765231/2022/PS-PEM-C_I

TECHNICAL SPECIFICATION

FOR

CONTROL VALVES WITH ACCESSORIES

(Pneumatically Operated)

2 X 500 MW TUTICORIN FGD TPP

VOLUME - IIB

SECTIONS-A, C & D

SPECIFICATION No: PE-TS-483-145-I108

BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT DIVISION

NOIDA, INDIA

BHEL	Technical specification for **Control Valves with Accessories** (Pneumatically Operated)	SPEC NO.: **PE-TS-483-145-I104**
		DOCUMENT NO.
		VOLUME II B
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		ISSUE NO. 0
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SECTION – A

SCOPE OF ENQUIRY

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SCOPE OF ENQUIRY

1. SCOPE

1.1 This specification covers the Design, Manufacture, Inspection and testing at manufacturer's works, proper packing for transportation and delivery to site of the **Control Valves with Pneumatic Actuator along with Accessories, Start-up/Commissioning Spares & Mandatory spares** as mentioned in different sections of this specification for **2 X 500 MW TUTICORIN FGD TPP** project.

1.2 The quality plan enclosed forms the minimum requirement but not limited to be adhered to by the bidder. Bidder to sign and stamp the same and submit along with the offer as an acceptance.

1.3 Following signed & stamped documents with company seal to be submitted by bidder.

a) Complete offer including calculation sheets, catalogues etc.
b) Quality Plan
c) Datasheet A & B, duly filled
d) Schedule of prices & unit prices, inspection schedule
e) Schedule of submission of drawings/documents, equipment manufacture, inspection & dispatch.

2 GENERAL TECHNICAL INSTRUCTIONS

2.1 It is not the intent here to specify all the details of design and manufacture. However, the equipment shall conform in all respects to high standard of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to the customer / consultant, who will interpret the meaning of drawing and specification and shall be entitled to reject any component or material which in his judgment is not in full accordance herewith.

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

2.3 BHEL' s / Customer' s representatives shall be given access to the shop in which the equipment are being manufactured or tested and all test records shall be made available to them.

2.4 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.

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SPECIFIC TECHNICAL REQUIREMENTS

The requirements in this section are specific for this project and shall over-ride the specification under Section-D in case of any contradiction. However, in case of any contradiction between this SPECIFIC TECHNICAL REQUIREMENTS and customer SPECIFICATION attached further, the customer SPECIFICATION shall prevail and BHEL's decision shall be final. BIDDER to comply the stringent requirement as per BHEL decision without any commercial implication.

1. **All the formats in Volume-III, SCHEDULE OF SUBMISSION OF DRG. /DOC. and QUALITY PLAN (BHEL Format) should filled-up and furnished with the bid, complete in all respect. In the absence of those, the bid would be considered incomplete and liable for rejection.** Catalogue, Leaflets related with the models of Control Valves as well as each Accessory must be furnished with the offer.

2. The Hook-up diagram for Control valve, attached in Section-D. The scope demarcation as indicated should be adhered.

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.**

4. 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.

5. For valves subjected to cavitation service, anti-cavitation trim shall be provided.

6. In case during erection/commissioning of the control valve, any spares are required which have not been specified in the Start-up/commissioning spares list, the same will have to be supplied by the bidder free of cost.

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

8. 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

9. Hand wheel shall have open/ close direction.

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

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

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

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

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

15. 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, shall be of Plug and socket electrical connection.

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

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

    In order to interface with DCS system, the smart positioner of Control Valves has to be HART Compatible.

19. Positioner shall have both fail freeze and fail safe feature.

20. Bidder to furnish ***compliance certificate*** duly signed and stamped by bidder attached further.

21. SPARES: The following spares are required to be offered

    (A) Recommended Spares:

    NIL

    (B) Start-up & Commissioning Spares:

    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. The format for price schedule to be filled-up by the bidder is enclosed in Volume-III

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 is enclosed in the Section-C of this specification.

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 desiccator's packs as necessary.

(C) Mandatory spares:

Bidder to supply mandatory spares as attached in specification.

20. Documentation:

(A) After the award of contract:

The documentation as listed below for the project

6 sets of the following documents + 3 sets of CDs to be enclosed for Approval:

1. Data sheet, Calculation, BOQ/BOM, GA drawing, Edge preparation details & hook up/ Installation drawing for control valve
2. QAP for Control valve
3. O&M Manual for Control Valve

(B) Final documentation:

The documentation as listed below will separate for respective projects

1. Category –I & IV Approved final drawings/data sheets, – 20 sets with 4 CD-ROMS
   Valve sizing calculations, Noise level calculations and
   Valve Outlet Velocity calculations.

2. Test certificates – 20 sets.

3. Operation & Maintenance Manuals – 20 sets with 4 CD-ROMS
   for Control Valve, Actuator and all the
   Accessories.

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COMPLIANCE CERTIFICATE

We shall comply with the following: -

1. All the requirements as stated in Technical Specification / Specific Technical requirement / Data sheets / Drawings, BHEL quality plan etc. as enclosed in the tender, shall be fully complied **without any deviation**.

2. BHEL Quality Plan (enclosed with the specification) duly signed and stamped is submitted herewith **without any deviation.**

3. Calculation of CV, Noise level, Valve outlet velocity, Trim exit velocity, Actuator sizing, Data Sheet-C in line with Data sheet-A of specification, dimensional drawings / edge preparation details, etc shall be submitted for BHEL/Customer review and approval, to reach BHEL within 15 days after receipt of LOI.

4. Selection of valves and Actuators are our (bidder's) responsibility. Any change in selection of type of valve and Actuators / 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 without any commercial implication and time delay.

5. Body material and Trim material combinations offered will be equivalent or better than the material specified in data Sheet-A. Wherever Trim material combinations offered differ from the specification, its superiority shall be authenticated with documentary evidence and justification produced for BHEL / Customer's concurrence. BHEL / Customer reserves the right to accept/rejects any variation to the specification.

(To be Signed & Stamped by the Bidder)

Signature with date	
Name	
Company seal	

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CUSTOMER SPECIFICATION

3.00.00 **CONTROL VALVES, ACTUATORS & ACCESSORIES**

3.01.00 **General Requirements**

3.01.01 Control Valves and accessories furnished by the Bidder shall be designed and tested in accordance with the latest applicable requirements of code for pressure piping ANSI B 31.1, ASME Boiler and pressure vessel code, Indian Boiler Regulation (IBR), ISA and other standards as specified elsewhere as well as in accordance with the applicable requirements of the "Federal Occupational Safety and Health Standards, USA" or acceptable equal standards.

All the control valves, their actuators and accessories to be furnished under this section shall be fully suitable and compatible with the services covered under the specification.

3.02.00 **Control Valve Sizing and Construction**

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

3.02.02 Valve sizing shall be suitable for obtaining rated flow conditions with valve opening at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 10% of total valve stem travel. All the valves shall be capable of handling at least 120% of the required rated flow. Further, the valve stem travel range from minimum flow condition to rated flow condition shall not be less than 50% of the total valve stem travel. The sizing shall be in accordance with the latest edition of ISA on control valves. While deciding the size of valves, Bidder shall ensure that valves port outlet velocity does not exceed 8 m/sec for liquid services, 150 m/sec. for steam services and 50% of sonic velocity for flashing services. Bidder shall furnish the sizing calculations clearly indicating the outlet velocity achieved with the valve size selected by him as well as noise calculations, which shall be subject to Owner / Consultant's approval during detailed engineering stage.

3.02.03 Control valves of steam and water applications shall be designed to prevent cavitation, wire drawing, flashing on the downstream side of valve and downstream piping. Thus for cavitation / flashing service, only valve with anti-cavitation trim shall be provided.

3.02.04 All other control valves shall have leakage rate as per leakage Class-IV as minimum.

3.02.05 The control valve induced noise shall be limited to 85 dBA at 1 meter from the valve surface under actual operating conditions. The noise abatement shall be achieved by valve body and trim design and not by use of silencers.

3.03.00 **Valve Construction**

3.03.01 All valves shall be of globe body design & straightaway pattern with single or double port unless otherwise specified or recommended by the manufacturer to be of angle body type. Rotary valve may alternatively be offered when pressure drops permit.

3.03.02 For large flow conditions with low pressure drops, butterfly valves shall be used.

3.03.03 Valves with high lift cage guided plugs & quick change trims shall be supplied in case of globe type valves.

3.03.04 Cast iron valves are not acceptable.

3.03.05 Bonnet joints for all control valves shall be of the flanged and bolted type or other construction acceptable to the Owner / Consultant. Bonnet joints of the internal threaded or union type shall not be acceptable.

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

3.03.07 All valves connected to vacuum on downstream side shall be provided with packing suitable for vacuum applications (e.g. double vee type chevron packing).

3.03.08 Valve characteristic shall match with the process characteristics.

3.03.09 Extension bonnets shall be provided when the maximum temperature of flowing fluid is greater than 280°C.

3.03.10 Flanged valves shall be rated at no less than ANSI pressure class of 300 lbs.

3.03.11 Gland material shall be chosen to suit the operating temperature. PTFE may be chosen for low temperature application and for high temperature application graphited asbestos glands are to be provided.

3.04.00 **Valve Materials**

Materials for Control Valves shall be equivalent/superior to the following:

Sl. No.	Service	Body Material	Trim Material
1	Non-corrosive, non-flashing and non-cavitation service below 275˚C.	Compatible with piping material	SS-316 with stellite faced guide posts and bushings.
2	Severe flashing / cavitation services.	Alloy steel as per ASTM A 217 Gr. WC9	400 series SS or equivalent to suit the specific requirement
3	Low flashing / cavitation service.	Alloy steel as per ASTM A 217 Gr. WC6	400 series SS or equivalent to suit the specific requirement
4	Condensate service below 300˚C.	SS-316	SS-316

Note: Valve body rating shall meet the process pressure and temperature requirements as per ANSI B16.34.

However, Bidder may offer valves with body and trim materials better than specified materials and in such cases Bidder shall furnish the comparison of properties including cavitation resistance, hardness, tensile strength, strain energy, corrosion resistance and erosion resistance etc. of the offered material vis-à-vis the specified material for Owner / Consultant's consideration and approval.

3.05.00 **End Preparation**

Valve body ends shall be either butt welded/socket welded, flanged (Rubber lined for condensate service) or screwed as finalized during detailed engineering and as per Owner / Consultant's approval. The welded ends wherever required shall be butt welded type as per ANSI B 16.25 for control valves of sizes 65 mm and above. For valves size 50 mm and below welded ends shall be socket welded as per ANSI B 16.11 Flanged ends wherever required shall be of ANSI pressure-temperature class equal to or greater than that of control valve body.

3.06.00 **Valve Actuators**

3.06.01 All control valves shall be furnished with pneumatic actuators. The Bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut off pressure and leakage class requirements. The valve actuators shall be capable of operating at 60 deg. C continuously.

3.06.02 Valve actuators and stems shall be adequate to handle the unbalanced forces occurring under the specified flow conditions or the maximum differential pressure specified. An adequate allowance for stem force, at least 0.15 kg/sq.cm. per linear millimeter of seating surface, shall be provided in the selection of the actuator to ensure tight seating unless otherwise specified.

3.06.03 Travel time of pneumatic actuators shall not exceed 10 seconds.

3.06.04 Spring-diaphragm type valve actuators shall be used in general applications. However piston type actuators shall be offered in case of high shut-off pressure & quick response requirement. Piston actuator shall be of double acting type for the regulating duty valves with long stem travel for better regulation and quick response.

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

3.06.06 All actuators shall be supplied mounted on the valve with all the accessories integrally mounted. The diaphragms shall be designed for 200% maximum operating pressure.

3.06.07 Nylon reinforced neoprene shall be used as diaphragm material.

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

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

3.06.10 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.

3.07.00 **Control Valve Accessory Devices**

All pneumatic actuated control valve accessories such as air locks, hand wheels / hand-jacks, Non-contact type limit switches, microprocessor based smart electronic Positioners, diffusers, external volume chambers, position transmitters (capacitance or resistance type only), reversible pilot for Positioner, tubing and air sets, solenoid valves and junction boxes etc. shall be provided as per the requirements. ~~For further details please refer clause no. 1.32.00 of this section of the specification.~~

3.08.00 **Tests**

All valves shall be tested in accordance with the Quality Assurance Programme (QAP). Bidder shall submit QAP for Owner's approval. The tests shall include but not be limited to the following :

a) Non destructive test as per ANSI B 16.34.

b) Hydrostatic shell test as per ANSI B 16.34 prior to seat leakage test.

c) Valve closure test and seat leakage test as per ANSI B 16.34 and as per the leakage class

d) Functional Tests: The fully assembled valves with actuator and all accessories shall be functionally tested to demonstrate from open to close position and vice versa. Valve lift shall be checked at 5 points at 0, 25, 50, 75 and 100% in both the directions with increasing and decreasing inputs. Performance of the valve with Positioner shall be as follows :

   i) Linearity : +/- 1%
   ii) Hysteresis : +/- 1%
   iii) Sensitivity : +/- 0.5%
   iv) Deadband : +/- 1%
   v) Reproducibility : 0.3% of total stroke
   vi) Overall accuracy : +/- 1%

e) CV test: CV test shall be carried out as type test on each size, type and design of the valves as per ISA 75.02 standard and test report shall be submitted for Owner's approval.

1.15.00 **Instrument Air System**

The instrument Air Supply System for various pneumatic Control & Instrumentation devices like pneumatic actuators, power cylinders, I/P converters, pneumatically operated valves etc. shall be complete in all respect with necessary Air Filter Regulators, valves, piping/tubing etc. Each pneumatic instrument shall have an individual air shut off valve. The pressure-regulating valve shall be equipped with an internal filter, a 50 mm pressure gauge and a built in filter-housing blow down valve.

Filter shall be of minimum 5-micron size & sintered bronze material.

1.15.01 **Air Filter Regulator**

01.	Filter Element	:	Sintered Bronze
02.	Filter Size	:	5 microns
03.	Input Air	:	10.0 Kg/Sq. cm (maximum)
04.	Output	:	Adjustable from 0-2.5 Kg / Sq. cm and 0-7.0 Kg / Sq. cm (continuous) as applicable.
05.	Effect of Supply	:	Maximum 0.02 Kg/Sq. cm for a change pressure variation in supply pressure of 4 Kg/Sq. cm
06.	Bowl Material	:	Metallic.
07.	Accessories	:	2" dial size output pressure gauge
08.	Feature	:	No perceptible drop of pressure on opening the drain port.

1.15.02 **Power Cylinders (Pneumatic)**

01.	Mounting Type	:	a)	Fixed position mounting (End mounting).
			b)	True union mounting
02.	Control Signal	:	4-20 mA DC for modulating purposes. 24V DC operated solenoid valve operating on pneumatic line for open & closing purpose of on & off drive.
03.	Supply Air	:	0-7 Kg / Cm^2.

04.	Selection	:	Based upon thrust / torque, stroke length, angular movement, full-scale travel time, repeatability, space factor etc. Provision for air-to-open and air-to-close operation.
05.	Casing	:	IP-55.
06.	Accessories	:	a) Air lock relay b) Hand wheel. c) Air filter regulator with gauge. d) Volume Booster. e) Limit Switches. f) Smart Positioner with Input and Output pressure gauges, local keypad & display. g) Solenoid Valve h) Integral non contact type position Transmitter (4-20 mA DC linear output). i) Junction box with cable gland
07.	Fail-safe operation	:	For regulating duty- stay put / Fail safe position against power & air fail.
08.	Repeatability	:	Better than 0.5% of full travel.
09.	Hysterisis	:	Less than ±1% of full travel
10.	Travel time	:	Better than 20 sec.
11.	Operating Temp. limit	:	80°C (min.)

1.15.03 **Electric to Pneumatic (E/P) Converters**

01.	Air Supply	:	1.5 kg/cm^2
02.	Max. supply Pressure	:	7 kg/cm^2
03.	Input Signal	:	4-20 mA DC (as required by the design of control system).
04.	Output Signal	:	0.2 to 1.0 kg/cm^2

05.	Control Action	:	Air to Close, Air to Open and Fail freeze-field selectable.
06.	Response Time	:	5 seconds for 0 to 90% output pressure
07.	Repeatability	:	+/- 0.1% span typical
08.	Accuracy	:	+/- 0.25% span typical
09.	Linearity	:	0.5% of span or better
10.	Hysteresis	:	0.1% of span or better
11.	Ambient Temp. effect	:	Less than 0.02% of span per ºC between -20 ºC to +60 ºC
12.	Supply pressure effect	:	Less than 1%
13.	Span and zero adjustment:		Screw
14.	Mounting	:	Close to Actuator (but not on the actuator)
15.	Output Capacity	:	To suit the actuator
16.	Protection Class	:	IP 65
17.	Allowable Drift Rate	:	± 2% of set point / hour maximum

On loss of control signal, the last set point pressure shall be maintained so that the associated control valve remains in stay put condition.

1.15.04 **Smart positioner**

01.	Type	:	Universal design (linear or rotary application)
02.	Input Signal	:	4-20mA DC, 2 wire loop with 24V DC.
03.	Output Signal (position F/B)	:	i) 4-20mA with HART Protocol ii) Configurable end position switch
04.	Supply Pressure	:	Single acting 1.2 to 7.0 bar Double acting 1.2 to 10.5 bar
05.	Air Delivery	:	Single acting 10.0 SCFM at 2.1 bar supply

			Double acting7.2 SCFM at 2.1 bar supply
. 06.	Housing	:	IP 65
07.	Repeatability	:	+/- 0.3% of span or better
08.	Accuracy	:	+/- 0.1% of span or better
09.	Communication	:	Hart protocol
10.	Power-up with position control	:	< 150 ms or better
11	Power interruption without Reset	:	<100ms or better
12. Body Material		:	Aluminium
13. Response Time		:	Less than 10 sec
14. Features		:	i) Noncontact position feedback sensor
			ii) Integral Electro-Pneumatic convertor
			iii) Self calibration with tunable response time
			iv) Online diagnostics
			v) Pressure gauges to be provided on positioner (I/P & O/P pressure)

1.15.05 **Solenoid Valve**

01.	Operating Principle	:	Electromagnetic (noiseless)
02.	Coil voltage rating	:	24V DC (in general) other 220V DC /240V AC /110V AC as per manufacturer recommendation.
03.	Ways	:	3 ways in general other depending on requirement
04.	Port size	:	1/4" NPT all ports
05.	Body	:	SS Bar Stock
06.	Trim	:	AISI SS-316

07.	Manual Operator	:	In built
08.	Duty	:	Suitable for continuous energization
09.	Sealing	:	Airtight and leak proof
10.	Fluid Temperature	:	0-150 O C (approx.)
11.	Coil Enclosure	:	Stainless Steel
12.	Insulation	:	Class-H
13.	Coil Casing	:	IP-65 (Explosion proof for NEC Class-1, Division-1 area)
14.	Mounting	:	On pipe or on panel
15.	Cable Connection	:	½" NPT cable gland
16.	Accessories	:	Mounting brackets, nuts and bolts as required.
17.	Special feature	:	a) LED indication b) Double coil type.

1.15.06 **Air Lock Relay**

01.	Type	:	Single acting with actuator (spring return) and double acting with double acting piston cylinder
02.	Max. supply Pressure	:	7 kg/cm^2
03.	Set Pressure	:	1.4 ~ 7 kg/cm^2
04.	Ambient Temperature	:	-5 to 60°C
05.	Port Size	:	¼" NPT(F)

1.15.07 **Position Limit Switch**

01.	Type	:	Proximity type
02.	Temperature Range	:	-25 to 85°C
03.	Protection Class	:	IP-65

04.	Switch configuration	:	2 SPDT
05.	Contact rating	:	5A min. at 240V AC on resistive load

9.01.02 **Junction Box**

01.	Type of Enclosure	:	Dust tight & weatherproof conforming to IP 65
02.	Material	:	3 mm sheet steel/ fiberglass reinforced polyester (UV stabilized)
03.	Type of Cover	:	Solid unhinged with retention chain/ screwed at all four corners
04.	Paint	:	RAL 7032 – Siemens Grey
05.	Mounting	:	Surface/ 2" pipe stanchion (At a dry compartment at one side of the enclosure/ rack with front opening type door)
06.	Cable Entry	:	3 mm (min) Bottom / side Gland plate
07.	Gasket	:	Neoprene
08.	Grounding	:	Brass earth lug with green screw head External-two (2) nos., Internal – one (1) no.
09.	No. of Drain holes	:	Two at bottom capped
10.	Identification	:	Label for JB & tags for cable
11.	Accessories	:	a) Rail mounted cage clamp type screw less terminals (suitable for conductor size up to 2.5 sq. mm of suitable voltage grade) with markers and 20% spare terminals. b) Cable gland (Brass) & raceways

9.01.03 **Cable Gland**

01.	Type	:	Double compression

	02.	Entry Thread	:	NPT
	03.	Material	:	Brass
	04.	Finish	:	Cadmium Plated.
	05.	Protection	:	IP 54 or better
	06.	Accessories	:	Neoprene gasket, locknuts, reducers etc.

9.01.04 **Cable Tray**

	01.	Material	:	Mild steel
	02.	Thickness	:	not less than 2.0 mm
	03.	Finish	:	Hot dip galvanized
	04.	Perforation	:	As per MFR standard.
	05.	Cover	:	Suitable for tray

9.02.00 **Process Hook Up Accessories & Specification (as applicable)**

Material and rating of the hook up items shall generally suit the piping and fluid condition. Bidder shall furnish hook up drawings and the drawings for open racks & closed racks for Owner / Consultant's approval.

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SECTION-C

DATASHEET A&B

General technical requirements for control valve with Accessories (with pneumatic actuator) are:

1. Valves selection will be based on enclosed control valve design parameters.
2. Trim material has been specified for the mentioned service conditions. However, any substitute material if recommended by the manufacturer will be provided if found technically acceptable after evaluation.
3. Valve sizing shall be suitable for obtaining rated flow conditions with valve opening at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 10% of total valve stem travel.
4. All the valves shall be capable of handling at least 120% of the required max. flow at full open condition. Valve stem travel range from min. flow condition to rated flow shall condition shall not be less than 50% of valve travel. 1
5. Valves port outlet velocity does not exceed 8 m/sec for liquid services, 150 m/sec. for steam services and 50% of sonic velocity for flashing services by selecting proper body size of the required CV.
6. Characteristics of control valves has been selected based on application / services. However in case supplier is not able to offer the required characteristics, due to Design considerations modified trim (mod.eq percentage or mod linear) will be selected after technical evaluation.
7. Anti- cavitation trims shall be provided for valves with cavitation services and Hardened trims for flashing services.
8. NIL
9. Control valve accessories shall be fitted on the valve body. Junction box shall be mounted on the valve body.
10. Type of flow action ("under the seat" or "over the seat") will be selected by the Vendor, however wherever downstream side is subjected to vacuum, flow action shall be "flow to close" (over the seat).
11. CV test shall be conducted for the valves.
12. The calculated CV, %valve lift and valve outlet velocity for different parameter Conditions shall be incorporated in vendor's final documentations, after detail Engineering.
13. Control valve drawings / documents / datasheet giving details of model no, valve Size, and calculations for valve sizing, noise & velocity and technical details of Various accessories (of the successful bidder) shall be furnished for information and records after completion of engineering.
14. Extension bonnets shall be provided when the maximum temperature of the flowing Fluid is greater than 280 deg C.
15. All regulating duty control valves shall have mechanical position indicator and contact less position transmitter (4-20mA DC output) for monitoring the position from local and control room respectively. Air lock relays shall be provided with all regulating duty pneumatic drives to achieve stay put / fail safe condition on air failure.
16. Design of all valve bodies shall meet the specification requirements and shall conform to the requirements of ANSI (USA) for dimensions, material thickness and material specification for their respective pressure classes. 1
17. The noise abatement shall be achieved by valve body and trim design and not by use of silencers.

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BHEL PEM	**DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)**	SPECIFICATION NO.: PE-TS-483-145-I 104	
		VOLUME	
		SECTION	
		REV. NO. 02	DATE : 20.07.2021
		SHEET	OF

Tag No. : PCB45AA001 Qty.:1 No Date Sheet No. PES-145-06-DS1-0

1

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	**NTPL TUTICORIN -FGD**	.....
	SERVICE	ACW PMPs RECIR VLV	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	100NB | 100NB	.....
	PIPE MATERIAL (inlet / outlet)	Carbon Steel | Carbon steel	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[■] A216 WCB [] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[■] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	: CAGE | GUIDE BUSH	SS 316 STELLITED | SS 316 STELLITED	.....|.....
	FLOW	[] BELOW SEAT [■] ABOVE SEAT	.....
	OUTLET VELOCITY	[■] < 8 M/SEC(WATER) | [] MAC NO. < 1/3 (STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	BIDDER TO SPECIFY	.....|.....
	*TRAVEL TIME FOR	<10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] STAYPUT	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER	[■] 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 POSITIONER	.....
	SOLENOID VALVE	[■] REQUIRED [] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

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BHEL PEM	**DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)**	SPECIFICATION NO.: PE-TS-483-145-I 104	
		VOLUME	
		SECTION	
		REV. NO. 02	DATE : 20.07.2021
		SHEET	OF

Tag No. : PCB45AA001 Qty.:1 No Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 1%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(G)	OUTLET PR. KG/CM2(G)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	NORMAL	73	2.8	0.4	36.0			
	2.	MIMIMUM	22	3.2	0.4	36.0			
	VALVE TYPE						[] CAVITATION [] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 3.8 * BODY DESIGN: PRESS (KG/CM2g) | TEMP (DEG C) 7.5 | 60.0 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							……		

765231/2022/PS-PEM-C_I

BHEL PEM	**DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)**	SPECIFICATION NO.: PE-TS-483-145-I 104	
		VOLUME	
		SECTION	
		REV. NO. 02	DATE : 20.07.2021
		SHEET	OF

Tag No. : PGB04AA001 Qty.:1 No Date 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	**NTPL TUTICORIN -FGD**	.....
	SERVICE	DMCW PMPs RECIR VLV	.....
	LOCATION	[■] INDOOR [] OUTDOOR	.....
	DUTY	[] ON/OFF [■] MODULATING	.....
	PIPE SIZE (inlet / outlet)	100NB | 100NB	.....
	PIPE MATERIAL (inlet / outlet)	Carbon Steel | Carbon steel	.....|.....
BODY*	MODEL NO.	BIDDER TO SPECIFY	.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	[■] GLOBE [] ANGLE | [] TOP [■] CAGE | ONE	.....|.....|.....|.....
	BODY SIZE: PORT SIZE: DESIGN CV	BIDDER TO SPECIFY	.....|.....|.....
	END CONNECTION & RATING (ANSI)	[■] BWE [] SWE [] FLANGED	.....
	BODY MATERIAL	[■] A216 WCB [] A217 WC6 [] SS [] A217 CS	.....
		[] A351 CF8M	.....
	PACKING: MATERIAL SINGLE / DOUBLE	[] PTFE [■] GRAFOIL [] DOUBLE [■] SINGLE	.....|.....
	BONNET TYPE	[■] STD [] EXTENDED [] FINNED	.....
	TRIM FORM	[■] LINEAR [] EQ. PERCENTAGE	.....
		[] QUICK OPEN (ON/OFF)	
	TRIM MATERIAL: SEAT | PLUG	|	.....|.....
	: CAGE | GUIDE BUSH	|	.....|.....
	FLOW	[] BELOW SEAT [■] ABOVE SEAT	.....
	OUTLET VELOCITY	[■] < 8 M/SEC(WATER) | [] MAC NO. < 1/3 (STM)	.....
	REQUIRED LEAKAGE CLASS	[] II [] III [■] IV [] V [] VI	.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA	.....
	VACUUM SERVICE	[] YES [■] NO	.....
	ANTI CAVITATION TRIM	[] YES [■] NO	.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	BIDDER TO SPECIFY	.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	BIDDER TO SPECIFY	.....|.....
	*TRAVEL TIME FOR	<10 SEC	.....
	OPEN TO CLOSE, CLOSE TO OPEN	|	.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	[■] STAYPUT	.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	[■] STAYPUT	.....
ACCESSORIES	POSITIONER (SMART)	[■] REQUIRED [] NOT REQUIRED	.....
	AIR FILTER REGULATOR	[■] REQUIRED [] NOT REQUIRED	.....
	AIR LOCK RELAY	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION LIMIT SWITCH	[■] REQUIRED [] NOT REQUIRED	.....
	POSITION TRANSMITTER	PART OF POSITIONER	.....
	SOLENOID VALVE	[] REQUIRED [ ] NOT REQUIRED	.....
	E/P CONVERTER	PART OF POSITIONER	.....
	JUNCTION BOX	[■] REQUIRED [] NOT REQUIRED	.....
	HAND WHEEL (SIDE MOUNTED)	[■] REQUIRED	.....
	LOCAL POSITION INDICATOR	[■] REQUIRED	.....
	ELECTRO PNEUMATIC POSITIONER	[] REQUIRED [■] NOT REQUIRED	.....

765231/2022/PS-PEM-C_I

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-483-145-I 104	
		VOLUME	
		SECTION	
		REV. NO. 02	DATE : 20.07.2021
		SHEET	OF

Tag No. : PGB04AA001 Qty.:1 No Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 1% ± 1% ± 0.5% ± 1%	…… …… …… ……

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(G)	OUTLET PR. KG/CM2(G)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION*	1.	NORMAL	73	8.3	1.0	44.0			
	2.	MINIMUM	22	9.5	1.0	44.0			
	VALVE TYPE						[] CAVITATION [] FLASHING [] HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 9.8 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 10.0 | 60.0 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						…… ……|…… ……		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						……		

765231/2022/PS-PEM-C_I

FORM NO. PEM-6666-0

Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

SPECIFICATION NO.:	**PE-TS-483-145-I104**
VOLUME	**II-B**
SECTION	**C**
REV. NO. 00	DATE: 13.07.2021

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						
	BYPASS	GAUGES	ENCL. CLASS	☐ YES ■ NO	☐ THREE ■TWO	■ IP-65	
	INPUT SIGNAL (Kg / Cm²)			■ 0.2 – 1.0	☐ 0.2 – 0.6	☐ 0.6 – 1.0	
	OUTPUT SIGNAL (Kg / Cm²)			TO SUIT ACTUATOR			
AIR FILTER REGULATOR	MFR. & MODEL NUMBER						
	AIR SUPPLY PRESS (Kg / Cm² g)			■ 5.0 – 8.0 ☐			
	OUTPUT PRESS (Kg / Cm² g)			TO SUIT ACTUATOR			
	FILTER SIZE			5 MICRON			
	OUTPUT GAUGE			■ REQUIRED	☐ NOT REQUIRED		
	AUTO DRAIN FEATURE			■ REQUIRED	☐ NOT REQUIRED		
AIR LOCK	MFR. & MODEL NUMBER						
	SET PRESS (Kg / Cm²)			1.4 to 7			
	SUPPLY PRESS (Kg / Cm²)			■ 5.0 – 7.0 ☐			
	RESET TYPE			AUTO			
	VENT PLUG			REQUIRED			
LIMIT SWITCH	MFR. & MODEL NUMBER						
	OPEN posn	INT posn	CLOSE posn	**1 NO.**	**---**	**1 NO.**	
	CONTACT TYPE			SPDT 2 NO + 2 NC			
	RATING (AC / DC)			5A 240V AC AND 0.2A 220V DC			
	ENCLOSURE CLASS			■ IP 65 ☐			
POSITION TRANSMITTER	MFR. & MODEL NUMBER			PART OF SMART POSITIONER			
	TYPE						
	SUPPLY						
	OUTPUT RATING						
	ACCURACY						
	ENCLOSURE CLASS						
SOLENOID VALVE	MFR. & MODEL NUMBER						
	RATING			■ 24V DC ☐ 220V DC ☐ 240V AC ☐			
	TYPE			3-WAY (UNIVERSAL OPERATION TYPE)			
	OPERATION	QUANTITY		☐ Stayput ☐ Interlock	☐ 1	☐ 2	
	COIL INSULATION CLASS			CLASS - H			
	ENCLOSURE CLASS			■ IP 65 ☐ NEMA 4 ☐			
HANDWHEEL	ORIENTATION			☐ TOP MOUNTED ■ SIDE MOUNTED			
JUNCTION BOX	NO. OF WAYS			☐ 24-WAYS ☐ AS REQUIRED ■ 36-Ways			
	SIZE			AS REQUIRED			
	CABLE GLANDS (Size / Quantity)			AS REQUIRED (Double Compression Type).			
	ENCLOSURE CLASS			■ IP 65 ☐			
	BODY MATERIAL			■ FRP (UV stabilized) ☐ SS ☐ METAL SHEET			
I/P CONVERTER	INPUT SIGNAL	POWER SUPPLY		PART OF SMART POSITIONER			
	SPLIT RANGE						
	ENCLOSURE CLASS						
	LINEARITY						
	HYSTERISIS						
Tubing & Fittings / per CV	**This is in addition to Tubing and fittings which are integral part of CV**			15 Meters of ¼ " SS Tubing, with 1 set of Fittings for each CV for connection to IA Header on one end and accessories on another end of CV.			
PAINTING	**COLOUR/SHADE**			■ RED ☐ GREEN ☐			
	THICKNESS (DFT) – in microns						
	TYPE			■ EPOXY ☐ ENAMEL ☐			

COMPANY SEAL
NAME
SIGNATURE
DATE

	Technical specification for **Control Valves with Accessories** (Pneumatically Operated)	SPEC NO.: **PE-TS-483-145-I801**	
		DOCUMENT NO.	
		VOLUME II B	
		SECTION C	
		ISSUE NO. 2	
		REV. NO. 00	DATE 08.11.2021

SECTION-C

DATASHEET C

	Technical specification for **Control Valves with Accessories** (Pneumatically Operated)	SPECIFICATION NO. **PE-TS-483-145-I801** DOCUMENT NO. VOLUME IIB SECTION **C** ISSUE NO. 2 REV. NO. 00 DATE: 08.11.2021

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

DATA SHEET C

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

GENERAL*	PROJECT	
	SERVICE	
	LOCATION	
	DUTY	
	PIPE SIZE (inlet / outlet)	
	PIPE MATERIAL (inlet / outlet)	
BODY	MODEL NUMBER	
	TYPE OF BODY : GUIDING : NO. OF PORTS	
	BODY SIZE : PORT SIZE : DESIGN CV	
	END CONNECTION & RATING (ANSI)	
	BODY MATERIAL	
	PACKING MATERIAL SINGLE / DOUBLE	
	BONNET TYPE	
	TRIM FORM	
	TRIM MATERIAL : SEAT | PLUG	
	TRIM MATERIAL : CAGE | GUIDE	
	FLOW	
	OUTLET VELOCITY	
	REQUIRED LEAKAGE CLASS	
	NOISE LEVEL (dBA)	
	VACUUM SERVICE	
	ANTI CAVITATION TRIM	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	
	CLOSE AT : OPEN AT (Kg / Cm^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	

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FORM NO. PEM-6666-0

BHEL	Technical specification for **Control Valves with Accessories** (Pneumatically Operated)	SPECIFICATION NO. **PE-TS-483-145-I801** DOCUMENT NO. VOLUME IIB SECTION **C** ISSUE NO. 2 REV. NO. 00 DATE: 08.11.2021

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

DATA SHEET C

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

PERFORMANCE OF VALVE	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.

SEA WORTHY PACKING ~~**APPLICABLE /**~~**NOT APPLICABLE**

765231/2022/PS-PEM-C_I

FORM NO. PEM-6666-0

Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

SPECIFICATION NO.:	**PE-TS-483-145-I801**
DOCUMENT NO.:	
VOLUME	**II-B**
SECTION	**C**
ISSUE NO. 2	
REV. NO. 00	DATE: 08.11.2021

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

DATA SHEET C FOR ACCESSORIES

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

POSITIONER	MFR. & MODEL NUMBER			
	BYPASS	GAUGES	ENCL. CLASS	
	INPUT SIGNAL (Kg / Cm^2)			
	OUTPUT SIGNAL (Kg / Cm^2)			
AIR FILTER REGULATOR	MFR. & MODEL NUMBER			
	AIR SUPPLY PRESS (Kg / Cm^2 g)			
	OUTPUT PRESS (Kg / Cm^2 g)			
	OUTPUT GAUGE			
	FILTER SIZE			
	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	15 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

765231/2022/PS-PEM-C_I

SECTION-C

QUALITY PLAN

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN	DOC . NO : PE-V0-483-145-I803 rev 03	DATE: 09.09.2021
	CUSTOMER :-- NLC TAMILNADU POWER LIMITED	QP NO.: PE-QP-999-145-I 006	DATE: 07.11.2020
	PROJECT: -- NTPL 2x500 MW TUTICORIN FGD	PO NO.: --	DATE: --
	ITEM: CONTROL VALVE / SYSTEM: C&I	SECTION: C	SHEET 1 OF 9

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY **			REMARKS
					M	C/N				D	M	C	N	
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	1.Physical, Chemical properties	MA	Physical, Chemical tests	100%	10%	Approved drg/ datasheet	Approved drg/data sheet	Test Certificate	√	P/W	V		TC for body/bonnet from foundry only
		2.Heat Treatment	MA	Review of H.T. Chart	100%	10%	Approved drg/datasheet	Approved drg/data sheet	Test Certificate	√	P/W	V		1.IBR Certification (if applicable) to be verified by BHEL. 2.Applicable for body /bonnet only
		3.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		Applicable for body and bonnet for rating ANSI 900 and above.
		4.Surface Quality	MA	1.Visual	100%	10%	ANSI/ MSS-SP-55	ANSI/ MSS-SP-55	Inspection Report	√	P/W	V		
				2. MT/PT	100%	10%	ASME B 16.34	ASME B 16.34	Inspection Report	√	P/W	V		After Machining on machined surface only
		5.Pressure Test for shell	MA	Hyd. Test	100%	10%	ISA-S-75.19/ ASMEB16.34	ISA-S-75.19/ ASME B 16.34	Inspection Report	√	P/W	V		For Body and Bonnet after machining.
1.2	Diaphragm	1.Surface Quality	MA	Visual	100%	10%	Mfr. standard	Mfr.	Inspection	√	P/W	V		

BHEL						BIDDER/ SUPPLIER	
ENGINEERING			QUALITY			Sign & Date	
	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by:		CHETAN MALIK	Checked by:		KUNDAN PRASAD		
Reviewed by:		R.K. RAINA	Reviewed by:		R.K. JAISWAL		

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN		DOC . NO : PE-V0-483-145-I803 rev 03	DATE: 09.09.2021
	CUSTOMER :-- NLC TAMILNADU POWER LIMITED		QP NO.: PE-QP-999-145-I 006	DATE: 07.11.2020
	PROJECT: -- NTPL 2x500 MW TUTICORIN FGD		PO NO.: --	DATE: --
	ITEM: CONTROL VALVE	SYSTEM: C&I	SECTION: C	SHEET 2 OF 9

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

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		CHETAN MALIK	Checked by:		KUNDAN PRASAD
Reviewed by:		R.K. RAINA	Reviewed by:		R.K. JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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Approved by:			

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN		DOC . NO : PE-V0-483-145-I803 rev 03	DATE: 09.09.2021
	CUSTOMER :-- NLC TAMILNADU POWER LIMITED		QP NO.: PE-QP-999-145-I 006	DATE: 07.11.2020
	PROJECT: -- NTPL 2x500 MW TUTICORIN FGD		PO NO.: --	DATE: --
	ITEM: CONTROL VALVE	SYSTEM: C&I	SECTION: C	SHEET 3 OF 9

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	**			REMARKS
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9					
2.0	**IN PROCESS INSPECTION**													
2.1	After machining, i, Body ii Bonnet iii Plug iv Valve Stem v seat ring/cage	1. Surface flaws	MA	Visual & MT/PT	100% (on accessible surfaces)	10%	ASME B 16.34	ASME B 16.34	Inspection Report	√	P/W	V		Butt weld ends shall be included.
		2. Dimensional checks	MA	Measurement	100%	10%	Mfr. standard	Mfr. standard	Inspection Report	√	P/W	V		
		3. Hard Facing (wherever applicable)	MA	Hardness Measurement	One sample/ Lot	One sample /Lot	Mfr. standard	Mfr. standard	Inspection Report	√	P/W	V		
FINAL TESTING/INSPECTION														
3.0	**TESTS ON COMPLETED VALVE**													
3.1	Actuator Chamber	Leakage & Strength	MA	Pneumatic Test	100%	10%	Mfr. standard	No Leakage	Test Certificate	√	P/W	W		
3.2	Body	Leakage & Strength(Body Mount Leakage)	MA	Hydro Test	100%	10%	ISA-S-75.19/ ASMEB16.34	No Leakage	Test Certificate	√	P/W	W		
3.3	Seat Leakage	Seat Leakage	MA	Pneumatic Test	100%	10%	FCI-70.2	FCI-70.2	Test Certificate	√	P/W	W		
4.0	**OPERATION TEST ON**	1. Valve Travel	MA	Measurement	100%	10%	Mfr. procedure	Approved drg/data	Inspection Report	√	P/W	W	**W**	

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	Sign & Date	Name		Sign & Date	Name	Seal	
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Reviewed by:		R.K. RAINA	Reviewed by:		R.K. JAISWAL		

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	CUSTOMER :-- NLC TAMILNADU POWER LIMITED		QP NO.: PE-QP-999-145-I 006	DATE: 07.11.2020
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	ITEM: CONTROL VALVE	SYSTEM: C&I	SECTION: C	SHEET 4 OF 9

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECKED	CATE GORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	**			REMARKS
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9					
	COMPLETED VALVE							sheet						
		2. Opening/ Closing Time	MA	Measurement	100%	10%	Mfr. procedure	Approved drg/data sheet	Inspection Report	√	P/W	W	W	3
		3. Linearity/Cam characteristic	MA	Measurement	100%	10%	Mfr. procedure	Approved drg/data sheet	Inspection Report	√	P/W	W	W	
		4. Repeatability	MA	Measurement	100%	10%	Mfr. procedure	Approved drg/data sheet	Inspection Report	√	P/W	W	W	
		5. Hysterisis	MA	Measurement	100%	10%	Mfr. procedure	Approved drg/data sheet	Inspection Report	√	P/W	W	W	
		6. Sensitivity	MA	Measurement	100%	10%	Mfr. procedure	Approved drg/data sheet	Inspection Report	√	P/W	W	W	
		7. Accuracy(Overall)	MA	Measurement	100%	10%	Mfr. procedure	Approved drg/data sheet	Inspection Report	√	P/W	W	W	
		8. 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 drg/data sheet	Test Certificate	√	P/W	V	V	♦Size = Body & port size or Body size & CV for non std port. Refer Note 1.
		9. Operation of	MA	Function	100%	10%	Mfr. Procedure	Approved	Inspection	√	P/W	W	W	On assembled

BHEL						BIDDER/ SUPPLIER	
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	PROJECT: -- NTPL 2x500 MW TUTICORIN FGD	PO NO.: --	DATE: --
	ITEM: CONTROL VALVE / SYSTEM: C&I	SECTION: C	SHEET 5 OF 9

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	C/N				D	M	C	N	
		limit switch & solenoids and other accessories						drg/data sheet	Report					Valve.
		10.Overall dimensions	MI	Visual and dimensional	100%	10%	Approved drg/data sheet	Approved drg./ data sheet	Inspection Report	√	P/W	W	W	
		11.Pre defined valve position in case of air failure	MI	Visual and dimensional	100%	10%	Approved drg. / data sheet	Approved drg./ data sheet	Inspection Report	√	P/W	W	W	
		12.Cleanliness, painting, stamping (for direction of flow), Tag No.	MA	Visual and dimensional, paint thickness	100%	10%	Mfr. Procedure	Approved drg/data sheet	Test Certificate	√	P/W	W	W	
		13. Surface Quality	MA	Visual	100%	10%	ANSI/ MSS-SP-55	ANSI/ MSS-SP-55	Test Certificate	√	P/W	W	W	

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	CUSTOMER :-- NLC TAMILNADU POWER LIMITED		QP NO.: PE-QP-999-145-I 006	DATE: 07.11.2020
	PROJECT: -- NTPL 2x500 MW TUTICORIN FGD		PO NO.: --	DATE: --
	ITEM: CONTROL VALVE	SYSTEM: C&I	SECTION: C	SHEET 6 OF 9

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	C/N				D	M	C	N
5.0	**AUXILIARY ITEMS(Performance test of auxiliary items shall be performed on the completely assembled valve)** – Refer NOTE-7												
5.1	Positioner	Overall leakage after assembly including Nozzles leakage	MA	Leak Test (in the steady state input signal)	100 %	10%	Mfr. Standard	No leakage	--	√	P/W		
5.2	Air Filter Regulator	1.Normal air consumption	MA	Measurement	Each type	Each type	Mfr. Standard	No leakage	--	√	P/W		
		2.Overall leakage	MA	Visual(soap solution)	100 %	10%	Mfr. Standard	No leakage	--	√	P/W		
5.3	Air lock relay	Performance Test	MA	Leakage test	100%	10%	Mfr. Standard	No leakage	--	√	P/W		
5.4	Electronic position transmitter(not applicable if provided integral to smart positioner)	1. Accuracy	MA	Operation	100%	10%	Approved drg/datasheet	Approved drg/data sheet	--	√	P/W		

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	CUSTOMER :-- NLC TAMILNADU POWER LIMITED		QP NO.: PE-QP-999-145-I 006	DATE: 07.11.2020
	PROJECT: -- NTPL 2x500 MW TUTICORIN FGD		PO NO.: --	DATE: --
	ITEM: CONTROL VALVE	SYSTEM: C&I	SECTION: C	SHEET 7 OF 9

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	C/N				D	M	C	N	
5.5	Current to Pneumatic converter(not applicable for smart positioner)	1. Physical Verification Make/Model	MA	Visual	100%	10%	Approved drg/datasheet	Approved drg/data sheet	--	√	P/W			
		2. Degree of Protection	MA	IP/NEMA test	Each type	Each type	Relevant Standard	Relevant Standard	--	√	P/W			
		3. Linearity	CR	Measurement	100%	10%	Approved drg/datasheet	Approved drg/data sheet	--	√	P/W			
		2. Hysterisis	CR	Measurement	100%	10%	Approved drg/datasheet	Approved drg/data sheet	--	√	P/W			
5.6	Smart Positioner (As Applicable)	1. Physical Verification Make/Model	MA	Visual	100%	10%	Approved drg/datasheet	Approved drg/data sheet	--	√	P/W			
		2. Degree of Protection	MA	IP/NEMA test	Each type	Each type	Relevant Standard	Relevant Standard	--	√	P/W			
		3. Linearity	CR	Measurement	100%	10%	Approved drg/datasheet	Approved drg/data sheet	--	√	P/W			
		4. Hysterisis	CR	Measurement	100%	10%	Approved drg/datasheet	Approved drg/data sheet	--	√	P/W			

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	PROJECT: -- NTPL 2x500 MW TUTICORIN FGD		PO NO.: --	DATE: --
	ITEM: CONTROL VALVE	SYSTEM: C&I	SECTION: C	SHEET 8 OF 9

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	C/N				D	M	C	N	
		5. Calibration with Hand Held Communicator	MA	Measurement	Each type	Each type	Mfr. Standard	Mfr. Standard	--	√	P/W			
5.7	**Electrical items** (i) Limit Switches	1.Routine Test	MA	HV, IR, Continuity function	100%	10%	Approved Data sheet	Approved Data sheet	--	√	P/W			
		2.Degree of protection	MA	IP/NEMA Tests	One sample/ type	One sample/ Lot	Approved Data sheet	Approved Data sheet	--	√	P/W			
	(ii) Solenoids	1.Routine Test	MA	HV, IR, Continuity function	100%	10%	Approved Data sheet	Approved Data sheet	--	√	P/W			
		2.Degree of protection	MA	IP/NEMA Tests	One sample/ type	One sample /Lot	Approved Data sheet	Approved Data sheet	--	√	P/W			
	(iii)Position Transmitter(if provided externally)	1.Routine Test	MA	HV, IR, Continuity function	100%	10%	Approved Data sheet	Approved Data sheet	--	√	P/W			
		2.Degree of protection	MA	IP/NEMA Tests	One sample/ type	One sample /Lot	Approved Data sheet	Approved Data sheet	--	√	P/W			
6.0	**PAINTING**	Soundness of	MA	Visual and	100%	10%	Mfr. Standard	Mfr.	Inspection	√	P/W			Refer Note-2

BHEL					
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	ITEM: CONTROL VALVE	SYSTEM: C&I	SECTION: C	SHEET 9 OF 9

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	D	M	C	N
					M	C/N							
		Painting		Measurement				Standard	Report					
7.0	PACKING	Soundness of Packing against transit damage	MA	Visual	100%	100%	Mfr. Standard	Mfr. Standard	Inspection Report	√	P/W	V		Refer Note-3

NOTES:

1. Cv test shall be conducted at FCRI/laboratory approved by Govt. Of India/BHEL approved Laboratory.
2. Customer's specification for painting shall be included during project specific enquiry. In the absence of Customer's 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. Vendor to provide the following to BHELPEM for verification:
   a) Photographs of valves duly placed inside the wooden box just before final packing.
   b) Photographs of the wooden box (along with P.O. details mentioned) in which valves have been finally packed just before dispatch

   Clearance for dispatch of valves will be given only after receipt of the photos of valves in satisfactory condition as mentioned above.
4. IBR certificates in Form III-C shall be submitted if called for in the specification/datasheet.
5. 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.
6. BHEL reserves the right to conduct repeat tests, if required.
7. Valve manufacturer to arrange for C.O. C's (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, **C**:MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **N**:CUSTOMER(OWNER/END CLIENT), **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					
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	Technical specification for **Control Valves with Accessories** (Pneumatically Operated)	SPEC NO.: **PE-TS-483-145-I801**
		DOCUMENT NO.
		VOLUME II B
		SECTION C
		ISSUE NO. 2
		REV. NO. 00 DATE 08.11.2021

SECTION – C

BILL OF QUANTITY-MAIN SUPPLY

BHEL	Technical specification for **Control Valves with Accessories** (Pneumatically Operated)	SPEC NO.: **PE-TS-483-145-I801** DOCUMENT NO. VOLUME II B SECTION C ISSUE NO. 2 REV. NO. 00 DATE 08.11.2021

BILL OF QUANTITY-MAIN SUPPLY

[A] CONTROL VALVES COMPLETE WITH POSITIONER AND ALL ACCESSORIES MOUNTED, TUBED AND TERMINATED ON JB

[A]	**MAIN SUPPLY**		
SR. NO.	TAG NO	DESCRIPTION	TOTAL QTY
1	ACW10	ACW PMPs RECIR VLV	1
2	ECW10	DMCW PMPs RECIR VLV	1
[B]	**1/4 " SS TUBING(15 METER FOR EACH TAG)**		**30 METER**
[C]	**SS FITTINGS- FOR EACH TAG**		**1 LOT**
1	SS FITTINGS for connection to Air Filter Regulator- FOR EACH TAG		1 LOT
2	SS FITTINGS for connection to Air Lock Relay- FOR EACH TAG		1 LOT
3	SS FITTINGS for connection to IA Header Isolation Valve - FOR EACH TAG		1 LOT
4	SS EQUAL TEE - FOR EACH TAG		1 LOT
5	SS 1/2 " NPT(M) X 1/4 " OD TUBE CONNECTOR- FOR EACH TAG		1 LOT
[D]	Cv test		2 Nos.

BHEL	Technical specification for **Control Valves with Accessories** (Pneumatically Operated)	SPEC NO.: **PE-TS-483-145-I801**
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SECTION – C

BILL OF QUANTITY-SPARES

	Technical specification for **Control Valves with Accessories** (Pneumatically Operated)	SPEC NO.: **PE-TS-483-145-I801**	
		DOCUMENT NO.	
		VOLUME II B	
		SECTION C	
		ISSUE NO. 2	
		REV. NO. 00	DATE 08.11.21

LIST OF COMMISSIONING SPARES

S NO	ITEM DESCRIPTION	QUANTITY FOR STATION
1	Gaskets	2 (two) Sets. for each type of Control Valve
2	Gland Packing	2 (two) Sets. for each type of Control Valve

LIST OF MANDATORY SPARES

Sno.	DESCRIPTION	REQUIREMENT	QTY
1	Pneumatic Diaghragm for Diaghragm actuated valve	2(two) nos. for each type of Actuator	2
	Actuator Seal Kit for Pneumatic Cylinder actuated valve	2 (two) nos. for each type of Actuator	
2	Gland Packing	1 (one) set for each type of Control Valve	2
3	Plug, Seat, Cage, Stem etc.	1 (one) set for each type of Control Valve	2
	Retainer Ring, Seal Ring etc.	1 (one) set for each type of Control Valve	
4	Gasket	2 (two) Sets. for each type of Control Valve	4
5	Position Transmitter complete set/positioner	10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.	2
	Control Valve/Power Cylinder E/P Positioner complete Set	10% of total quantity used in the system or minimum 2 (two) nos. whichever is more for each type and model	
6	Position Limit Switch for Pneumatic type On/Off Valve/Power Cylinder	10 Nos. for each type & ratings	10
7	Air Lock Relay	10Nos. for each type	10
8	Signal Air Booster Unit	2Nos. for each type	2

NOTE

1. Wherever quantity has been specified as percentage (%), the quantity of mandatory spares to be provided by contractor shall be the specified percentage (%)of the total population of the plant. In case the quantity so calculated happens to be a fraction, the same shall be rounded off to next higher whole number.
2. 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 above list.

SECTION – D

- **EQUIPMENT SPECIFICATION (PES-145-06)**
- **SPECIFICATION FOR SMART POSITIONER (PES-145-06A)**
- **HOOK-UP DIAGRAM(PES-145-06B)**
- **GUIDELINES FOR PACKING(PES-145-06C)**
- **SUB-VENDOR LIST**

765231/2022/PS-PEM-C_I

BHEL	Technical specification for **Control Valves with Accessories** (Pneumatically Operated)	SPECIFICATION NO. **PE-TS-483-145-I801** DOCUMENT NO. VOLUME **II-B** SECTION **D** ISSUE NO. 2 REV. NO. 00 DATE : 08.11.2021

SECTION-D

EQUIPMENT SPECIFICATION (PES-145-06)

	SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)	SPECIFICATION NO.: PE-TS-483-145-I801
		DOCUMENT NO.: PES – 145 - 06
		VOLUME II B
		SECTION D
		ISSUE NO. 2
		REV. NO. 00 DATE : 08.11.2021

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.

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-483-145-I801	
		DOCUMENT NO.: PES – 145 - 06	
		VOLUME II B	
		SECTION D	
		ISSUE NO. 2	
		REV. NO. 00	DATE : 08.11.2021

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

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.

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-483-145-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-483-145-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

SECTION-D

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

FORM NO. PEM-6666-0

	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)	SPECIFICATION NO.: PE-TS-434-145-I801 DOCUMENT NO.: PES-145-06A VOLUME. II B SECTION D ISSUE NO. 2 , REV.00 | DATE 18.06.2016

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.

FORM NO. PEM-6666-0

BHEL	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)	SPECIFICATION NO.: PE-TS-427-145-I108 DOCUMENT NO.: PES-145-06A SECTION D ISSUE NO. 2 . REV.00 | DATE 24.12.2016

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

FORM NO. PEM-6666-0

BHEL	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)	SPECIFICATION NO.: PE-TS-427-145-I108 DOCUMENT NO.: PES-145-06A SECTION D ISSUE NO. 2 , REV.00 | DATE 24.12.2016

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	½-Npt, side or bottom entry to avoid water Ingress.

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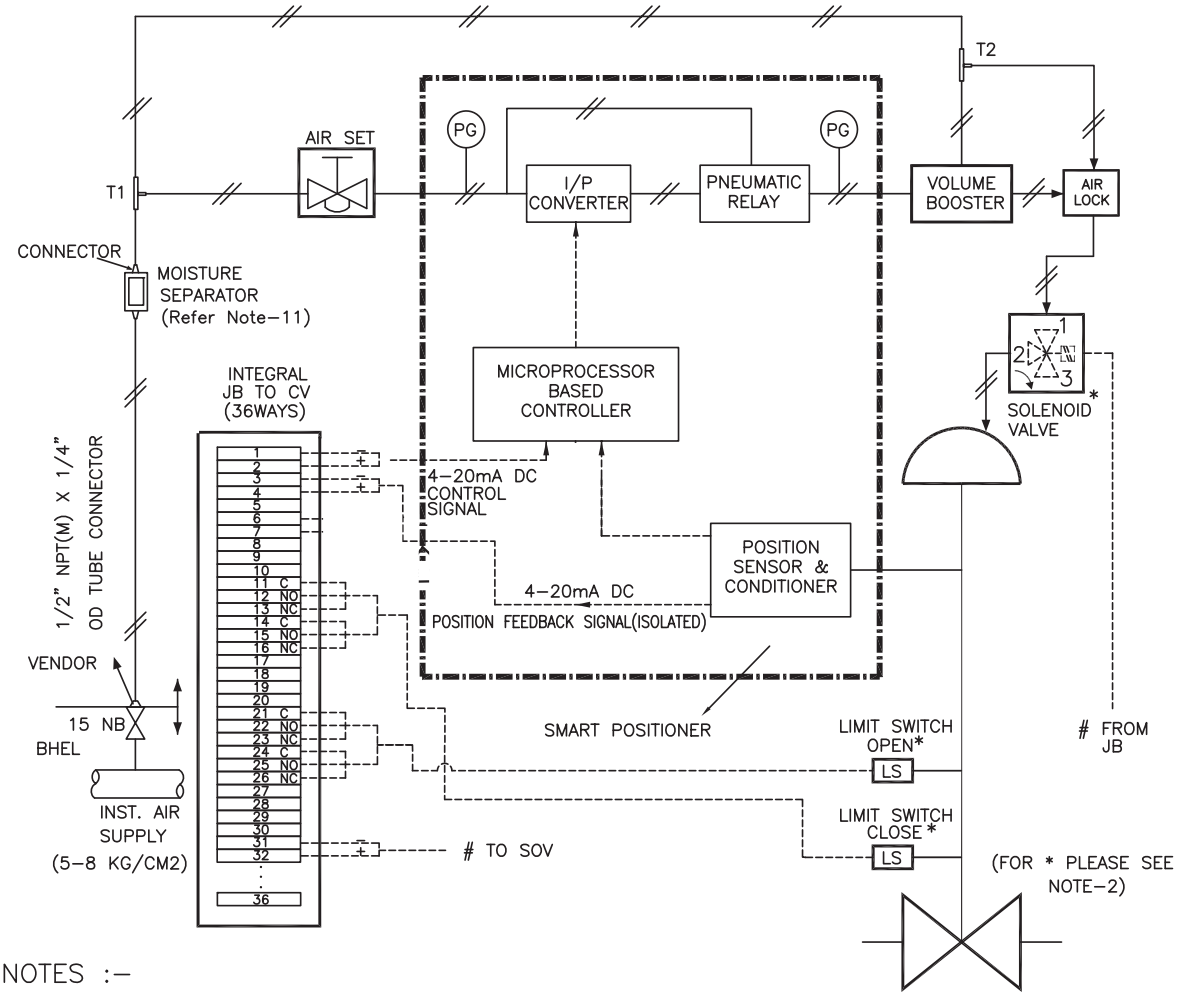
FORM NO. PEM-6666-0

SECTION-D

HOOK-UP DIAGRAM (PES-145-06B)

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



NOTES :–

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

BHEL

2 X 500 MW TUTICORIN FGD

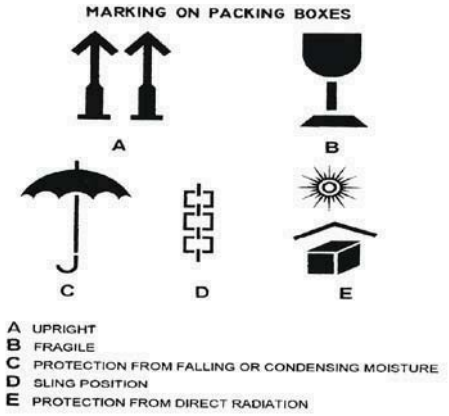
L1

SECTION – D

GUIDELINES FOR PACKING (PES-145-06C)

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)

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	Technical specification for **Control Valves with Accessories** (Pneumatically Operated)	SPECIFICATION NO. **PE-TS-483-145-I801** DOCUMENT NO. VOLUME **II-B** SECTION **D** ISSUE NO. 2 REV. NO. 00 DATE : 08.11.2021

SECTION-D

SUB-VENDOR LIST

NTPL- FGD_C&I Sub- Vendor List

S.No	Item	CAT-1	CAT-2
1	Junction Box	• PYROTECH • RITTAL • CHEMIN • BCH • PRAMMEN • HENSEL	• SAJAS ELECTRICALS • SHIBSHA INSTRUMENT INDIA P LTD • WIN POWER • ACE ELECTRICAL EQUIPMENTS (I) PVT LTD • SVG CONTROL SYSTEMS PRIVATE LIMITED • TECH-UP ENGINEERING PVT. LTD • SAHYADRI ELECTRO CONTROLS (INDIA) PRIVATE LTD., • SRI VISHNU INDUSTRIES • KEAS CONTROL SYSTEMS INDIA PRIVATE LIMITED • BALAJI ELECTROCONTROLS PVT. LTD., • MAIKA METALS PVT LTD • PANAM CONTROLS • TECHNO GRIP • SOUTH INDIA SWITCH GEAR CO. • ASSOCIATED ENGINEERS • MANISHA COMPOSITEK PRIVATE LIMITED • SUCHITRA INDUSTRIES • DEVI POLYMERS PRIVATE LIMITED • EPP COMPOSITES PRIVATE LIMITED • K.S. INSTRUMENTS PVT. LTD., • FICOM ENGINEERING PVT LTD

NTPL- FGD_C&I Sub- Vendor List

			• SHRENIK & COMPANY • ALLIED MOULDED ENCLOSURE PRODUCTS (INDIA) PVT LTD • K.S. INSTRUMENTS PVT LTD, • SHRENIK & COMPANY • SUDHIR SWITCHGEARS PVT LTD, • FLAMEPACK • BALIGA • FCG FLAMEPROOF CONTROL GEARS • ELECTROMECHANICAL
5	Terminal Blocks	• CONNECTWELL • ELMEX • PHOENIX • WEIDMULLER • WAGO	• ELMAX

NTPL- FGD_C&I Sub- Vendor List

8	Proximity sensor/switch	• OMRON • P&F • BRUEL & KAJER • MEGGITT	• GE • FORBES MARSHALL • MAGNUM CONTROLS • EM ELECTRONIX PVT. LIMITED • TECHNIC EUCHNER ELECTRONIC P L
9	Pressure Gauges/DP Gauge	• WIKA • AN INSTRUMENTS • BAUMER • H GURU • MANOMETER • GOA THERMOSTATIC • FORBES MARSHALL • GAUGES BOURDON (INDIA) PVT. LTD.	• WALCHANDNAGAR INDUSTRIES LTD. • PRECISION MASS PRODUCTS PVT. LTD • THERMAL INSTRUMENT INDIA PVT. LTD.

NTPL- FGD_C&I Sub- Vendor List

18	I/P Converters	• FAIRCHILD • IMI NORGREN	
19	Air Filter Regulator	• PLACKA • SHAVO NORGREN • NORGREN	• DIVYA CONTROL ELEMENTS PVT LTD • PARKER
20	Solenoid Valves	• AVCON • ASCO • HERION • DANFOSS	• ROTEX AUTOMATION LIMITED • IMI NORGREN HERION PVT. LTD
21	Power Cylinders	• INSTRUMENTATION LIMITED • SMC PNEUMATICS (INDIA) PVT. LTD	• KERALA STATE ELECTRONICS DEVELOPMENT CORPORATION LTD • VELJAN HYDRAIR LIMITED

NLC INDIA LIMITED NEYVELI

BHARAT HEAVY ELECTRICALS LIMITED PS-MKTG. NEW DELHI

NTPL- FGD_C&I Sub- Vendor List

			• GG PNEUMATICS & HYDRAULICS • NUCON PNEUMATICS PVT LTD • RMEBS CONTROLS PRIVATE LIMITED • DUNCAN ENGINEERING LIMITED • REXROTH • PARKER • EATON POWER • L&T

NLC INDIA LIMITED NEYVELI

BHARAT HEAVY ELECTRICALS LIMITED PS-MKTG. NEW DELHI

765242/2022/PS-PEM-C_I

	PRE-QUALIFICATION REQUIREMENTS FOR VENDOR REGISTRATION	PE-PQ-999-145-I001 REVISION NO. 00 DATE: 29.03.2022 SHEET NO. 1 OF 2

PROJECT: **2X500MW NTPL, TUTICORIN FGD**
PACKAGE: **CONTROL VALVE**

1.0 a.	Bidder should be Original equipment manufacturer (OEM) for CONTROL VALVE.
b.	In case bidder is not OEM, evaluation shall be done as following: 1. If bidder happens to be Indian subsidiaries of foreign OEM, then the credentials of the foreign OEM can also be considered for meeting PQR. 2. If bidder happens to be Authorized channel partner or having 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 scope of the work. The scope matrix shall include their respective roles including design vetting, manufacturing of critical component and warranty/guarantee. If bidder(s) qualifies on the basis of credentials of his principal/JV partner/Collaborator etc., then the principal/JV partner/Collaborator shall be responsible for overall design vetting and warranty/guarantee of the package. Accordingly confirmation from the principal/JV partner/Collaborator etc to be submitted along with the bid.
2.0	Bidder other than Category-1 (refer clause no. 6 of the PQR) to furnish documentary evidence to show that similar or higher capacity component/equipment / system has been supplied by the bidder or their associate/collaborator and the same has been operating satisfactorily for **two years on or before 18.04.2020.** The documentary evidence will be in the form of Performance certificates furnished by the end user. a. 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 parameter to be attached along with the performance certificate. b. All necessary credential/performance certificate shall be submitted along with the bid. Proven ness criteria are a pre-condition for qualification of bid.
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 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.

PREPARED BY	CHECKED & REVIEWED BY	APPROVED BY
Raveesh Kumar 30.03.22	30.03.2022	30.3.22
RAVEESH KUMAR MGR	S. S. BANSALA DGM	DIPESH PALIT GM (C&I, NBG, IPDS, DTG & PPDC)

765242/2022/PS-PEM-C_I

	PRE-QUALIFICATION REQUIREMENTS FOR VENDOR REGISTRATION	PE-PQ-999-145-I001
		REVISION NO. 00 DATE: 29.03.2022
		SHEET NO. 2 OF 2

6.

ITEM: Control Valve Vendor list	
Category-I	**Category-II**
MASONEILAN	FUJIKIN
EMERSON (FISHER)	FORBES ARCA
INSTRUMENTATION LTD	EMERSON PROCESS MANAGEMENT
KOSO INDIA PVT LTD	R K CONTROL INSTRUMENTS PVT. LTD.
MIL CONTROLS	SUZHOU DELAN ENERGY SCIENCE & TECHNOLOGY CO. LTD.
BOMAFA SPL. VALVE SOLUTIONS PVT LTD.	VALVITALIA S.P.A
FORBES MARSHALL ARCA PVT. LTD.	WALDEMAR PRUSS ARMATURENFAB RIK GMBH
MASCOT VALVES PVT. LTD.	
SAMSON CONTROLS PVT. LTD.	
SEVERN GLOCON INDIA PVT. LTD.	
GE OIL & GAS INDIA PVT. LTD	
COPES VULCAN	

PREPARED BY	CHECKED & REVIEWED BY	APPROVED BY
30.03.22	30.03.2022	30.03.22
RAVEESH KUMAR	S. S. BANSALA	DIPESH PALIT
MGR	DGM	GM (C&I, NBG, IPDS, DTG & PPDC)

TUTICORIN - 2X500 MW FGD - CONTROL VALVES & MANDATORY SPARES BOQ

[A] VALVE DETAILS

SR. NO.	Tag No.	Service	Total Qty. For Station	
1	PGB04AA001	DMCW PMPs RECIR VLV	1 No.	
2	PCB45AA001	ACW PMPs RECIR VLV	1 No.	
3	--	SS FITTINGS -Conn. to AFR	1 LOT for 2 CV	
4	--	SS FITTINGS -Conn. to IA HDR ISO VLV	1 LOT for 2 CV	
5	--	SS FITTINGS -Conn. to Air LOCK	1 LOT for 2 CV	
6	--	SS FITTINGS - Equal Tee	1 LOT for 2 CV	
7	--	SS TUBING	30 Mtr (15 Mtr/CV)	

[B] CV TEST CHARGES

SR. NO.	ITEM NO.	DESCRIPTION	Total Qty. For Station	
1	CV TEST CHARGES	CV TEST CONTROL VALVE	2	

[C] COMMISSIONING SPARES

SR. NO.	DESCRIPTION	VALVE BODY SIZE	Total Qty. For Station	
1	GASKIT	2 (two) Sets. for each type of Control Valve	2	
2	PACKING	2 (two) Sets. for each type of Control Valve	2	

[D] MANDATORY SPARES

SR.NO	ITEM NO.	DESCRIPTION	REQUIREMENT	QTY
1	CV-AC-06	Pneumatic Diaghragm for Diaghragm actuated valve	2(two) nos. for each type of Actuator	2
1a	--	Actuator Seal Kit for Pneumatic Cylinder actuated valve	2 (two) nos. for each type of Actuator	
2	CV-AC-17	Gland Packing	1(one) set for each type of Control Valve	2
3	CV-TRM-20.1	Plug, Seat, Cage, Stem etc.	1 (one) set for each type of Control Valve	2
3a	--	Retainer Ring, Seal Ring etc.	1 (one) set for each type of Control Valve	
4	CV-AC-18	Gasket	2 (two) Sets. for each type of Control Valve	4
5	CV-AC-27	Position Transmitter complete set	10% of total quantity used in the system or minimum 2(two) nos. whichever is more for each type and model.	2
5a	--	Control Valve/Power Cylinder E/P Positioner complete Set	10% of total quantity used in the system or minimum 2 (two) nos. whichever is more for each type and model	
6	CV-AC-24	Position Limit Switch for Pneumatic type On/Off Valve/Power Cylinder	10 Nos. for each type & ratings	10
7	CV-AC-19	Air Lock Relay	10Nos. for each type	10
8	CV-AC-21	Signal Air Booster Unit	2Nos. for each type	2
NOTES :-				

1. Wherever quantity has been specified as percentage (%), the quantity of mandatory spares to be provided by contractor shall be the specified percentage (%)of the total population of the plant. In case the quantity so calculated happens to be a fraction, the same shall be rounded off to next higher whole number.

2. 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 above list.