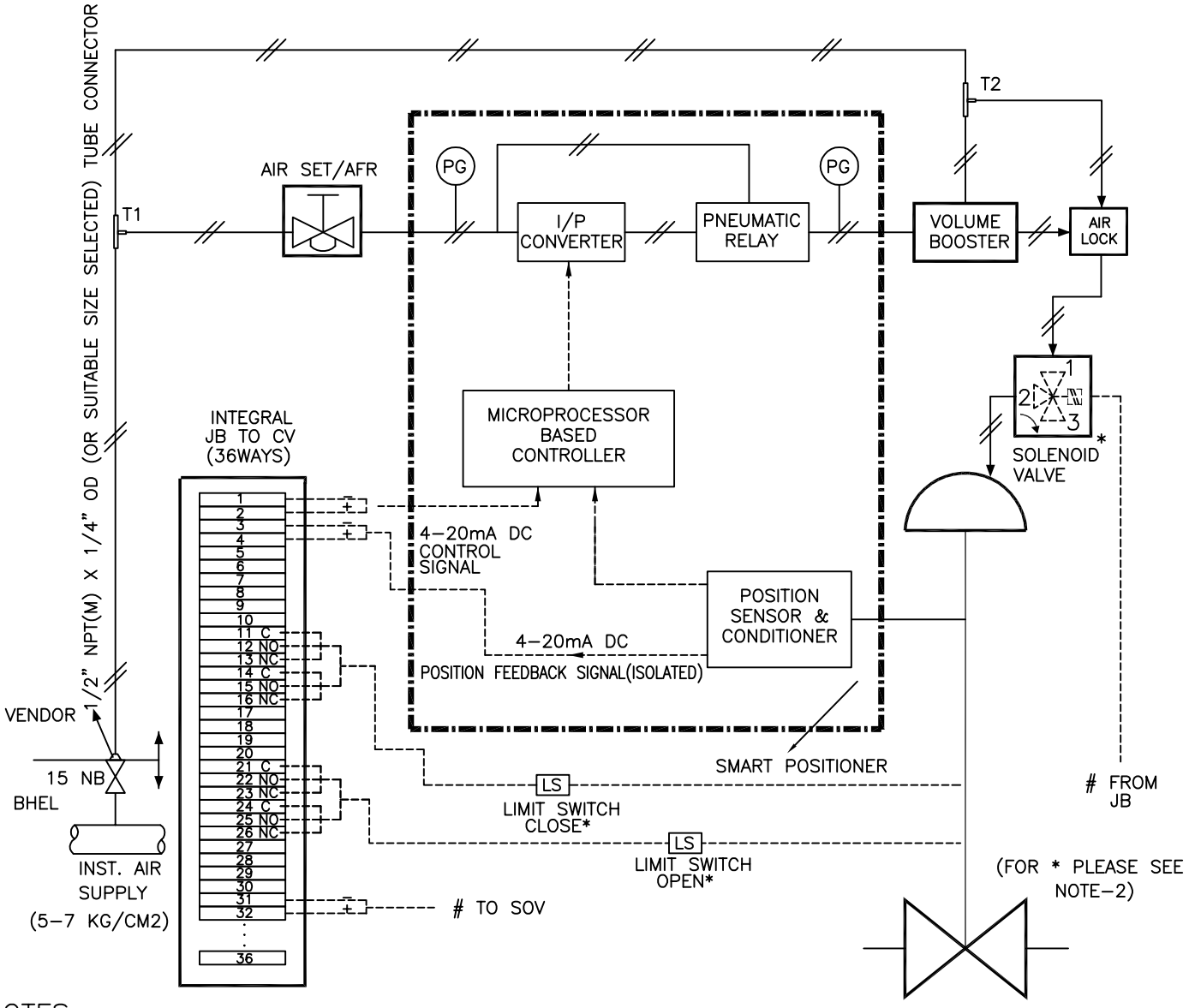
DATA SHEET B FOR ACCESSORIES

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

POSITIONER	MFR. & MODEL NUMBER			
	BYPASS	GAUGES	ENCL. CLASS	
	INPUT SIGNAL (Kg / Cm^2)			
	OUTPUT SIGNAL (Kg / Cm^2)			
AIR FILTER REGULATOR	MFR. & MODEL NUMBER			
	AIR SUPPLY PRESS (Kg / Cm^2 g)			
	OUTPUT PRESS (Kg / Cm^2 g)			
	OUTPUT GAUGE			
	FILTER SIZE			
	AUTO DRAIN FEATURE			
AIR LOCK	MFR. & MODEL NUMBER			
	SET PRESS (Kg / Cm^2)			
	SUPPLY PRESS (Kg / Cm^2)			
	RESET TYPE			
	VENT PLUG			
LIMIT SWITCH	MFR. & MODEL NUMBER			
	OPEN posn	INT posn	CLOSE posn	
	CONTACT TYPE			
	RATING (AC / DC)			
	ENCLOSURE CLASS			
POSITION TRANSMITTER	MFR. & MODEL NUMBER			
	TYPE			
	SUPPLY			
	OUTPUT RATING			
	ACCURACY			
	ENCLOSURE CLASS			
SOLENOID VALVE	MFR. & MODEL NUMBER			
	RATING			
	OPERATION	QUANTITY		
	COIL INSULATION CLASS			
	ENCLOSURE CLASS			
HANDWHEEL	ORIENTATION			
JUNCTION BOX	NO. OF WAYS			
	SIZE			
	CABLE GLANDS (Size / Quantity)			
	ENCLOSURE CLASS			
	BODY MATERIAL			
I/P CONVERTER	INPUT SIGNAL	POWER SUPPLY		
	SPLIT RANGE			
	ENCLOSURE CLASS			
	LINEARITY			
	HYSTERISIS			
Cu./SS Tubing & Fittings / per CV	12 Meters of ¼ " PVC coated SS Tubing, with 1 set of Fittings for each CV for connection to IA Header on one end and accessories on another end of CV.			
PAINTING	**COLOUR/SHADE**			
	THICKNESS (DFT)			
	TYPE			

COMPANY SEAL
NAME
SIGNATURE
DATE

CONTROL VALVE HOOK-UP DIAGRAM
(WITH SMART POSITIONER)

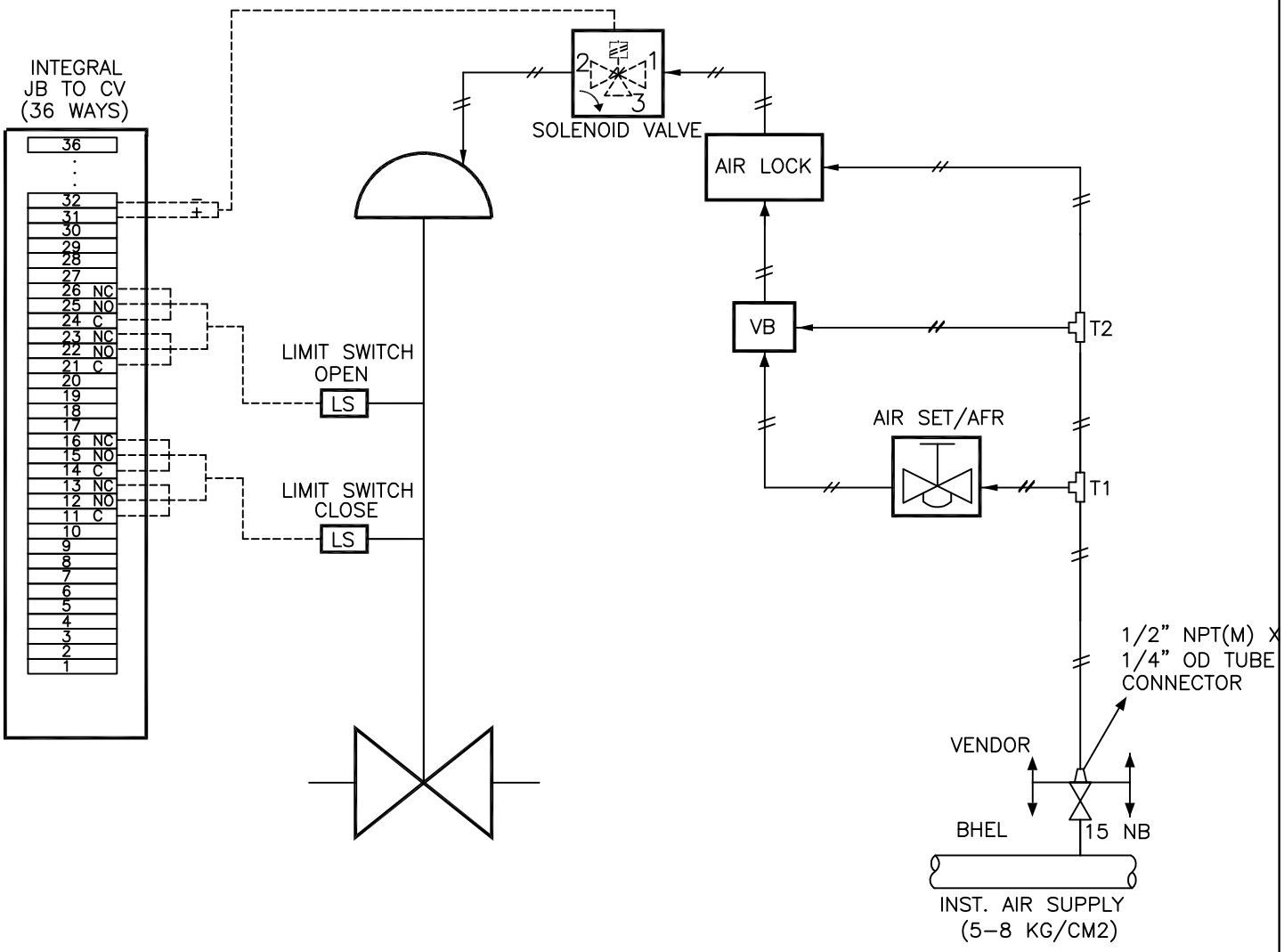


NOTES :-

1. POSITION OF EACH VALVE ON SUPPLY AIR FAILURE / ELECTRICAL SIGNAL FAILURE SHALL BE AS PER SPECIFICATION / DATA SHEET.
2. SOLENOID VALVE & LIMIT SWITCHES WILL BE PROVIDED ONLY FOR CONTROL VALVES IF INDICATED IN RESPECTIVE DATA SHEETS.
3. SOLENOID VALVES PORTS CONDITION:
   PORT 1 AND 2 SHALL BE CONNECTED UNDER DE-ENERGISED CONDITION.
   PORT 2 AND 3 SHALL BE CONNECTED UNDER ENERGISED CONDITION.
4. PRESSURE GAUGES REQUIRED FOR AIR SUPPLY AT INLET AND OUTLET OF SMART POSITIONERS.
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. TUBING AND FITTINGS TO BE PROVIDED AS FOLLOWS:-
   (a) TUBING: MATERIAL- SS316; SIZE- 1/4" OR SUITABLE SIZE SELECTED FOR EACH CONTROL VALVE ASSEMBLY; LENGTH- 12 METER PER CV.
   (b) FITTINGS: MATERIAL- SS,DOUBLE COMPRESSION TYPE; TUBE CONNECTOR- 1/2" NPT(M) X 1/4" OR SUITABLE SIZE SELECTED FOR EACH CONTROL VALVE ASSEMBLY; FITTINGS FOR CONNECTION TO AIR FILTER REGULATOR,AIR LOCK RELAY,IA HEADER ISOLATION VALVE AND EQUAL TEES.
10. VOLUME BOOSTER/DUMP VALVE AND ITS RELATED TUBING & CONNECTORS SHALL BE PROVIDED, IF REQUIRED TO ACHIEVE THE DESIRED TRAVEL TIME (<10Sec). AIR CONNECTION TO VOLUME BOOSTER/DUMP VALVE SHALL ALSO BE PROVIDED.
11. EXPANDER/REDUCER BETWEEN VALVE BODY AND PIPE SHALL BE SUPPLIED BY BHEL.
12. EXPANDER/REDUCER BETWEEN VALVE BODY AND DIFFUSER/CARTRIDGE/SILENCER(IF APPLICABLE) SHALL BE SUPPLIED BY BIDDER.

BHEL	**2 X 800 MW ADANI MAHAN**	DRG. No. PE-TS-504-145-H104
	TITLE:- CONTROL VALVE HOOK-UP DIAGRAM	

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



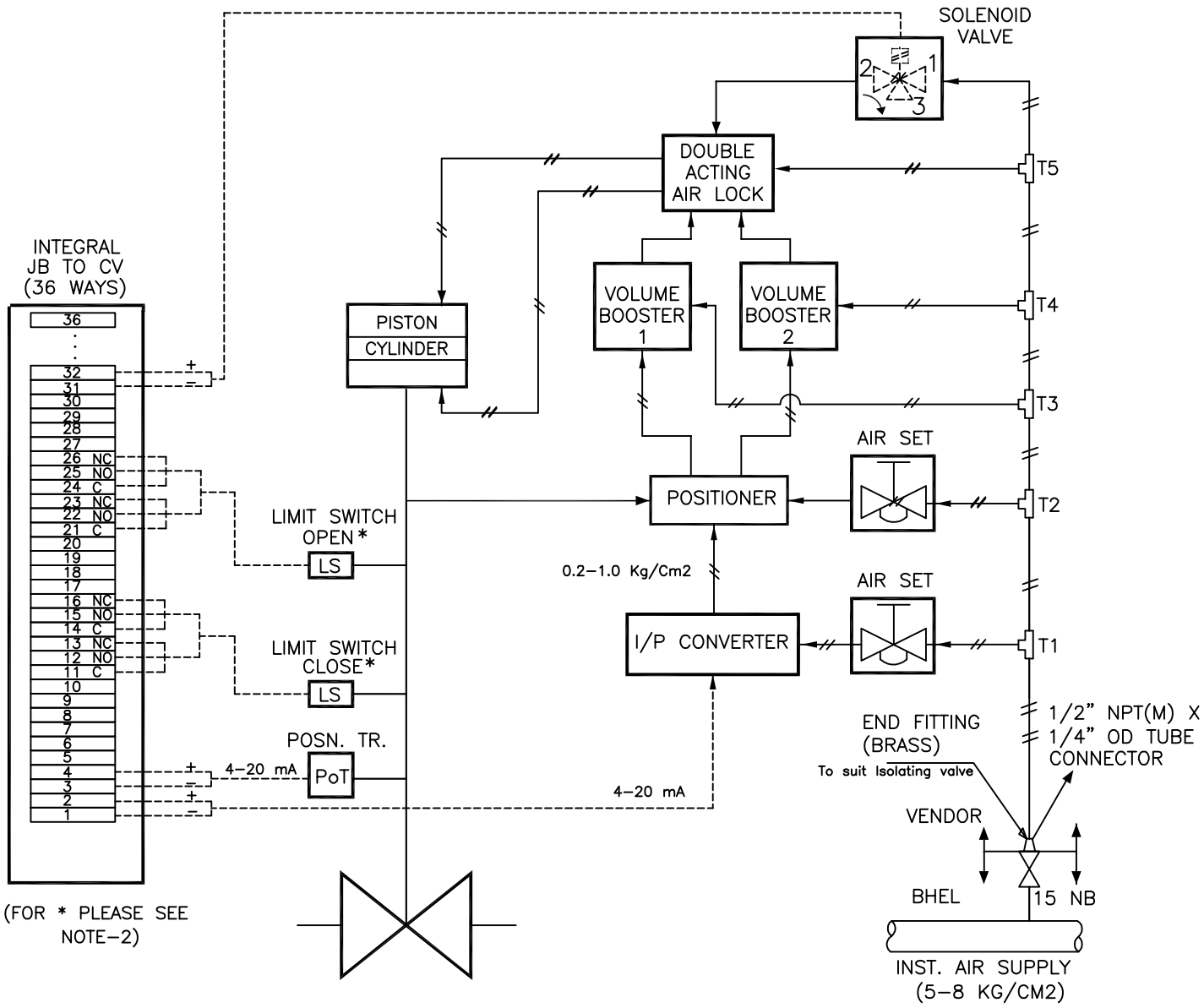
NOTES :–

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

BHEL	2 X 800 MW ADANI MAHAN	DRG. No.	PE–TS–504–145–H104	
	TITLE:– CONTROL VALVE HOOK–UP DIAGRAM	REV. No.		DATE
		SHEET	Page 16 of 33	

506927/2024/PS-PEM-S&CE

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



NOTES :–

1. POSITION OF EACH VALVE ON SUPPLY AIR FAILURE / SIGNAL AIR FAILURE SHALL BE AS PER SPECIFICATION / DATA SHEET. AIR LOCK SHALL BE PROVIDED ACCORDINGLY.
2. SOLENOID VALVE & LIMIT SWITCHES WILL BE PROVIDED ONLY FOR CONTROL VALVES IF INDICATED IN RESPECTIVE DATA SHEETS.
3. SOLENOID VALVES PORTS CONDITION:
   PORT 1 AND 2 SHALL BE CONNECTED UNDER DE–ENERGISED CONDITION.
   PORT 2 AND 3 SHALL BE CONNECTED UNDER ENERGISED CONDITION.
4. PRESSURE GAUGES REQUIRED FOR AIR SUPPLY & OUTPUT(S).
5. MOUNTING ACCESSORIES AS REQUIRED.
6. POSITION FEEDBACK SIGNAL SHALL BE 2 WIRE 4–20mA ISOLATED SIGNAL.
7. JB TERMINALS SHALL BE CAGE CLAMP TYPE SUITABLE FOR 2.5 SQ. MM COPPER WIRE. EXTERNAL CONNECTION, OF PLUG IN TYPE OR THROUGH CABLE GLAND, SHALL BE AS PER DATA SHEET.
8. ALL APPLICABLE ACCESSORIES SHALL BE PROVIDED AS INDICATED IN THE INDIVIDUAL CONTROL VALVE DATA SHEET / ACCESSORIES DATA SHEET.
9. 12 METERS I/4" PVC COATED COPPER / SS TUBING (AS PER ACCESSORIES DATA SHEET) & 1 SET OF FITTINGS TO BE SUPPLIED FOR EACH CONTROL VALVE FOR CONNECTION TO ISO VLV AT INST AIR HEADER ON ONE END AND TO AIR LOCK RELAY/AIR FILTER REGULATOR ON THE OTHER END. ALL THE BRASS / SS FITTINGS SHALL BE DOUBLE COMPRESSION TYPE.
10. VOLUME BOOSTER (ALONG WITH TEE–T3 AND RELATED TUBING & CONNECTORS) SHALL BE PROVIDED TO MEET STROKING TIME IF REQUIRED. AIR CONNECTION TO VOLUME BOOSTER FROM TEE–T3&T4 AND POSITION SENSOR SHALL BE PROVIDED.

BHEL	**2 X 800 MW ADANI MAHAN**	DRG. No. **PE–TS–504–145–H104**
	TITLE:– CONTROL VALVE HOOK–UP DIAGRAM	

506927/2024/PS-PEM-S&CE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANADARD QUALITY PLAN		SPEC. NO : --	DATE: --
	CUSTOMER :-- ADANI MAHAN ENERGEN LIMITED (MEL)		QP NO.: PE-QP-504-145-H 006 REV 03	DATE: 29.07.2024
	PROJECT: -- 2x800MW ULTRA SUPER CRITICAL THERMAL POWER PROJECT MAHAN (PH-II) SINGRAULI, MP		PO NO.: --	DATE: --
	ITEM: CONTROL VALVE	SYSTEM: S&CE		SHEET 1 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	B/C				D	M	B	C	
1	2	3	4	5	6		7	8	9		**			

1.0	**RAW MATERIAL**													
1.1	Body & Bonnet castings/forgings,plug,valve stem, seat ring/cage	Physical, Chemical properties	MA	Physical, Chemical tests	100%	10%	Approved drg/ datasheet	Approved drg/data sheet	Test Certificate	√	P/ W	V	V	
		Heat Treatment	MA	Review of H.T. Certificate	100%	10%	Approved drg/ datasheet	Approved drg/data sheet	Test Certificate	√	P/ W	V	V	1. Applicable for body /bonnet only 2. IBR certificate(if applicable) to be verified.
		Internal quality of castings/forgings	MA	RT for Body & UT for Bonnet	100%	10%	ASME B 16.34	ASME B 16.34	Test Report/ Film	√	P/ W	V	V	Applicable for body and bonnet for rating ANSI 600 and above.
		Surface Quality	MA	1.Visual	100%	10%	ANSI/ MSS-SP-55	ANSI/ MSS-SP-55	Inspection Report	√	P/ W	V	V	Applicable for body/bonnet only.
		Pressure Test for shell	MA	Hyd. Test	100%	10%	ISA-S-75.19	ISA-S-75.19	Inspection Report	√	P/ W	V	V	For Body and Bonnet after machining.

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Name	Sign & Date		Name	Sign & Date	Seal			Name	Sign & Date	Seal
Prepared by:	SWETANA SINGH		Checked by:	SUMAN NAKWAL				Reviewed by:			
Reviewed by:	PRIYANKA		Reviewed by:	HARISH KUMAR				Approved by:			
Approved by:	MAYANK KESHARWANI										

506927/2024/PS-PEM-S&CE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANADARD QUALITY PLAN	SPEC. NO : --	DATE: --
	CUSTOMER :-- ADANI MAHAN ENERGEN LIMITED (MEL)	QP NO.: PE-QP-504-145-H 006 REV 03	DATE: 29.07.2024
	PROJECT: -- 2x800MW ULTRA SUPER CRITICAL THERMAL POWER PROJECT MAHAN (PH-II) SINGRAULI, MP	PO NO.: --	DATE: --
	ITEM: CONTROL VALVE / SYSTEM: S&CE		SHEET 2 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	**			AGENCY
					M	B/C				D	M	B	C	
1	2	3	4	5	6		7	8	9					
1.2	Diaphragm	Surface Quality	MA	Visual	100%	10%	Mfr. standard	COC./Test Certificate	COC/Test Certificate	√	P/ V	V	V	
		Hardness	MA	Measurement	100%	10%	Mfr. standard	COC/Test Certificate	COC/ Test Certificate	√	P/ V	V	V	
		Endurance/ Life cycle	MA	Cyclic Test 10,000 cycles	One/ type	One/ type	Mfr. standard	No damage	COC/Test Certificate	√	P/ V	V	V	
1.3	Spring	Composition	MA	Chemical-Analysis	One Sample/ Heat	One Sample/ Heat	Mfr. Standard	COC/Test Certificate	COC/Test Certificate	√	P/ V	V	V	
		Mech. Properties	MA	Mech. Test	One Sample/ Heat	One Sample/ Heat	Mfr. Standard	COC/Test Certificate	COC/Test Certificate	√	P/ V	V	V	
		Performance	MA	1.Stiffness Ratio	100%	10%	Mfr. standard	COC/Test Certificate	COC/Test Certificate	√	P/ V	V	V	
				2.Scragging	100%	10%	Mfr. standard	COC/Test Certificate	COC/Test Certificate	√	P/ V	V	V	
				3.Cyclic Test (Endurance)	One/ type	One/ type	Mfr. standard	COC/Test Certificate	COC/Test Certificate	√	P/ V	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
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	Name	Sign & Date		Name	Sign & Date	Seal			Name	Sign & Date	Seal
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506927/2024/PS-PEM-S&CE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANADARD QUALITY PLAN	SPEC. NO : --	DATE: --
	CUSTOMER :-- ADANI MAHAN ENERGEN LIMITED (MEL)	QP NO.: PE-QP-504-145-H 006 REV 03	DATE: 29.07.2024
	PROJECT: -- 2x800MW ULTRA SUPER CRITICAL THERMAL POWER PROJECT MAHAN (PH-II) SINGRAULI, MP	PO NO.: --	DATE: --
	ITEM: CONTROL VALVE / SYSTEM: S&CE		SHEET 3 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	**			REMARKS
					M	B/C				D	M	B	C	
1	2	3	4	5	6		7	8	9					
				4. Dimension (Measurement)	One sample/ Lot	One sample /Lot	Mfr. Standard	COC/Test Certificate	COC/Test Certificate	√	P/ V	V		
2.0	**IN PROCESS INSPECTION**													
2.1	After machining, i, Body ii Bonnet iii Plug iv Valve Stem v seat ring vi cage	Surface flaws	MA	Visual & MT/PT	100% (on accessible surfaces)	10%	ASME B 16.34	ASME B 16.34	Inspection Report	√	P/ W	V		Butt weld ends shall be included.
		Dimensional checks	MA	Measurement	100%	10%	Appd Drg.	Appd Drg.	Inspection Report	√	P/ W	V		
		Hard Facing (wherever applicable)	MA	Hardness Measurement	One sample/ Lot	One sample /Lot	Appd Datasheet	Appd Datasheet	Inspection Report	√	P/ W	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Name	Sign & Date		Name	Sign & Date	Seal			Name	Sign & Date	Seal
Prepared by:	SWETANA SINGH		Checked by:	SUMAN NAKWAL				Reviewed by:			
Reviewed by:	PRIYANKA		Reviewed by:	HARISH KUMAR				Approved by:			
Approved by:	MAYANK KESHARWANI										

506927/2024/PS-PEM-S&CE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANADARD QUALITY PLAN	SPEC. NO : --	DATE: --
	CUSTOMER :-- ADANI MAHAN ENERGEN LIMITED (MEL)	QP NO.: PE-QP-504-145-H 006 REV 03	DATE: 29.07.2024
	PROJECT: -- 2x800MW ULTRA SUPER CRITICAL THERMAL POWER PROJECT MAHAN (PH-II) SINGRAULI, MP	PO NO.: --	DATE: --
	ITEM: CONTROL VALVE / SYSTEM: S&CE		SHEET 4 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	**			REMARKS
					M	B/C				D	M	B	C	
1	2	3	4	5	6		7	8	9					

FINAL TESTING/INSPECTION															
3.0	**TESTS ON COMPLETED VALVE**														
3.1	Actuator Chamber	Leakage	MA	Pneumatic Test	100%	~~10%~~ $	Mfr. standard	No Leakage	Test Certificate	√	P/ W	W	W	$Refer Sampling Plan
3.2	Body	Leakage (Body Mount Leakage)	MA	Hydro Test	100%	~~10%~~ $	ISA-S-75.19/	No Leakage	Test Certificate	√	P/ W	W	W	
3.3	Seat Leakage	Seat Leakage	MA	Pneumatic / WaterTest	100%	~~10%~~ $	FCI-70.2	Approved Datasheet	Test Certificate	√	P/ W	W	W	
4.0	**OPERATION TEST ON COMPLETED VALVE ASSEMBLY**	Valve Travel	MA	Measurement	100%	10%	Approved datasheet	Approved Datasheet	Inspection Report	√	P/ W	W	W	
		Opening / Closing Time	MA	Measurement	100%	10%	Approved datasheet	Approved Datasheet	Inspection Report	√	P/ W	W	W	
		Linearity / Cam characteristic	MA	Measurement	100%	10%	Approved datasheet	Approved Datasheet	Inspection Report	√	P/ W	W	W	
		Repeatability	MA	Measurement	100%	10%	Approved datasheet	Approved Datasheet	Inspection Report	√	P/ W	W	W	
		Hysterisis	MA	Measurement	100%	10%	Approved datasheet	Approved Datasheet	Inspection Report	√	P/ W	W	W	
		Sensitivity	MA	Measurement	100%	10%	Approved datasheet	Approved Datasheet	Inspection Report	√	P/ W	W	W	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Name	Sign & Date		Name	Sign & Date	Seal			Name	Sign & Date	Seal
Prepared by:	SWETANA SINGH		Checked by:	SUMAN NAKWAL				Reviewed by:			
Reviewed by:	PRIYANKA		Reviewed by:	HARISH KUMAR				Approved by:			
Approved by:	MAYANK KESHARWANI										

506927/2024/PS-PEM-S&CE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANADARD QUALITY PLAN	SPEC. NO : --	DATE: --
	CUSTOMER :-- ADANI MAHAN ENERGEN LIMITED (MEL)	QP NO.: PE-QP-504-145-H 006 REV 03	DATE: 29.07.2024
	PROJECT: -- 2x800MW ULTRA SUPER CRITICAL THERMAL POWER PROJECT MAHAN (PH-II) SINGRAULI, MP	PO NO.: --	DATE: --
	ITEM: CONTROL VALVE / SYSTEM: S&CE		SHEET 5 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	**			REMARKS
					M	B/C				D	M	B	C	
1	2	3	4	5	6		7	8	9					
		Accuracy(Overall)	MA	Measurement	100%	10%	Approved datasheet	Approved Datasheet	Inspection Report					
		Control Valve characteristics / CV Test	MA	Measurement (Press. vs. discharge and discharge vs opening 0-100% in steps of 10%)	One per type	One per type	Mfr. Procedure	Approved Datasheet	Test Certificate	√	P/ W	V	V	
		Operation of limit switch & solenoids and other accessories	MA	Function	100%	10%	Mfr. Procedure	Approved Datasheet	Inspection Report	√	P/ W	W	W	On assembled Valve.
		Overall dimensions	MI	Visual and dimensional	100%	10%	Approved drg	Approved drg	Inspection Report	√	P/ W	W	W	
		Pre-defined valve position in case of air / signal failure	MI	Visual and dimensional	100%	10%	Approved data sheet	Approved data sheet	Inspection Report	√	P/ W	W	W	
		Stamping (for direction of flow), Tag No.	MA	Visual	100%	10%	Approved drg /datasheet	Approved drg /datasheet	Test Certificate	√	P/ W	W	W	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
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Prepared by:	SWETANA SINGH		Checked by:	SUMAN NAKWAL				Reviewed by:			
Reviewed by:	PRIYANKA		Reviewed by:	HARISH KUMAR				Approved by:			
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506927/2024/PS-PEM-S&CE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANADARD QUALITY PLAN	SPEC. NO : --	DATE: --
	CUSTOMER :-- ADANI MAHAN ENERGEN LIMITED (MEL)	QP NO.: PE-QP-504-145-H 006 REV 03	DATE: 29.07.2024
	PROJECT: -- 2x800MW ULTRA SUPER CRITICAL THERMAL POWER PROJECT MAHAN (PH-II) SINGRAULI, MP	PO NO.: --	DATE: --
	ITEM: CONTROL VALVE / SYSTEM: S&CE		SHEET 6 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	B/C				D	M	B	C	
1	2	3	4	5	6		7	8	9		**			

5.0	AUXILIARY ITEMS(Performance test of auxiliary items shall be performed on the completely assembled valve) – Refer NOTE-3													
5.1	Air Filter Regulator	Performance Test	MA	Measurement	Each type	Each type	Mfr. Standard	No leakage	--	√	P/ V	V	V	
		Overall leakage	MA	Visual(soap solution)	100 %	10%	Mfr. Standard	No leakage	--	√	P/ V	V	V	
5.2	Air lock relay	Performance Test	MA	Leakage test	100%	10%	Mfr. Standard	No leakage	--	√	P/ V	V	V	
5.3	Smart Positioner	Physical Verification Make/Model	MA	Visual	100%	10%	Approved drg/ datasheet	Approved drg/ datasheet	--	√	P/ V	V	V	
		Degree of Protection	MA	IP/NEMA test	Each type	Each type	Relevant Standard	Relevant Standard	--	√	P/ V	V	V	
		Calibration	MA	Measurement	Each type	Each type	Mfr. Standard	Mfr. Standard	--	√	P/ V	V	V	
5.4	**Electrical items** (i) Limit Switches	Routine Test	MA	HV, IR, Continuity function	100%	10%	Approved Data sheet	Approved Data sheet	--	√	P/ V	V	V	
		Degree of protection	MA	IP/NEMA Tests	One sample/ type	One sample/ Lot	Approved Data sheet	Approved Data sheet	--	√	P/ V	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
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Prepared by:	SWETANA SINGH		Checked by:	SUMAN NAKWAL				Reviewed by:			
Reviewed by:	PRIYANKA		Reviewed by:	HARISH KUMAR				Approved by:			
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506927/2024/PS-PEM-S&CE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANADARD QUALITY PLAN		SPEC. NO : --	DATE: --
	CUSTOMER :-- ADANI MAHAN ENERGEN LIMITED (MEL)		QP NO.: PE-QP-504-145-H 006 REV 03	DATE: 29.07.2024
	PROJECT: -- 2x800MW ULTRA SUPER CRITICAL THERMAL POWER PROJECT MAHAN (PH-II) SINGRAULI, MP		PO NO.: --	DATE: --
	ITEM: CONTROL VALVE	SYSTEM: S&CE		SHEET 7 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	B/C				D	M	B	C	
	(ii) Solenoids	Routine Test	MA	HV, IR, Continuity function	100%	10%	Approved Data sheet	Approved Data sheet	--	√	P/ V	V	V	
		Degree of protection	MA	IP/NEMA Tests	One sample/ type	One sample /Lot	Approved Data sheet	Approved Data sheet	--	√	P/ V	V	V	
	(iii)Position Transmitter(if provided externally)	Routine Test	MA	HV, IR, Continuity function	100%	10%	Approved Data sheet	Approved Data sheet	--	√	P/ V	V	V	
		Degree of protection	MA	IP/NEMA Tests	One sample/ type	One sample /Lot	Approved Data sheet	Approved Data sheet	--	√	P/ V	V	V	
6.0	**PAINTING**	Paint Thickness	MA	Measurement DFT check	100%	10%	Approved drg/data sheet	Approved drg/data sheet	Inspection Report	√	P/ W	V	V	
7.0	**PACKING**	Soundness of Packing against transit damage	MA	Visual	100%	100%	Approved drg/data sheet	Approved drg/data sheet	Inspection Report	√	P/ W	V		

NOTES:

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Name	Sign & Date		Name	Sign & Date	Seal			Name	Sign & Date	Seal
Prepared by:	SWETANA SINGH		Checked by:	SUMAN NAKWAL				Reviewed by:			
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506927/2024/PS-PEM-S&CE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANADARD QUALITY PLAN	SPEC. NO : --	DATE: --
	CUSTOMER :-- ADANI MAHAN ENERGEN LIMITED (MEL)	QP NO.: PE-QP-504-145-H 006 REV 03	DATE: 29.07.2024
	PROJECT: -- 2x800MW ULTRA SUPER CRITICAL THERMAL POWER PROJECT MAHAN (PH-II) SINGRAULI, MP	PO NO.: --	DATE: --
	ITEM: CONTROL VALVE / SYSTEM: S&CE		SHEET 8 OF 8

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	B/C				D	M	B	C	

1. Cv test shall be conducted at FCRI/ laboratory approved by Govt. Of India/BHEL approved Laboratory. Alternatively, valid Cv test certificate for a similar control valve (same size, same Cv, same trim characteristics) can be accepted.
2. Copies of all TC's (Test Certificates) for materials duly correlated with Heat Nos., TC's for electrical items and mechanical tests(Leak/Operation), C.O.C's (Certificates of Conformance) shall be submitted to BHEL for verification and acceptance.
3. for COC (Certificates of Conformance) for the tests w.r.t. control valve accessories mentioned at Sl. No. 5 of the QAP.

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,

** **M**:SUPPLIER / MANUFACTURER/ SUB-SUPPLIER/SUB-CONTRACTOR, , **B**: BHEL/ BHEL NOMINATED THIRD PARTY INSPECTION AGENCY, **C**: CUSTOMER, **P**:PERFORM,**W**:WITNESS, **V**:VERIFICATION,AS APPROPRIATE **MA**:MAJOR,**MI**:MINOR,**CR:**CRITICAL,**RT-**RADIOGRAPHIC TEST,**UT-**ULTRASONIC TEST,**PT-**DYE PENETRANT TEST,**MT-**MAGNETIC PARTICLE TEST

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
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	Name	Sign & Date		Name	Sign & Date	Seal			Name	Sign & Date	Seal
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Reviewed by:	PRIYANKA		Reviewed by:	HARISH KUMAR				Approved by:			
Approved by:	MAYANK KESHARWANI										

INSPECTION SAMPLING PLAN FOR VALVES for final testing QAP sr. no 3.1,3.2,3.3				
VALVE CLASS/SIZE	VALVE SIZE≤ 100NB (CAT-B)	100NB<VALVE SIZE≤300NB (CAT-A)	300NB<VALVE SIZE≤600NB (CAT-A)	VALVE SIZE>600NB (CAT-A)
VALVE CLASS>1500	As per agreed QAP	100% /Type/Size	100% /Type/Size	100% /Type/Size
900<VALVE CLASS≤1500	As per agreed QAP	100% /Type/Size	100% /Type/Size	100% /Type/Size
600<VALVE CLASS≤900	As per agreed QAP	50% /Type/Size	100% /Type/Size	100% /Type/Size
300<VALVE CLASS≤600	As per agreed QAP	50% /Type/Size	50% /Type/Size	100% /Type/Size
150<VALVE CLASS≤300	As per agreed QAP	10% /Type/Size	50% /Type/Size	100% /Type/Size
VALVE CLASS≤150	As per agreed QAP	10% /Type/Size	10% /Type/Size	100% /Type/Size

Note1:-Valve Class in ANSI & Valve Size in mm.

Note2:- This inspection sampling plan is applicable for final testing of Gate, Globe, Check, Butterfly, Ball & Plug valves which are subjected to witness by MEL/ authorized TPIA as per approved QAP.

Note3:- Where quantum of inspection is less than 100%, If any defect found during inspection by MEL/ authorized TPIA, testing on all the valves of that perticular lot shall be witnessed by MEL/ authorized TPIA.

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	PE-TS-504-145-H801A Rev. No. 00 Date : 19.07.2024

BILL OF QUANTITY - MAIN SUPPLY

ANNEXURE - I

[A]	CONTROL VALVES COMPLETE WITH POSITIONER AND ALL ACCESSORIES MOUNTED, TUBED AND TERMINATED ON JB				
SR. NO.	**TAG NOS.**	**SERVICE**	**QTY/UNIT**	**QTY FOR TWO UNITS**	**UOM**
1	FDV-14	LOW LOAD FEED CONTROL	1	2	NOS
[B]	**1/4 " SS TUBING (12 METER FOR EACH TAG)**		12	24	MTR
[C]	**SS FITTINGS- FOR EACH TAG**				
1	SS FITTINGS for connection to Air Filter Regulator- FOR EACH TAG		1	2	SET
2	SS FITTINGS for connection to Air Lock Relay- FOR EACH TAG		1	2	SET
3	SS FITTINGS for connection to IA Header Isolation Valve - FOR EACH TAG		1	2	SET
4	SS EQUAL TEE - FOR EACH TAG		1	2	SET
5	SS 1/2 " NPT(M) X 1/4 " OD TUBE CONNECTOR- FOR EACH TAG		1	2	SET
[D]	**COMMISIONING SPARES (Gaskets & Gland Packing)** **1 Lot is equal to 1 set with each control valve tag**		1	1	LOT
[E]	**VALVE DIAGNOSTIC AND CONFIGURATION SOFTWARE (FOR ALL TAGS)** **1 Lot is equal to 1 set with each control valve tag**		1	1	LOT
[F]	**CV TEST CHARGES**		1	1	LOT

BILL OF QUANTITY - MANDATORY SPARES

1	**Control Valve**	**QTY FOR STATION**
1.1	Pneumatic Diaphragm for Diaphragm actuated valve (or equivalent item applicable for selected Actuator Type shall be provided)	2(two) nos. for each type of Actuator
1.2	Actuator Seal Kit for Pneumatic Cylinder actuated valve	2(two) nos. for each type of Actuator
1.3	Gland Packing	1(one) set for each type of Control Valve
1.4	Plug, Seat, Cage, Stem etc.	1(one) set for each type of Control Valve
1.5	Retainer Ring, Seal Ring etc.	1(one) set for each type of Control Valve
1.6	Gasket	2(two) Sets. for each type of Control Valve
2	**Common Items for Control Valve & Power Cylinder**	
2.1	Control Valve/Power Cylinder Positioner complete Set	10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.
2.2	Complete Set of Solenoid Valve for Pneumatic type On/Off Valve/Power Cylinder	2Nos. for each type & ratings
2.3	Position Limit Switch for Pneumatic type On/Off Valve/Power Cylinder	10Nos. for each type & ratings
2.4	Air Lock Relay	10Nos. for each type
2.5	Signal Air Booster Unit	2Nos. for each type

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	PE-TS-504-145-H801A Rev. No. 00 Date : 19.07.2024

SUB VENDOR LIST

SL.NO	ITEM DESCRIPTION	SUB VENDORS
1	SMART POSITIONER	ABB
		SIEMENS
		EMERSON
		METSO
		YOKOGAWA
2	AIR FILTER REGULATOR / AIR LOCK RELAY	SHAVO NORGEN, MUMBAI
		EMERSON (ASCO) CHENNAI
		PLAKA, CHENNAI
		FAIR CHILD, USA
3	SOLENOID VALVE	ROTEX, VARODARA
		AVCON.MUMBAI
		ASCO, CHENNAI
4	JUNCTION BOX	K.S INDUSTRIES PVT LTD
		SUCHITRA INDUSTRIES
		SHRENIL & COMPANY
		FLEXPRO ELECTRICALS PVT LTD
		AJMERA INDUSTRIAL & ENGINEERING WORKS
		TRINITY TOUCH, PALWAL
		KEMROK, VADRODARA
		SUMP COMPOSTIES, AHEMDABAD

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	PE-TS-504-145-H801A Rev. No. 00 Date : 19.07.2024

PAINTING REQUIREMENT

Package	Condition	Surface Preparation	Primer Coat	No. of Coats	DFT (in Microns)	Intermediate Coat (in Microns)	No. of Coats	DFT (in Microns)	Final Coat	No. of Coats	DFT (in Microns)	Total DFT	Remarks
Control Valve	F91,WC9,WCB valves (above 60 deg C)	Sa 2.5	Heat Resistant Aluminium Paint IS 13183, Grade I/II	1	20	NA	NA	NA	Heat Resistant Aluminium Paint IS 13183, Grade I/II	1	20	40	1) Powder Coating for non-metallic part shall be of Two coats system of Zinc Rich Epoxy base with total DFT of Min 80 microns 2). Stainless Steel, Non-Ferrous and Galvanised item/portion will not be painted
	Carbon Steel Actuators and F91,WC9,WCB valves (upto 60 deg C #)	Sa 2.5	Epoxy Based Zinc Primer (92% Zinc in dry film (min), % VS = 35 (min))	1	30	Epoxy based MIO pigmented intermediate coat	1	75	Epoxy based Finish paint to IS14209 / Aliphatic acrylic Polyurethane paint to IS 13213	2	30	165	

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	PE-TS-504-145-H801A Rev. No. 00 Date : 19.07.2024

PACKING REQUIREMENT - Minimum requirement of packing specified herewith, any superior packing can also be acceptable

Sl.no	DESCRIPTION
1	**Type of Packing:**
1.1	Item shall be fully covered with multi layered cross laminated colourless polyethylene sheet of at least 100 GSM and shall be packed inside wooden box or crate or fixed on wooden pallet depending upon the size.
1.2	Item shall be firmly fixed to the bottom of the packing box/crate/pallet with the help of supports/blocks to arrest the movement from all sides.
1.3	The electronic items like positioner and other delicate items like pressure gauges etc. shall be disassembled and packed separately in polyethylene air bubble film or black foam prior to placing in wooden boxes. Instructions with sketch for mounting the Smart Positioner & Pressure Gauge shall be sent along with the packing list for erection at site.
1.4	Loose items/accessories like nipples, expander/reducer, root valves etc. shall be separately packed with polyethylene sheet of at least 100 GSM inside the packing box/crate.
1.5	Threaded connection of Smart Positioner & Pressure Gauge shall be shipped with the end caps fitted to avoid any damage. Corrosion inhibitors are to be applied on all unpainted carbon steel surfaces.
1.6	Marking for Fragile & Condensing environment shall be done on the packing box.
2	**Quality of wood:**
2.1	**Quality of wood:** Wood used for packing box shall be Pinewood, Rubber wood, Mango wood, Fir wood, Silver Oak wood or other as per availability with moisture content not exceeding 30%.
3	**Cushioning material and moisture absorber:**
3.1	Suitable cushioning shall be provided by rubberized coir/ expanded soft polyethylene foam.
3.2	Adequate quantity of packed desiccant shall be suitably placed inside the packing box.
4	**Packing slip & holder:**
4.1	Packing slip kept in polyethylene bag shall be placed inside the wooden box at appropriate place.
4.2	One copy of packing slip wrapped in polyethylene bag covered in galvanized iron tin sheet/ aluminium packing slip holder shall be fixed on the external surface the packing box.

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	PE-TS-504-145-H801A Rev. No. 00 Date : 19.07.2024

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID	
Sl. No.	**DOCUMENT TITLE**
1	PQR CREDENTIALS
2	COMPLIANCE SHEET

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE		
Sl. No.	**DOCUMENT TITLE**	**FIRST SUBMISSION SCHEDULE**
1	DATASHEET	With 15 days from PO
2	GA DRAWING WITH EDGE PREPARATION	With 15 days from PO
3	DESIGN CALCULATION	With 15 days from PO
4	INSTALLATION DIAGRAM	With 15 days from PO
5	QUALITY PLAN DULY SIGNED & STAMPED	With 15 days from PO
6	CV TEST REPORTS	Test Report to be submitted prior to final inspection
BHEL/Customer comments/approval and Vendor Resubmission schedule		
BHEL 1st Comment		Within 10 days of Vendor submission.
Vendor Resubmission		Within 7 days of BHEL/ Customer Comments.
BHEL /Customer Comment/Approval on subsequent revision		Within 18 days of Vendor submission/Resubmission

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT		
Sl. No.	**DOCUMENT TITLE**	**SUBMISSION SCHEDULE**
1	APPROVED DOCUMENTS	Along with dispatch
2	CV TEST REPORT	
3	O&M MANUAL	
4	ALL TEST CERTIFICATES	

	TECHNICAL SPECIFICATION CONTROL VALVES 2 X 800 MW ADANI MAHAN	PE-TS-504-145-H801A Rev. No. 00 Date : 19.07.2024

COMPLIANCE CERTIFICATE	
1	It is hereby confirmed that the technical specification has been read and understood. We confirm compliance to the tender specification including any prebid clarification and amendments issued prior to techno-commercial bid opening without any deviation.
2	It is hereby declared that any technical submittals which was not specifically asked by BHEL in NIT shall not to be considered as part of bid and shall not be evaluated by BHEL.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

506927/2024/PS-PEM-S&CE

PRE-QUALIFICATION REQUIREMENT

	CONTROL VALVES WITH ACCESSORIES (FDV-14) 2 X 800 MW ADANI MAHAN	PE-PQ-504-145-I001A	
		DATE	19/07/2024
		REV NO	00

1.0	Bidder should be Original equipment manufacturer (OEM) for CONTROL VALVES. In case bidder is not the OEM, evaluation shall be done as following :- (i) If bidder happens to be an Indian subsidiary of foreign OEM, then credentials of foreign OEM can be considered for meeting the PQR. (ii) If bidder happens to be authorised channel partner or has a valid collaboration agreement/licensing agreement with some other company or being a Joint Venture company, then the credentials of collaborator/licensing company/Principal company/JV partner can also be considered for meeting PQR as per the scope of work. The scope matrix shall include their respective roles including design vetting, manufacturing of critical component and warranty/ guarantee. If bidder qualifies on the basis of credentials of their principal/ JV partner/ Collaborator etc., then the principal/ JV partner/ Collaborator shall be responsible for overall design vetting and warranty/ guarantee of the package.
2.0	The Product being offered by the bidder should be in use successfully in power plant or any other industrial application for at least 1 (One) year. Bidder to submit either of following supporting documents for the product (control valve) with the following parameters :- (i) Minimum valve size = 6” (ii) Minimum pressure rating = ANSI #2500 (iii) Minimum differential pressure(DP) = 50 Kg/cm2 Copy of minimum 1 (One) Performance Certificate from end user / Customer certifying that product is running successfully for 1 (One) year from date of commissioning. The certificate should clearly indicate date of commissioning, date of issue of certificate and name/designation of the certificate issuer. Copy of purchase order & technical parameters to be attached along with the performance certificate. The date of satisfactory performance feedback certificate should not be later than the date of subject enquiry/NIT. OR Copy of repeat orders from minimum 2 (Two) different purchasers. Order received by supplier from same purchaser with a gap of minimum 2 (Two) years shall be considered as repeat order. Copy of technical parameters for each order to be attached. The date of repeat order should not be later than the date of subject enquiry/NIT.
3.0	Bidder to furnish experience list of last 5 years indicating customer name, purchase order reference, item supplied & year of supply to establish the continuity of business.
4.0	Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
5.0	Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidders/collaborators to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
6.0	Consideration of offer shall be subject to customer’s approval of bidders.
7.0	After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

PREPARED BY	REVIEWED BY	APPROVED BY
SWETANA SINGH (DY. MGR)	PRIYANKA (SR. MGR)	MAYANK KESHARWANI (DGM)

2X800 MW MEL SINGRAULI PHASE II BTG										
UNPRICE SCHEDULE FOR CONTROL VALVES WITH ACCESSORIES (FDV-14) -MAIN AND MANDATORY SPARES										
[A]	CONTROL VALVES COMPLETE WITH POSITIONER AND ALL ACCESSORIES MOUNTED, TUBED AND TERMINATED ON JB									
SR. NO.	TAG NOS.	SERVICE	QTY/ UNIT	QTY FOR TWO UNITS	UOM	Unit Price (Ex-Works) (Quote/Unquote)	Total Price (Ex-Works) (Quote/Unquote)	Freight @ % of total EX-Works Price (Quote/Unquote)	GST @ 18% in INR (Quote/Unquote)	Total Price Including Freight & GST (Quote/Unquote)
1	FDV-14	LOW LOAD FEED CONTROL	1	2	NOS					
[B]	**1/4 " SS TUBING (12 METER FOR EACH TAG)**		12	24	MTR					
[C]	**SS FITTINGS- FOR EACH TAG**									
1	SS FITTINGS for connection to Air Filter Regulator- FOR EACH TAG		1	2	SET					
2	SS FITTINGS for connection to Air Lock Relay- FOR EACH TAG		1	2	SET					
3	SS FITTINGS for connection to IA Header Isolation Valve - FOR EACH TAG		1	2	SET					
4	SS EQUAL TEE - FOR EACH TAG		1	2	SET					
5	SS 1/2 " NPT(M) X 1/4 " OD TUBE CONNECTOR- FOR EACH TAG		1	2	SET					
[D]	**COMMISIONING SPARES (Gaskets & Gland Packing) 1 Lot is equal to 1 set with each control valve tag**		1	1	LOT					
[E]	**VALVE DIAGNOSTIC AND CONFIGURATION SOFTWARE (FOR ALL TAGS) 1 Lot is equal to 1 set with each control valve tag**		1	1	LOT					
[F]	**CV TEST CHARGES**		1	1	LOT					
BILL OF QUANTITY - MANDATORY SPARES										
1	**Control Valve**		**QTY FOR STATION**							
1.1	Pneumatic Diaphragm for Diaphragm actuated valve (or equivalent item applicable for selected Actuator Type shall be provided)		2 (two) nos. for each type of Actuator							
1.2	Actuator Seal Kit for Pneumatic Cylinder actuated valve		2 (two) nos. for each type of Actuator							
1.3	Gland Packing		1 (one) set for each type of Control Valve							
1.4	Plug, Seat, Cage, Stem etc.		1 (one) set for each type of Control Valve							
1.5	Retainer Ring, Seal Ring etc.		1 (one) set for each type of Control Valve							

1.6	Gasket	2 (two) Sets. for each type of Control Valve					
2	**Common Items for Control Valve & Power Cylinder**						
2.1	Control Valve/Power Cylinder Positioner complete Set	10% of total quantity used in the system or minimum 2 (two) nos. whichever is more for each type and model.					
2.2	Complete Set of Solenoid Valve for Pneumatic type On/Off Valve/Power Cylinder	2 Nos. for each type & ratings					
2.3	Position Limit Switch for Pneumatic type On/Off Valve/Power Cylinder	10 Nos. for each type & ratings					
2.4	Air Lock Relay	10 Nos. for each type					
2.5	Signal Air Booster Unit	2 Nos. for each type					
Notes - Refer Technical Specification alongwith.**							