



BELLARY TPS Unit#3, 1x700MW

TECHNICAL SPECIFICATION
FOR CONTROL VALVES WITH ACCESSORIES
(Pneumatically operated)

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JOB NO. 367	TITLE TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH ACCESSORIES (Pneumatically operated)	DOC. NO. PE-TS-367-145-I 004			
	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA	DEPT	NAME	SIGN	DATE
		CODE	MS		05.12.2011
		I	SHB		05.12.2011

	PREAMBLE	SPECIFICATION NO. PE-SS-999-100-Q-001
		VOLUME
		SECTION
		REV. NO. DATE
		SHEET OF

1.0 The tender document contains three (3) volumes. The bidder shall meet the requirements of all the three volumes.

1.1 **Volume-I (CONDITIONS OF CONTRACT)**

This consists of four parts as below :-

Volume-IA : This part contains instructions to bidders for making bids to BHEL.

Volume-IB : This part contains general commercial conditions of the tender & includes provision that vendor is responsible for the quality of item supplied by their sub-vendors.

Volume-IC : This part contains special conditions of contract.

Volume-ID : This part contains commercial conditions for erection & commissioning site work, as applicable.

1.2 **Volume-II TECHNICAL SPECIFICATIONS**

Technical requirements are stipulated in Volume-II which comprises of :-

Volume-IIA : General Technical Conditions

Volume-IIB : Technical Specification including Drawings, if any.

1.2.1 **Volume-IIB**

This volume is sub-divided into following sections :-

Section-A : This section outlines the scope of enquiry.

Section-B : This section provides "Project Information".

Section-C : This section indicates technical requirements specific to the contract, not covered in Section-D.

Section-D : This section comprises of technical specifications of equipments complete with data sheet A, B and C.

Data Sheet - A specifies data and other requirements pertaining to the Equipment.

Data Sheet - B Specifies data to be filled by the bidder (Data Sheet-B is contained in Volume-III).

Data Sheet - C Indicates data/documents to be furnished after the award of contract as per agreed schedule by the vendor (as applicable).

1.2.2 **Volume-III TECHNICAL SCHEDULES**

This volume contains technical schedules and Data Sheets-B, which are to be duly filled by the bidder and the same shall be furnished with the technical bid as per instructions given in Document No. PE-SS-999-100-Q-002 in Volume-III.

2.0 The requirements mentioned in Section-C / Data Sheets-A of section-D shall prevail and govern in case of conflict between the same and the corresponding requirements mentioned in the descriptive portion in Section-D.

PARTICULARS	PREPARED BY	APPROVED BY
NAME	V M RAO	C L ABBEY
DESIGNATION	DGM	AGM & MR
SIGN. & DATE		



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: **PE-TS-367-145-I 004**

VOLUME II B

SECTION

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**KARNATAKA POWER CORPORATION LIMITED
BELLARY TPS Unit#3, 1x700MW**

**TECHNICAL SPECIFICATION
FOR
CONTROL VALVES WITH ACCESSORIES
(Pneumatically Operated)**

VOLUME II-B

SPECIFICATION No: PE-TS-367-145-I 004



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



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: **PE-TS-367-145-I 004**

VOLUME II B

SECTION A

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SECTION – A

SCOPE OF ENQUIRY



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

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VOLUME II B

SECTION A

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SCOPE OF ENQUIRY

1.0 SCOPE

- .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 and Mandatory Spares as mentioned in different sections of this specification for **Bellary TPS Unit#3, 1x700MW - KPCL**
- .2 The quality plan enclosed forms the minimum requirement but not limited to be adhered to by the bidder.
- .3 The enquiry shall be operated in "**COMPLAINE MODE**" means bidder to comply with the requirement of specification, quality plan, delivery schedule, quantities, start-up/commissioning spares, mandatory spares, recommended spares etc, and as a token of acceptance of the same, following formats to be signed, stamped with company seal and submitted for the project.
 - a) Compliance certificate
 - b) Quality plan
 - c) Schedule of price, unit prices, inspection schedule
 - d) Schedule of submission of drawings / documents, equipment manufacture inspection and dispatch
- .4 **No separate technical offer, data sheets to be submitted with the bid. Any such document shall not be taken cognizance of, and document (Compliance certificate) at 3 above shall be final and binding. Data sheets shall be furnished by the successful bidder (vendor), only after the award of contract & shall be subject to Purchaser's Approval.**
- .5 **Bidder to note that CV test is required to be conducted on one type per size, CV value. Bidder to group such valves and indicates the same along with the price bid. Unpriced portion to be submitted to engineering.**

2.0 GENERAL TECHNICAL INSTRUCTIONS

- 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 The omission of specific reference to any component / accessory necessary for the proper performance of the equipments shall not relieve the supplier of the responsibility of providing such facilities to complete the supply within the quoted prices.
- 3 BHEL's / Customer's representatives shall be given access to the shop in which the equipments are being manufactured or tested and all test records shall be made available to them.
- 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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SECTION B

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SECTION – B

PROJECT INFORMATION

KPCU/BTPS/03/EPC		KARNATAKA POWER CORPORATION LIMITED		SECTION: B
		BELLARY TPS, UNIT-3 OF 700 MW		VOLUME-II
		TITLE		SHEET 1 OF 2
		PROJECT INFORMATION		
1.0	Owner	Karnataka Power Corporation Ltd Shakthi Bhavan No.82, Race Course Road Bangalore-560 001 Karnataka, India		
2.0	Project Title	1x700 MW Bellary Thermal Power Station Unit No3, Stage-3		
3.0	Location	Kudatini Village Bellary Dist Karnataka state INDIA		
4.0	Latitude and Longitude	15° 11' 58" N Latitude 76° 43' 23" E Longitude		
5.0	Elevation above mean sea level	478 meters		
6.0	<u>Climatic Conditions</u>			
	(a) <u>Temperature</u>			
	i. <u>Monthly basis</u>			
	Mean of daily maximum temperature	42.5° C (in the month of April)		
	Mean of daily minimum temperature	19.5° C (in the month of Dec)		
	ii. <u>Monthly basis</u>			
	Mean of daily maximum	37.5° C		
	Mean of daily minimum	19.5° C		
	iii. Highest temperature recorded			
	Lowest temperature recorded	14.6° C		
	(b) Relative Humidity			
	Varies between 11% and 70%			
	(c) <u>Rainfall</u>			
	Annual average rain	492 to 846 mm most of which occurs during August to October		
	(d) <u>Wind Speed</u>			
	i. Annual mean wind speed	8.4 km / hr		
	ii. Maximum mean wind speed	19 km / hr in the month of July.		
8.0	Wind Load			
	(a) Basic wind speed of 39 m/sec as given in Fig.1 of the code.			
	(b) Factor K1 shall be taken as 1.06			
	(c) Terrain category shall be 2 and corresponding values shall be taken for K2			
	(d) Factor K3 shall be taken as 1.0			
9.0	Wind Loading for Stack			
	(a) For wind pressure as per clause 8.0 above			
	(b) For RC stacks as per IS: 4998			
10.0	Seismic data (as per IS:1893 latest issue)			
	(a) Zone			
	(b) Importance factor (I)			
11.0	Auxiliary power supply			
	Auxiliary electrical equipment to be supplied against this specification shall be suitable for operation on the following supply system.			



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SECTION – C

SPECIFIC TECHNICAL REQUIREMENTS



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1.	Specific Technical Requirements	3
2.	Hook-up Diagram for Control valve	1
3.	Customer Specification: Section D3.4, Volume-IV (Sheet 66, 67 of 73)	2



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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.

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-C. the scope demarcation as indicated should be adhered. The connection details at Instrument Air valve shall be furnished to successful bidder after the award of contract.
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 24 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.



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15. All JB's and valves shall be with double compression type Ni plated brass cable glands.

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

17. All local cabling upto JB's shall be in Conduit (Flexible/Rigid). If JB is not mounted near valve

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

(A) Mandatory Spares:

The items listed in list of mandatory spares attached at section-D, of this specification, are the essential spares required to be offered by the bidder, and the price for which (Lump sum as well as individual) for each item to be quoted separately under the separate heading. The format for price schedule to be filled-up by the bidder is enclosed in Volume-III

The prices for Mandatory spares indicated by the bidder shall be used for bid evaluation purposes.

Each Case / Container containing Mandatory spares shall be clearly marked or labelled on the outside with the description of the spares contained in it. When more than one items of spare parts are packed in a single Case / Carton, a general description of the contents shall be shown outside of such case, and detailed list enclosed. All Cases, Containers and Packages must be suitably marked and numbered for the purpose of identification.

(B) Recommended Spares:

In addition to the Mandatory spares mentioned, the bidder shall also furnish a List of Recommended spares for 3 years of normal operation of the Control valves / Accessories. The BHEL/Customer reserves the right to buy any or all of the recommended spares.

The prices of these spares will remain valid for a period of minimum 6 months after the placement of order.

(C) 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-D 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.



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20. Documentation:

(A) Along with the bids: following documents for the project

- a) Signed and stamped compliance certificates in attached format(VOL.-III).
- b) "Schedule of prices" and "Schedule of unit Prices" in attached format (VOL.-III).
- c) Schedule of submission of Drg. / Doc, Equip. Manufacture, Inspection and Dispatch.
- d) Inspection schedule
- e) Quality Plan Duly signed and Stamped

(B) 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 with the bids for Approval:

- 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. Quality Plan duly signed and stamped.
- g. All calculations like CV, Noise Level, Valve Outlet Velocity, Actuator sizing etc.
- h. All relevant catalogues for the models of the valves as well as accessories finalised.
- i. Bar chart to indicate the time schedule for procurement, manufacture, testing and dispatch.

(B) Final documentation:

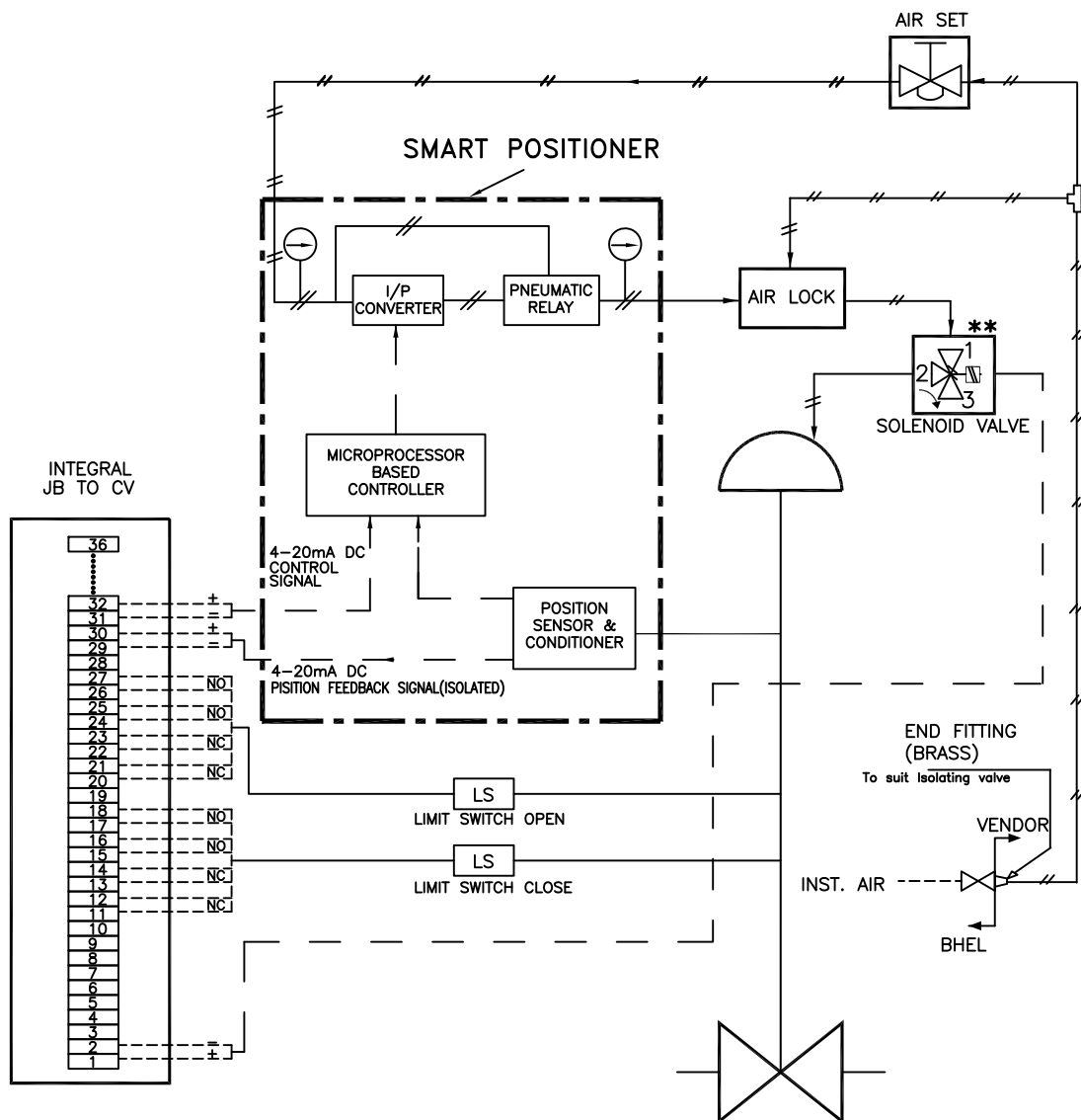
The documentation as listed below will separate for respective projects

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.



TITLE


CONTROL VALVE HOOK-UP DIAGRAM WITH SMART POSITIONER KPCL-BELLARY#3, (1 x 700 MW)




NOTE:—

1. SOLENOID VALVE WILL BE PROVIDED ONLY FOR ON/OFF DUTY VALVES & FOR CONTROL VALVES WHERE OPEN/CLOSE INTERLOCK IS REQUIRED AND INDICATED IN RESPECTIVE DATA SHEETS.
2. SOLENOID VALVES PORT CONDITION:
PORT 1 & 2 SHAL BE CONNECTED UNDER DE-ENERGISED CONDITION.
PORT 2 & 3 SHAL BE CONNECTED UNDER ENERGISED CONDITION.
3. FOR ON/OFF DUTY PNEUMATIC CONTROL VALVE, SMART POSITIONER SHALL NOT BE APPLICABLE.
4. JB TERMINALS SHALL BE CAGE CLAMP TYPE SUITABLE FOR 2.5 SQ. MM COPPER WIRE.
5. 15 METERS 1/4 " PVC COATED COPPER TUBING AND 1 SET OF FITTINGS TO BE SUPPLIED FOR EACH CONTROL VALVE FOR CONNECTION TO ISO VALVE AT INST AIR HEADER ON ONE END AND TO AIR LOCK RELAY/AIR FILTER REGULATOR ON THE OTHER END.
6. VOLUME BOOSTER IF REQUIRED SHALL BE PROVIDED.

** APPLICABLE TO VALVES WHERE OPEN/CLOSE ACTION REQUIRED ON INTERLOCK CONDITION

	KARNATAKA POWER CORPORATION LIMITED BELLARY TPS, UNIT-3 OF 700 MW		SECTION: D3.4 VOLUME-IV SHEET 67 OF 73
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welded for sizes 50 NB and above. Flanged connection shall be provided for DM water services, with suitable rubber lined interfaces. Water seal shall be provided for valves that could be subjected to below atmospheric conditions.			
49.00.05	Generally stem and guide material(trim) shall be SS 316 sterilized, and plug and seat material will be 17-4 PH SS, except for specific applications like DM water, HP bypass services. Refer to Table-5 for selection of control valve body material and actuator type. The noise abatement shall be obtained by valve body and trim design and not by use of silencer. The trims supplied shall be suitable for quick changing. Actuator housing shall be of pressed steel construction.		
49.00.06	In Vibration prone areas, positioners shall be located away from the control valve/damper and location shall be approved by OWNER/ENGINEER. Position transmitter shall be non-contact type.		
49.00.07	The control valve design shall be suitable for the required fail-safe conditions, of process / equipment. The valves shall be supplied and commissioned as per the fail-safe philosophy required for the process. Wherever the required turndown is not possible with a standard single valve, specially designed trims shall be customised and used. Pressure regulators upstream of control valves would not be envisaged.		
49.00.08	All final Control elements (Control valves & control dampers) shall be with pneumatic or electric actuators. All actuators would be sized so that the final control elements operate properly even when the upstream pressure exceeds 110% of maximum value. Pneumatic actuators would be provided with air failure lock and remote release, limit switches, adjustable minimum and maximum stops, load position indicators, positioners, non-contact type electronic position transmitters and solenoid valves in accordance with the system requirements.		
49.00.09	SMART positioners shall be provided for all pneumatic operated control valves/dampers. For the services in heat prone area Integral type positioners shall be offered. The type of actuator shall be pneumatic type except Governing valves, HP/LP bypass services for which hydraulic actuator shall be used.		
50.00.00	Programmable Logic Controllers (PLC): For systems mentioned in Table-I:		
50.00.01	The microprocessor shall be based on 32 bit processing. The programme memory shall be non volatile memory. The PLC shall perform protection logic, interlock and sequential control functions such as binary logic operation, set/reset operation, timers, counters, logic blocks, maths functions, boolean functions & timer functions. PLC shall complete with processor, I/O cards, memory modules, racks, mounting accessories. The scan time for digital inputs shall not be more than 60msec and execution 120msec. The system shall be loaded to maximum 60% under worst loading conditions.		

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displayed in the form of bar charts and alarms shall be generated on occurrence of tube leakage. One speaker, power supply failure alarm and steam leak alarm shall be provided.				
The system shall be capable of operating in presence of soot blowers in operation and insensitive to the presence of nearby echo-inducing surfaces. Separately isolated 4-20mA DC analogue signals shall be provided for monitoring acoustic level for tube leaks. Bidder shall provide necessary acoustic signal generator, signal receiver, transducer with microphone, amplifier, required cables/junction box, remote control panel, 24" TFT monitor, alarm contacts to DDCMIS and all other accessories, air purging system, signal processor & controller, dust, water & weather proof control cabinet, connecting cables and interface to SBC system.				
48.00.00	Master Clock System: The existing master clock system of unit-1 shall be used for providing synchronising signal to DDCMIS. Provision of additional 20 ports and 20 nos slave display units shall be provided. The required hard ware and software including cables for connectivity from unit-1 and slave display units shall be considered.			
49.00.00	Control Valves: Multistage, anticavitation, Balanced, modulating, globe type, cage guided, single ported, diaphragm type of actuator with hand wheel, Pneumatic positioners, air filter regulator, air lock device, solenoid valve, limit switches and position transmitters completely tubed with junction box. E/P converters suitable for accepting 4-20mA DC signal. Pneumatic (copper) tubing complete with accessories, fittings, positioners shall be provided with input/output/bypass gauges. Local position indicator & LVDT type position transmitter with 2 wire, 4-20mA DC output. All limit switches/position transmitters, E/P converter signals etc., shall be wired out to external block of actuator and respective junction boxes.			
49.00.02	Control valves shall be sized to have an opening of 15% at minimum flow condition and 85% at maximum flow condition. Noise level shall not exceed 85 dB at a distance of about 1.5 M from the valve. In case of predicted noise level above 85dBA, suitable low noise trim shall be provided.			
49.00.03	Leakage class for double seated valve shall not exceed 0.05%, and single seated valve shall not exceed 0.01%. Either extended type bonnet or cooling fin type bonnet shall be provided for service above 200°C and for other service the bonnet type shall be standard.			
49.00.04	The end connections shall be socket welded for sizes below 50 NB and butt			



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SECTION D

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EQUIPMENT SPECIFICATION
DATA SHEETS - A&B
DATA SHEETS - C
QUALITY PLAN
BILL OF QUANTITY
SPARES
SUBMISSION OF DRAWING



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SECTION D


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SECTION – D

EQUIPMENT SPECIFICATION

	SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)	SPECIFICATION NO.: PES – 145 - 06		
		VOLUME	II B	
		SECTION	D	
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1.0 SCOPE

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) for use in Utility/Captive Power Station/Combined Cycle Station.

2.0 CODES AND STANDARDS

2.1 All the equipments specified herein shall comply with the requirements of the latest issue of the relevant National and International standards.

2.2 The Design and Materials used for the components shall also comply with the relevant National and International standards.

2.3 As a minimum requirement, the following standards shall be complied with :

Indian Boiler Regulation (IBR)	:	
Allowable Seat leakage	:	ANSI-B16.104 / FCI-70.2
Pressure & Temperature ratings	:	ANSI-B16.34
Enclosure class	:	IEC-144 / NEMA / IS-13947
Control Valves	:	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 0-55°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 operating conditions and system characteristics as specified in the Data Sheet-A.


3.1.1 The control valve shall be of globe body design with single port. The valve trim, shall be suitable for quick removal without any cutting or welding.

3.1.2 The material of body, internals and packing shall be as specified in the data sheets. Alternatives, considered more suitable for service specified may be given as alternative offer, along with adequate justification. However main offer shall totally meet specification requirements. Asbestos shall not be used for the packing or any other component.

3.1.3 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. Bonnets having teflon packing shall have valve stem finished to 2-4 microns. Packing material requiring lubrication will not be acceptable. Justification for proper selection of bonnet & packing shall be furnished in the bid.

3.1.4 The valve end connection as specified in Data Sheet-A shall conform to ANSI B16.25 for Butt Weld connection and ANSI B16.5 for flanged ends. End to end dimension shall be as per ANSI 16.10.

3.1.5 The valve seat leakage shall be as per ANSI B16.104 / FCI-70.2. The leakage class shall be as per Data Sheet-A.

	SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)	SPECIFICATION NO.: PES – 145 - 06		
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3.1.6

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

3.1.7

The sizing shall conform to the requirements of ANSI/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.

3.1.8

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 implication.

3.1.9

Suitable justification and evidence shall be furnished regarding proper selection of the valve.

3.1.10

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

i)

Liquid service

<=

7 Metres/Sec.

ii)

Steam service

<=

1/3 Sonic velocity in the flow medium.

3.1.11

For flashing duty, the 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


In case of predicted noise level above 85 dBA, suitable low noise trim or inbuilt diffusers shall be provided to bring down the noise level below 85dBA.

3.1.14

The equivalent weighted sound level measured at 1.5M. above floor level in elevation and one metre horizontally from the control valve expressed in decibels to a reference of 0.0002 microbar shall not exceed 85 dBA (without pipe insulation). The offer shall include noise prediction calculations for each valve.

3.1.15

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.

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3.2 Pneumatic Actuator

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 and shut off pressure.

3.2.1 The pneumatic spring opposed diaphragm actuator 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 20 seconds under the most stringent service conditions.

3.2.5 The actuator shall be painted with epoxy based paint.

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 tube and flare less brass fittings (Refer typical hook up diagram in sheet 12 of 12).

3.3.1 Hand wheel


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

3.3.2 Local Position Indicator

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

3.3.3 Position Transmitter

The position transmitter shall be supplied as indicated in Data Sheet-A. The electronic position transmitter shall be non-contact type with 4-20 mA DC 2-wire output suitable for 12-50V DC supply. The resistance type position transmitter shall have 0-100 ohm variation for valve position change of 0-100%. The position transmitters of both types shall have accuracy and enclosure class. Necessary cable glands shall be supplied.

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3.3.4

Air Filter Regulator

Instrument quality air at suitable pressure of 5.5 Kg/Cm2(g) to 7 Kg/Cm2(g) shall be supplied to each valve through air filter regulator. The filter regulator shall include an inbuilt blow-down valve, 5 micron size filter. The design pressure for regulator shall be 7 Kg/cm2g. The Air filter regulator shall be selected to meet the requirements of positioner/actuator, E/P convertor and air-lock. The flow capacity of the Air filter regulator shall be variable with a knob. Output gauge shall be provided wherever pneumatic positioner is not specified for the valve.

3.3.5

Air Lock Relay

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

3.3.6

Solenoid Valves

Solenoid valves are meant for interlock & protection purposes overriding the controller signal, and/or to result stayput action on controller signal failure. The Solenoid valve shall be 3-way **Universal** type and the valve internals shall be of stainless steel. The coil shall have class-H insulation and rated for continuous AC/DC duty as specified in Data sheet-A. The enclosure shall be to IP-55. Cable gland shall be provided for cable entry. The solenoid shall in general conform to IS-8935. The solenoid operation shall be universal type. The solenoid shall be suitable for 24V DC supply, unless specified otherwise in Data Sheet-A.

3.3.7

Limit Switches

Limit switches are required as specified in the data sheet-A. Each limit switch shall have 2NO+2NC contacts with contact rating of 5A at 240V AC/0.2A at 220V DC unless otherwise specified. The switch enclosure shall conform to IP-55. Each limit switch shall be supplied with cable glands.

3.3.8

I/P Converter

I/P Converters shall preferably be of force balance type and shall produce pneumatic output signal corresponding to input current signal, also specified in Data Sheet. Converter electronics shall be protected against reverse connection of signal polarities and a separate external connection shall be provided to facilitate grounding of instrument casing. Cable glands with neoprene gromets suitable for PVC cables shall be provided. I/P convertor shall have span adjustment facility. I/P convertor enclosure shall conform to IP-55 enclosure class.

3.3.9


Positioner

Positioner shall be suitable for accepting controller output signal 0.2-1.0 Kg/cm2, 0.2-0.6 Kg/cm2 or 0.6-1.0 Kg/cm2 as specified and give an output suitable for the actuator. Pneumatic positioner shall have 3 gauges. All gauges shall have metric scales. The positioner input signal range shall be adjustable. Wherever applicable, it shall be possible to bypass the positioner by means of a switch. **Linearity and Hysteresis shall be as indicated in Data sheet-A**

3.3.10

Electro pneumatic Positioner

In place of separate E/P Converter and pneumatic positioner a combined electro pneumatic positioner can also be supplied. The electro pneumatic positioner shall have 2 gauges.

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3.3.11

Junction Box

Wherever specified, an integral junction box with all electrical accessories conduited up to JB shall be supplied. The junction box shall have two (2) cable glands for outgoing cables. Junction box shall have enclosure class of IP-55.

3.4

Guarantee & Performance

3.4.1

The overall performance of the control valve with pneumatic actuator assembly shall be as follows:-

i)

Hysteresis

:

± 1% of span

ii)

Linearity

:

± 2% of span

iii)

Sensitivity

:

± 0.5% of span.

iv)

Repeatability

:

± 1% of span

v)

Accuracy (Overall)

:

± 2% of span

3.4.2

The guarantee for the control valve, pneumatic actuator & accessories shall be for 12 months continuous operation from the date of commissioning, unless specified otherwise in VOL-IIB Section-B or Section-C.

3.5

Electric Actuator

The electric actuator shall be employed for modulating duty.

3.5.1

The actuator assembly shall be complete with drive motors, gears, hand wheel, signaling & switching units, associated control, integral starter, (when specified) and other accessories as required.

3.5.2

The Electric Actuator shall be capable of positioning the associated valve at the desired opening for all the operating conditions.

3.5.3

The motor shall meet the requirements of Current, torque, Axial thrust, Accelerating & stall time as imposed by the driven equipment.

3.5.4

The motor shall be suitable for direct on line starting.

3.5.5

Motors shall be suitable for inching & plugging duty operations.

3.5.6

The motors shall be capable of starting and accelerating to rated speed at 85% of rated voltage.

3.5.7

The motors shall be rated for continuous operations for modulating duty.

3.5.8

The motor shall operate satisfactorily under the following conditions:

i)

±10% supply voltage variation at rated frequency.

ii)

-5% to + 3% variation in frequency at rated supply voltage.

iii)


Simultaneous variation in voltage and frequency, the sum of absolute percentage not exceeding 10%.

3.5.9

The Actuator shall be suitable for mounting directly on the valve and shall be suitable for mounting in any position. Supports required for inclined mounting shall form part of supply of valve assembly.

3.5.10

The actuator shall be capable of producing the required torque and thrust at the output shaft for satisfactory operation of the associated valve.

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3.5.11 Each actuator shall have a hand wheel for emergency operation. The hand wheel shall be designed such that it is declutched automatically when the power supply to the motor is restarted.

3.5.12 The hand wheel shall be so arranged that when looking from hand wheel, the valve is closed by rotating the hand wheel in clockwise direction.

3.5.13 Motor shall be totally enclosed conforming to IP-65 or better as per data sheet. The enclosure shall be suitable to protect the motor from leakage steam, water or oil from valve joints and glands.

3.5.14 Where flameproof enclosures are specified, it shall meet the specification IS-2148.

3.5.15 Insulation shall be at least class-B or better and shall be tropicalised to withstand the atmospheric condition.


3.5.16 The actuator shall be provided with antifriction bearing in grease filled cartridge.


3.5.17 Each actuator shall be provided with a mechanical position indicator to indicate accurately the valve position.

3.5.18 The integral starter, if specified in data sheet-A, shall be provided in weatherproof enclosure with protection class not less than IP-65 or better as per data sheet.

The integral starter shall consist of:

- Mechanical & Electrically interlocked reversing contractors suitable for class AC4 duty or Thyristor as per data sheet.
- Thermal overload relay.
- Step down control transformer with fuses.
- Interposing relay.
- Monitoring relay..
- Open, Close & Stop push buttons.
- Indicating lamps.
- Local-Remote lockable selector switch with spare potential free contacts, wired for remote interface.
- A potential free contact shall be provided for remote annunciation of power failure/overload condition. The contact shall be SPDT, rated for at 5A 240V AC or 0.2A at 220V DC.

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3.5.19 The actuator shall be suitably time rated for the duty cycle involved with the necessary number of starts per hour, but in no case, less than 1200 starts per hour.					
3.5.20 The actuator shall be provided with a suitable control unit for receiving 4-20 mA signal from remote controller.					
3.5.21 The servomotor gear should have self locking or suitable brake so as to maintain it's last position as and when the motor power is switched off.					
3.5.22 Thermostat/Thermistor as specified in the data sheet shall be provided for sensing the winding temperature and giving trip command. The trip contact shall be change over type. The contact shall be wired up to the actuator terminal box.					
3.6 Accessories for Control Valve with Electric Actuator					
3.6.1 Torque Switches					
i) Each actuator shall be provided with at least one open and one close torque switches each with 2 NO+2 NC contacts. The contacts shall be rated for 5A at 240V AC or 0.2A at 220V DC.					
ii) The torque switches shall have a minimum accuracy $\pm 3\%$ of set value.					
iii) The torque switches shall be provided with calibrated knobs for setting desired torque. Separate knobs shall be provided for close and open torque switches.					
iv) The torque switches shall be provided with mechanical latching device to prevent operation when unsealing from the positions. The latching device shall unlatch as soon as the valve leaves the end position. If such provision is not possible, the torque switches shall be bypassed by end position limit switches, which open on valve leaving end position. These limit switches are additional to the number of limit switches specified elsewhere.					
v) The torque switches or worm gear shall be self-locking type so that when torque switch operates it remains operated until the actuator is operated in the reverse.					
vi) The torque switch enclosure shall conform to IP-55.					
3.6.2 Limit Switches					
Each limit switch shall have 2NO+2NC contact with contacts rated for 5A 240V AC/0.2A 220V DC unless otherwise specified. The switch enclosure shall conform to IP-55. Each limit switch shall be supplied with cable glands.					
3.6.3 Space Heater					
A space heater shall be provided in limit switch and starter compartments to prevent condensation. This shall be suitable for the power supply specified in the data sheet. Where integral starters are provided the space heaters shall be wired to control supply within the actuator.					

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3.6.4 Remote Position Transmitter

The position transmitter shall be supplied as indicated in Data Sheet-A. The electronic position transmitter shall be non-contact type with 4-20mA DC 2-wire output suitable for 12-50V DC supply. The resistance type position transmitter shall have 0- 100 ohm variation for valve position change of 0-100%. The position transmitters of both types shall have $\pm 1\%$ accuracy. The enclosure shall conform to IP-55. Necessary cable glands shall be supplied.

3.6.5 Wiring

- The actuator and the accessories will be neatly wired up to the terminal boxes.
- The internal wiring shall be minimum of 1 mm² stranded PVC insulated copper conductor.
- The wiring shall be identified by means of numbered ferrules on both ends of all wires.

3.7 Terminal and Terminal boxes

3.7.1 Motor Terminal Box

- The terminals, terminal boards, terminal boxes, winding tails and associated equipment shall be suitable for connection to supply system having short circuit capacity specified in data sheet and clearance time determined by the associated fuses.
- The terminals shall be stud type insulated from the frame. The insulation shall not be porcelain. The studs shall be of brass or stainless steel or phosphor bronze of adequate size.
- The terminal box shall be totally enclosed conforming to degree of protection IP-65.

3.7.2 Actuator Terminal Box

- All terminals of limit and torque switches, space heater, position transmitters, thermostat/thermister shall be brought to a common terminal box. The enclosure shall be to degree of protection IP-65.
- Terminal board with plug in connector shall be provided. Alternatively stud type or insertion type may be considered. Pinch screw type however will not be accepted. All terminals shall be shrouded to prevent accidental contact. Where stud type terminals are offered, it shall be as per clause 3.7.1 (ii).
- There shall be at least five terminals spare to terminate spare cores of cable.

3.7.3 Cable Glands


The motor terminal box and actuator terminal box shall be provided with required number of double compression nickel plated brass cable glands to suit cable type and associated size.

3.7.4 Earthing Terminal

Two earthing terminal shall be provided on either side of motor and actuator terminal box.

3.7.5 Painting

The Actuator shall be painted with epoxy-based paint.

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4.0 TESTING AND INSPECTION

4.1 The bidder shall adopt suitable quality assurance plan to ensure that the equipments offered will meet the specification requirements in full.

4.2 The bidder shall furnish the Quality Plan in the format enclosed in volume-III. In case the Quality Plan(s) is/are included in volume-IIB, the bidder shall furnish his Quality Plan strictly in line with the same. The Quality Plan shall be discussed and finalised with the technically accepted bidders before opening the price bid. The stages where purchaser would like to be associated for witnessing or verification of tests would be indicated by the purchaser in the Quality Plan before approval.

4.3 The following test shall be conducted as a minimum requirement.

4.3.1 Control Valve

- i) Radiographic tests on castings.
- ii) Dye penetrant tests on machined surface.
- iii) Ultrasonic tests for the forgings & bars of all valves with 60 Kg/cm² & higher ratings.
- iv) Hydrostatic tests as per ANSI B 16.34 prior to seat leakage tests.
- v) Valve closure and seat leakage tests as per ANSI B 16.104 / FCI-70.2.

4.3.2 Pneumatic Actuators

Functional test of actuator and each accessory.

4.3.3 Electric Actuator

- i) Routine tests on motors as per IS: 325.
- ii) Functional test on actuator and each accessory.
- iii) Insulation resistance and high voltage test.
- iv) Stall current & Stall torque test.
- v) Output shaft speed and torque of actuator and corresponding current tests.

4.3.4 Control valve with Actuator & Accessories fully assembled


- i) Functional tests of control valve operation along with actuator & accessories.
- ii) Dimension checks.

4.3.5 Type tests or Test Reports

- i) Valve lift vs. Flow test (Cv Test)
- ii) Degree of protection tests for the enclosures
- ii) Temperature rise test (applicable for Electrical Actuator only).
- iii) Type test for motor as per IS: 325.

4.4 Inspection will be conducted by BHEL and/or their authorised representatives as per the agreed inspection schedule. The inspection schedule will be submitted by the bidder, for BHEL's approval at contract stage. The cost of all tests and inspections will be deemed to have been included in the bid. For all the type tests covered under 4.3.5 above, "Type Test Certificates" as per agreed Quality Plan shall be furnished. In the absence of the same, such Type Tests shall be arranged at the Vendor's works in the presence of BHEL and/or their authorised representatives or in independent Test House/Laboratory approved by BHEL.

4.5 The Standard QP is included in this specification to enable bidder to understand the extent of inspection and testing requirements to execute this job. The successful bidder has to follow the agreed QP, taking care of customer requirements mentioned in Sec-C and submit QP for final approval by BHEL / Customer.

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5.0 SPARES AND CONSUMABLES

5.1 Commissioning Spares and consumables

As part of the main equipment supply, the bidder shall supply all commissioning spares and consumables required during Start-up,

5.2 Mandatory Spares

The bidder shall offer along with main offer, the Mandatory Spares as specified in Volume IIB Section-C of the specification. The Mandatory Spares offered shall be of the same make and type as the main equipment.

5.3 Recommended Spares

The bidder shall furnish a list of Recommended Spares along with the normal service expectancy period and frequency of replacement; quantities recommended for 3 years operation along with unit rate against each item to enable BHEL / BHEL's Customer to place a separate order later, if required.

5.4 Special Tools & Tackles

The bidder shall furnish a list of Special Tools & Tackles included in the bid.

6.0 DRAWINGS AND DOCUMENTS

6.1 The bidder shall furnish the following documents in required number of copies along with the bid:

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

6.1.2 Wiring diagrams for Electrical Actuators.

6.1.3 Hook up diagrams of Control Valve with Actuator & accessories.

6.1.4 Valve & actuator assembly dimensional drawings with weights.

6.1.5 Quality Plan

6.1.6 All relevant Catalogs with detailed technical information.

6.1.7 Bar-chart to indicate the time schedule for procurement, manufacture, testing and despatch.

6.2 The successful bidder shall furnish the following documents in required number of copies to BHEL during the contract stage:

6.2.1 For approval

- i) Dimensional drawings.
- ii) Installation drawings with overall dimensions of the completed equipment and clearances for operation and maintenance.
- iii) Data sheet-C, completely filled-up along with all the enclosures including the sizing calculations & noise calculations.
- iv) Quality Plan.
- v) Test Certificates.



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

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6.2.2 Final / As-built Drawings

Final / As-built drawings / CDs in required number of copies shall be submitted.

6.3 Operation & Maintenance Manuals

O&M Manuals in required number of copies shall be submitted. O&M manuals shall also contain storage and commissioning instructions.

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.

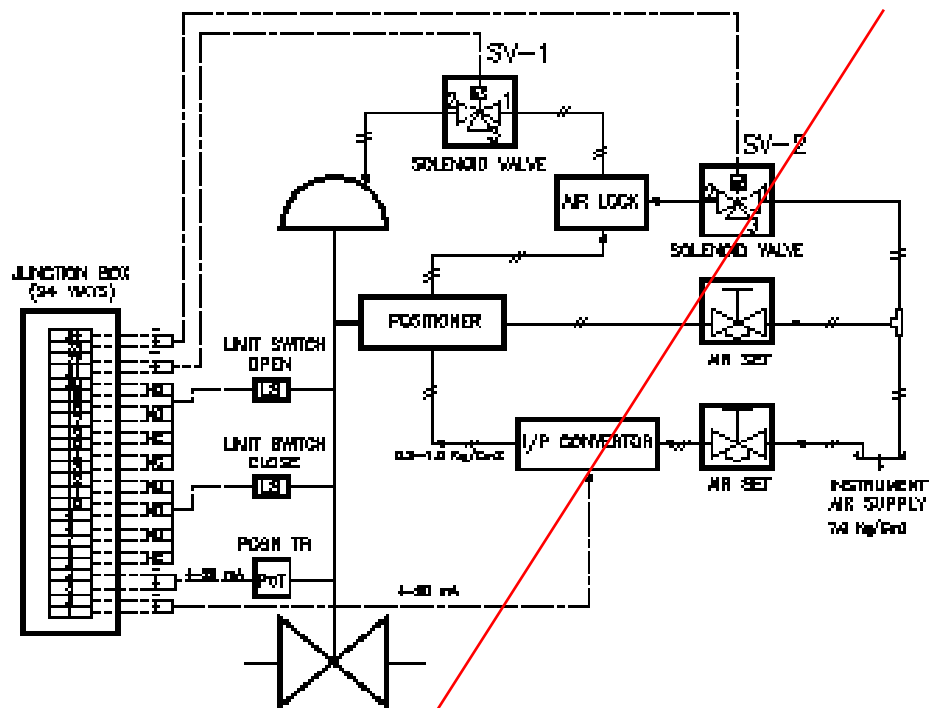
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8.0 APPLICABLE DATA SHEET FORMS

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 :
DS1-1 | Data sheet no. PES-145-06- |
| - Data sheet C for Control Valve with Pneumatic Actuator :
DS2-1 | Data sheet no. PES-145-06- |
| - Data sheet A&B for Control Valve with Electric Actuator :
DS3-1 | Data sheet no. PES-145-06- |
| - Data sheet C for Control Valve with Electric Actuator :
DS4-1 | Data sheet no. PES-145-06- |

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- 1 SOLENOID VALVE SV-1 WILL BE PROVIDED, IF SPECIFIED IN DATA SHEETS.
FOR OVER-RIDING THE CONTROLLER SIGNAL.
- 2 SOLENOID VALVE SV-2 WILL BE PROVIDED, IF SPECIFIED IN DATA SHEET, FOR
VALVE STROKING POSITION REARMEMENT ON CONTROLLER SIGNAL FAILURE.
- 3 SOLENOID VALVES PORT CONNECTION

PORT 1 AND 2 SHALL BE CONNECTED UNDER DE-ENERGIZED CONDITION.
PORT 2 AND 3 SHALL BE CONNECTED UNDER ENERGIZED CONDITION.
- 4 FOR ON/OFF DUTY PNEUMATIC CONTROL VALVE, THE FOLLOWING
ACCESSORIES SHALL NOT BE APPLICABLE:-
 - 1 POSITIONER
 - 2 POSITION TRANSMITTER
 - 3 I/P CONVERTER
 - 4 AIR LOCK



SPECIFICATION FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)

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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 to positioner (4-20mA)
Valve Position Feedback	4-20mA output signal for Position Feedback is to be provided to control system.

2.0 Environment :

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

3.0 Diagnostic Features :

Diagnostic / Test Features (to be available in Smart Positioner and shall be accessible through any HMS software)	Minimum Diagnostic Features Like <ul style="list-style-type: none"> • Measurement of Valve positioning timing, • Detection of actuator leakage, • Display of fault alarm. • Logging of alarms and history. • Valve friction/jamming detection. • Detection of valve wear & tear, • Valve stroke length and timing.
	Advanced Diagnostic Features Like (OPTIONAL) <ul style="list-style-type: none"> • On line partial closure test. • Valve signature analysis (online graphical/tabular representation of input signal Vs valve travel). • Step response test.

4.0 Software :

Software (to be supplied alongwith smart positioner)	<ul style="list-style-type: none"> • Windows based software to meet the requirement for configuration, diagnostics, calibration and testing of Valve and actuator. • Easily up-gradable with same hardware and compatible with any Hart Management Systems (HMS). • Shall be capable to cater to all the tags in the specification at the same time without change in wiring.
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SPECIFICATION FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)

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5.0 Hardware :

Hardware (As required)	1. PC with software for configuring and accessing diagnostic features of the positioners.
	2. Multiplexers for interfacing smart positioner with PC.
	3. Communication cable for interconnecting multiplexers with PC.
	4. RS232/RS485 converter (if required)

Note : Power supply for Multiplexer shall be arranged by the owner.

6.0 Valve Action :

Valve Action	Direct & Reverse. (Same positioner for Single Acting or Double Acting And no separate relays required for changing from Single acting to double).
	During Failure of input Electrical signal (4-20 mA), valve to attain fail Freeze position without any external hardware. (Sol valve, Power Supply etc.)

7.0 Flow Characterization :

Flow Characterization	Possible to fit valve characteristic curve linear & Equal percentage
------------------------------	--

8.0 Performance:

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

9.0 Test Certificates:

Test Certificates/Test Reports for degree of protection, Accuracy and calibration test (as a minimum) to be submitted as per Manufacture Standard / Relevant Standard.

10.0 EMC & CE compliance

International Standard Like EN/IEC.

To EN 50081-2 & EN 50082 or equivalent



**SPECIFICATION FOR MICROPROCESSOR BASED
ELECTRONIC POSITIONER (SMART)**

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11.0 Accessories

In Built Operator Panel	Display with push buttons for Configuration and display on the positioner itself
Hand Held Hart Calibrator	Universal Hart Calibrator To Be Provided, One Per Unit.
Press Gauge Block	For Supply & Output Pr., Filter Regulator Other Accessories Shall Be Provided As per Control valve hook-up diagram.
Electrical cable entry	½ - NPT, side or bottom entry to avoid water Ingress.



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: **PE-TS-367-145-I 004**

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DATA SHEETS – A & B

BHEL PEM	DOCUMENT TITLE :-	DOCUMENT PE-DC-367-100-I104 NUMBER
	DATA SHEET FOR CONTROL VALVES	REVISION 00 DATE 05.12.2011 NUMBER
	KPCL-BELLARY#3, (1 x 700 MW)	SHEET 2 OF 52

Notes:

1. All general technical requirements including material & construction, leakage class, body sizing and Cv sizing etc. shall be as per customer specifications.
2. 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 °C.
3. If the downstream is subjected to vacuum, flow direction of the fluid shall be to close. Separate indication for the same has not been made in the data sheet.
4. Valve and actuator shall be designed for full differential pressure (Max. shut-off pressure).
5. Mandatory spares for control valves, shall be as per contract.
6. Testing & other requirements shall be as per customer's specifications.
7. Quantity indicated is for one unit.
8. Tolerances on end to end, center to center, center to face shall be in accordance with ASME B16.10.
9. For valves subjected to cavitation service, anti cavitation trim shall be provided.

BHEL PEM	DOCUMENT TITLE :-	DOCUMENT NUMBER PE-DC-367-100-I104
	DATA SHEET FOR CONTROL VALVES	REVISION 00 DATE 05.12.2011 NUMBER
	KPCL-BELLARY#3, (1 x 700 MW)	SHEET 3 OF 52

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S.No.	SERVICE	Qty. for 1 Unit
1.	D/A Pegging from Aux. Steam Header (ASV-8)	01
2.	D/A Pegging from CRH Line (CRHV-6)	01
3.	Main Condensate Control (CDV-22 & CDV-25)	02
4.	CEP A/B/C Minimum Recirculation (CDV-10, CDV-12 & CDV-14)	03
5.	GSC min. flow recirculation (CDV-39)	01
6.	Excess Dump Control (CDV-43)	01
7.	Condensate for SD F/T (CDV-67)	01
8.	Condensate for Valve Gland Sealing (CDV-72)	01
9.	HPH-7A/7B Normal Drain to HPH-6A/6B (DRV-2 & DRV-8)	02
10.	HPH-7A/7B Alt.Drain to HP Drain F/T (DRV-5 & DRV-11)	02
11.	HPH-6A/6B Normal Drain to Deaerator (DRV-15 & DRV-22)	02
12.	HPH-6A/6B Alt. Drain to HP Drain F/T (DRV-18 & DRV-25)	02
13.	LPH-3 Normal Drain to LPH-2 (DRV-28)	01
14.	LPH-3 Alt. Drain to LP Drain F/T (DRV-31)	01
15.	LPH-2 Normal Drain to LPH-1 (DRV-34)	01
16.	LPH-2 Alt. Drain to LP Drain F/T (DRV-37)	01
17.	Deaerator Overflow (DRV-48)	01
18.	HPH-8A/8B Normal Drain to HPH-7A/7B (DRV-53 & DRV-59)	02
19.	HPH-8A/8B Alt. Drain to HP Drain F/T (DRV-56 & DRV-62)	02
20.	LPH-4 Normal Drain to LPH-3 (DRV-65)	01
21.	LPH-4 Alt. Drain to LP Drain F/T (DRV-68)	01
22.	DM Normal Makeup to Hotwell (DMV-2)	01
23.	Emergency MU to Hotwell (DMV-9)	01
24.	Low Load Feed Control (FDV-14)	01

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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 _____
SERVICE _____
LOCATION _____
DUTY _____
PIPE SIZE (inlet / outlet) _____
PIPE MATERIAL (inlet / outlet) _____

KPCL-BELLARY#3, (1X700MW)
D/A PEGGING FROM AUX. STEAM HEADER
☒ INDOOR ☐ OUTDOOR
☐ ON/OFF ☒ MODULATING
 323.9 x 9.53 | 559 x 10
 SA 106 GR B | SA 672 GR B70

BODY

MODEL NO.

TYPE OF BODY: GUIDING : NO. OF PORTS

BODY SIZE: PORT SIZE: DESIGN CV

END CONNECTION & RATING (ANSI)

BODY MATERIAL

PACKING: MATERIAL SINGLE / DOUBLE

BONNET TYPE

TRIM FORM

TRIM MATERIAL: SEAT | PLUG
: CAGE | GUIDE BUSH

FLOW

OUTLET VELOCITY

REQUIRED LEAKAGE CLASS

NOISE LEVEL (dBA) (spec. 3.1.14)

VACUUM SERVICE

ANTI CAVITATION TRIM

Bidder To Specify
☐ **GLOBE** ☐ **ANGLE** | ☐ **TOP** ☒ **CAGE** | **ONE**
Bidder To Specify
☐ **BWE** ☐ **SWE** ☐ **FLANGED**
☒ **A216 WCB** ☐ **A217 WC6** ☐ **SS** ☐ **A217 CS**
☐ **A351 CF8M**
☐ **PTFE** ☒ **GRAFOIL** ☐ **DOUBLE** ☒ **SINGLE**
☐ **STD** ☐ **EXTENDED** ☐ **FINNED**
☒ **LINEAR** ☐ **EQ. PERCENTAGE**
☐ **QUICK OPEN (ON/OFF)**
SS 316 STELLITED | **SS 316 STELLITED**
SS 316 STELLITED | **SS 316 STELLITED**

☐ **BELOW SEAT** ☐ **ABOVE SEAT**
☐ **< 7 M/SEC(WATER)** | ☒ **MAC NO. < 1/3 (STM)**
☐ **II** ☐ **III** ☒ **IV** ☐ **V** ☐ **VI**
LESS THAN 85 dBA
☐ **YES** ☒ **NO**
☐ **YES** ☒ **NO**

PNEUMATIC ACTUATOR

MODEL NO. & SIZE
CLOSE AT : OPEN AT (KG/CM2g)
TRAVEL TIME FOR
OPEN TO CLOSE, CLOSE TO OPEN
VALVE POSN. ON SIGNAL AIR FAILURE
VALVE POSN. ON SUPPLY AIR FAILURE

Bidder To Specify

1.0 0.2

< 10 Seconds

 |

☐ TO OPEN ☐ STAYPUT ☐ TO CLOSE

☒ STAYPUT

ACCESSORI

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

☒ REQUIRED ☐ NOT REQUIRED
☒ REQUIRED ☐ NOT REQUIRED
☒ REQUIRED ☐ NOT REQUIRED
☒ REQUIRED ☐ NOT REQUIRED
 PART OF POSITIONER
☒ REQUIRED ☐ NOT REQUIRED
 PART OF POSITIONER
☒ REQUIRED ☐ NOT REQUIRED
☒ REQUIRED
☒ REQUIRED

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			$\pm 1\%$ $\pm 1\%$ $\pm 0.5\%$ $\pm 2\%$				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	7.5% BMCR	17.8	16	1.65	210			
	2.	25% BMCR (COLD)	59.3	16	1.7	210			
	3.	15% BMCR (HOT)	50.9	16	3.7	210			
	4.	35% BMCR (COLD)	83	16	1.7	210			
	5.	START-UP	94.82	16	1.7	210			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP		
MAX SHUT OFF PRESS (KG/CM2g) 20 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 20 240 IBR FORM III-C <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED								
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								
NOTES:									
1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITION INDICATED AT SL. NO. 3 AND SHALL BE CHECKED FOR ALL SPECIFIED CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	15% BMCR	45.6	14.4	3.65	340.7			
	2.	60% BYPASS MDBFP	191	36.97	3.65	354.1			
	3.	HP/LP BYPASS HOUSE LOAD	206	38.9	3.65	372.6			
	4.	START-UP	83	14.4	1.65	340.7			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP		
MAX SHUT OFF PRESS (KG/CM2g) 74.6 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 74.6 380 IBR FORM III-C <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED								
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								
NOTES:									
1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 2 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-367-145-I104	
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Tag No.CDV-39... Qty.: ...1 per Unit ...

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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	KPCL-BELLARY#3, (1X700MW)
	SERVICE	GSC MIN. FLOW RECIRCULATION
	LOCATION	<input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR
	DUTY	<input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING
	PIPE SIZE (inlet / outlet)	219.1 x 8.18 219.1 x 8.18
	PIPE MATERIAL (inlet / outlet)	SA 106 GR C SA 106 GR C
BODY	MODEL NO.	Bidder To Specify
	TYPE OF BODY: GUIDING : NO. OF PORTS	<input checked="" type="checkbox"/> GLOBE <input type="checkbox"/> ANGLE <input type="checkbox"/> TOP <input checked="" type="checkbox"/> CAGE ONE
	BODY SIZE: PORT SIZE: DESIGN CV	Bidder To Specify
	END CONNECTION & RATING (ANSI)	<input checked="" type="checkbox"/> BWE <input type="checkbox"/> SWE <input type="checkbox"/> FLANGED
	BODY MATERIAL	<input type="checkbox"/> A216 WCB <input checked="" type="checkbox"/> A217 WC6 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS
		<input type="checkbox"/> A351 CF8M
	PACKING: MATERIAL SINGLE / DOUBLE	<input type="checkbox"/> PTFE <input checked="" type="checkbox"/> GRAFOIL <input checked="" type="checkbox"/> DOUBLE <input type="checkbox"/> SINGLE
	BONNET TYPE	<input type="checkbox"/> STD <input type="checkbox"/> EXTENDED <input type="checkbox"/> FINNED
	TRIM FORM	<input checked="" type="checkbox"/> LINEAR <input type="checkbox"/> EQ. PERCENTAGE
		<input type="checkbox"/> QUICK OPEN (ON/OFF)
	TRIM MATERIAL: SEAT PLUG	17-4 PH SS 17-4 PH SS
	: CAGE GUIDE BUSH	17-4 PH SS 17-4 PH SS
	FLOW	<input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT
	OUTLET VELOCITY	<input checked="" type="checkbox"/> < 7 M/SEC (WATER) <input type="checkbox"/> MAC NO. < 1/3(STM)
	REQUIRED LEAKAGE CLASS	<input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input checked="" type="checkbox"/> V <input type="checkbox"/> VI
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA
	VACUUM SERVICE	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	ANTI CAVITATION TRIM	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	Bidder To Specify
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 0.2
	TRAVEL TIME FOR	< 10 Seconds
	OPEN TO CLOSE, CLOSE TO OPEN	
	VALVE POSN. ON SIGNAL AIR FAILURE	<input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE
	VALVE POSN. ON SUPPLY AIR FAILURE	<input checked="" type="checkbox"/> STAYPUT
ACCESSORIES	POSITIONER (SMART)	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED
	AIR FILTER REGULATOR	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED
	AIR LOCK RELAY	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED
	POSITION LIMIT SWITCH	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED
	POSITION TRANSMITTER	PART OF POSITIONER
	SOLENOID VALVE	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED
	E/P CONVERTER	PART OF POSITIONER
	JUNCTION BOX	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED
	HAND WHEEL (SIDE MOUNTED)	<input checked="" type="checkbox"/> REQUIRED
	LOCAL POSITION INDICATOR	<input checked="" type="checkbox"/> REQUIRED

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MIN.	32.4	35.61	0.3	53.8			
	2.	MAX	324	35.02	0.7	53.8			
	VALVE TYPE						<input checked="" type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM2g) 43 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 43/VACUUM 55 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							
NOTES: 1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 2 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	KPCL-BELLARY#3, (1X700MW) EXCESS RETURN TO CST <input type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 273 x 9.27 273 x 9.27 SA 106 GR B SA 106 GR B	
BODY	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT PLUG : CAGE GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	Bidder To Specify <input type="checkbox"/> GLOBE <input checked="" type="checkbox"/> ANGLE <input type="checkbox"/> TOP <input checked="" type="checkbox"/> CAGE ONE Bidder To Specify <input checked="" type="checkbox"/> BWE <input type="checkbox"/> SWE <input type="checkbox"/> FLANGED <input type="checkbox"/> A216 WCB <input checked="" type="checkbox"/> A217 WC6 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS <input type="checkbox"/> A351 CF8M <input type="checkbox"/> PTFE <input checked="" type="checkbox"/> GRAFOIL <input type="checkbox"/> DOUBLE <input checked="" type="checkbox"/> SINGLE <input type="checkbox"/> STD <input type="checkbox"/> EXTENDED <input type="checkbox"/> FINNED <input checked="" type="checkbox"/> LINEAR <input type="checkbox"/> EQ. PERCENTAGE <input type="checkbox"/> QUICK OPEN (ON/OFF) 17-4 PH SS 17-4 PH SS 17-4 PH SS 17-4 PH SS <input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT <input checked="" type="checkbox"/> < 7 M/SEC (WATER) <input type="checkbox"/> MAC NO. < 1/3(STM) <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input checked="" type="checkbox"/> V <input type="checkbox"/> VI LESS THAN 85 dBA <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN VALVE POSN. ON SIGNAL AIR FAILURE VALVE POSN. ON SUPPLY AIR FAILURE	Bidder To Specify 1.0 0.2 < 10 Seconds <input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT	
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	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED PART OF POSITIONER <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED PART OF POSITIONER <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input checked="" type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> REQUIRED	

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MIN.	40	37.9	4.0	53.8			
	2.	MAX	400	30	5.0	53.8			
	VALVE TYPE						<input checked="" type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM2g) 43 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 43 55 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							
NOTES: 1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 2 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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DATA SHEET – A & B

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			$\pm 5\%$ $\pm 5\%$ $\pm 0.5\%$ $\pm 2\%$				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MAX.	10	34	0.5	53.8			
	VALVE TYPE						<input checked="" type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM2g) 43 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 43/VACUUM 55 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							
NOTES:									
1.	+	DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 1 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.							
2.	#	WITHOUT POSITIONER, LINEARITY SHALL BE $\pm 5\%$ ONLY.							

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MAX.	4	34	3.0	53.8			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM2g) 43 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 43 55 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								
NOTES:									
1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 1 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									
2. VALVE MATERIAL SHALL BE A217WC6 AND ANTI-CAVITATION TYPE TRIM IN CASE THE VALVE IS SUBJECTED TO CAVITATION FOR THE GIVEN CONDITION.									

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DATA SHEET – A & B

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DATA SHEET – A & B

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DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)

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	$\pm 1\%$
	HYSTERESIS	$\pm 1\%$
	SENSITIVITY	$\pm 0.5\%$
	ACCURACY (OVERALL)	$\pm 2\%$

	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
SERVICE CONDITION	1.	40% MCR	53	7.2	6.4	160.5			
	2.	60% MCR	94.11	11.4	7.6	174.1			
	3.	100% MCR	204.88	19.8	13.5	197.4			
	4.	VWO	222.85	21.24	12.8	200.5			
	5.	BMCR	233.2	20.81	13.4	199.3			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input checked="" type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM2g) 30 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 30 210 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							

NOTES:

1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. 4 AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

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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 SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	KPCL-BELLARY#3, (1X700MM) HPH-6A/6B ALT. DRAIN TO HPD F/T <input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 273 x 6.35 323.9 x 9.53 SA 106 GR B SA 106 GR B	
BODY	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT PLUG : CAGE GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	Bidder To Specify <input checked="" type="checkbox"/> GLOBE <input type="checkbox"/> ANGLE <input type="checkbox"/> TOP <input checked="" type="checkbox"/> CAGE ONE Bidder To Specify <input checked="" type="checkbox"/> BWE <input type="checkbox"/> SWE <input type="checkbox"/> FLANGED <input type="checkbox"/> A216 WCB <input checked="" type="checkbox"/> A217 WC9 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS <input type="checkbox"/> A351 CF8M <input type="checkbox"/> PTFE <input checked="" type="checkbox"/> GRAFOIL <input checked="" type="checkbox"/> DOUBLE <input type="checkbox"/> SINGLE <input type="checkbox"/> STD <input type="checkbox"/> EXTENDED <input type="checkbox"/> FINNED <input checked="" type="checkbox"/> LINEAR <input type="checkbox"/> EQ. PERCENTAGE <input type="checkbox"/> QUICK OPEN (ON/OFF) 440 C 440 C 440 C 440 C <input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT <input checked="" type="checkbox"/> < 7 M/SEC (WATER) <input type="checkbox"/> MAC NO. < 1/3(STM) <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input checked="" type="checkbox"/> V <input type="checkbox"/> VI LESS THAN 85 dBA <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN VALVE POSN. ON SIGNAL AIR FAILURE VALVE POSN. ON SUPPLY AIR FAILURE	Bidder To Specify 1.0 0.2 < 10 Seconds <input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT	
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	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED PART OF POSITIONER <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED PART OF POSITIONER <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input checked="" type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> REQUIRED	

Tag No. : DRV-18 & DRV-25 Qty.: 2 per Unit (One against each Tag No.) Data Sheet No. PES-145-06-DS1-0

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	53	9.5	0.3	174			
	2.	60% MCR	94.11	13.6	0.3	190.9			
	3.	100% MCR	204.88	21.8	0.3	214.9			
	4.	VWO	222.86	23.4	0.3	218.3			
	5.	BMCR	233.2	23	0.5	217.3			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM2g) 30 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 30/VACUUM 230 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							
NOTES: 1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 4 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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DATA SHEET – A & B

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	50.1	0.7	0.5	79.4			
	2.	60% MCR	80.2	1.1	0.8	88.5			
	3.	100% MCR	153.5	1.83	1.2	100.7			
	4.	VWO	167.3	1.9	1.3	102.4			
	5.	LPH-1 OUT	174	1.6	1.2	92.2			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input checked="" type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
MAX SHUT OFF PRESS (KG/CM2g) 7 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 7/VACUUM 110 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED								
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								
NOTES: 1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 4 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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DATA SHEET – A & B

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	50.1	1.5	0.3	96.4			
	2.	60% MCR	80.2	1.95	0.3	107.2			
	3.	100% MCR	153.5	2.7	0.3	120.7			
	4.	VWO	167.3	2.8	0.3	122.6			
	5.	LPH-2 OUT	209	2.24	0.5	113.1			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
MAX SHUT OFF PRESS (KG/CM2g) 7 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 7/VACUUM 130 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED								
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								
NOTES:									
1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ____4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	70.4	0.45	0.3	58.4			
	2.	60% MCR	113.47	0.63	0.4	65.6			
	3.	100% MCR	217.5	1.0	0.6	75.5			
	4.	VWO	236.8	1.05	0.6	76.9			
	5.	ALL HPH OUT	241.2	1.1	0.5	77.9			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input checked="" type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM2g) 7 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 7/VACUUM 85 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							
NOTES: 1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 4 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	70.4	1.08	0.3	78			
	2.	60% MCR	113.5	1.26	0.3	86.8			
	3.	100% MCR	217.5	1.61	0.3	98.7			
	4.	VWO	236.8	1.67	0.3	100.4			
	5.	LPH-1 OUT	270	1.37	0.5	90.9			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
MAX SHUT OFF PRESS (KG/CM2g) 7 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 7/VACUUM 105 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED								
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								
NOTES:									
1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ____4____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			$\pm 5\%$ $\pm 5\%$ $\pm 0.5\%$ $\pm 2\%$				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MAX.-1 10% BMCR	231	14.7	0.3	189.5			
	2.	MAX.-2 10% BMCR	231	5.7	0.5	138.2			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input checked="" type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
MAX SHUT OFF PRESS (KG/CM2g) 20 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 20/VACUUM 200 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED								
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								
NOTES:									
1.	+	DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 1 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.							
2.	#	WITHOUT POSITIONER, LINEARITY SHALL BE $\pm 5\%$ ONLY.							

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DATA SHEET – A & B

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DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)

DATA SHEET – A & B

NOTES:

1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. 4 AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	30.83	2.34	1.1	98.3			
	2.	60% MCR	49.8	3.4	1.6	108.5			
	3.	100% MCR	95.95	5.4	2.3	122.6			
	4.	VWO	104.6	5.8	2.4	124.7			
	5.	LPH-2 OUT	115	5.1	2.0	112.4			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input checked="" type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM2g) 7 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 7/VACUUM 135 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							
NOTES:									
1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 4 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			$\pm 1\%$ $\pm 1\%$ $\pm 0.5\%$ $\pm 2\%$				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	40% MCR	30.83	3.2	0.3	127.8			
	2.	60% MCR	49.8	4.2	0.3	139.5			
	3.	100% MCR	95.95	6.2	0.3	156			
	4.	VWO	104.6	6.6	0.3	158.3			
	5.	LPH-3 OUT	133.2	5.6	0.5	151.17			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM2g) 7 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 7/VACUUM 165 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							
NOTES: 1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 4 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

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DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY			± 1%				
	HYSTERESIS			± 1%				
	SENSITIVITY			± 0.5%				
	ACCURACY (OVERALL)			± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM ² (A)	OUTLET PR. KG/CM ² (A)	TEMP DEG (C)	CALCULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MIN. (1% MU)	10	6.7	0.5	33			
	2.	NORMAL (1% MU)	23	4.9	0.55	33			
	3.	DM PUMP DESIGN FLOW	75	4.9	1.6	33			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM ² g) 10 BODY DESIGN : PRESS (KG/CM ² g) TEMP (DEG C) 10/VACUUM 50 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							
NOTES: 1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ____2____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

SPECIFICATION NO.: PE-TS-367-145-I104		
VOLUME	II-B	
SECTION	D	
REV. NO.	00	DATE : 05.12.2011
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Data Sheet No. PES-145-06-DS1-0

[illegible]

SPECIFICATION NO.: PE-TS-367-145-I104			
VOLUME	II-B		
SECTION	D		
REV. NO.	00	DATE : 05.12.2011	
SHEET	49	OF	52

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

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	MIN. (1% MU)	23	5.5	0.45	33			
	2.	NORMAL (3% MU)	69	4.8	0.5	33			
	3.	CT PUMP DESIGN FLOW	150	3.9	0.8	33			
	VALVE TYPE						<input checked="" type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
	MAX SHUT OFF PRESS (KG/CM2g) 10 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 10/VACUUM 50 IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED							
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								
NOTES: 1. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u> 2 </u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

SPECIFICATION NO.: PE-TS-367-145-I104

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

DATA SHEET – A & B

[illegible]

SPECIFICATION NO.: PE-TS-367-145-I104		
VOLUME	II-B	
SECTION	D	
REV. NO.	00	DATE : 05.12.2011
SHEET	51	OF 52

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

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)			± 1% ± 1% ± 0.5% ± 2%				
SERVICE CONDITION	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY
	1.	5% MCR (MIN.SPEED)	115.5	82	18	111			
	2.	15% MCR	346.5	122	75.2	111			
	3.	25% MCR	577.5	126	115.4	111 TO 138			
	4.	35% Boiler Min R/c-I	808.5	124	119.5	155.4			
	5.	35% Boiler Min R/c-II	808.5	124	20	111			
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
MAX SHUT OFF PRESS (KG/CM2g) 470 BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 470 200 IBR FORM III-C <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED								
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								
NOTES:									
1. * PARAMETERS LIKELY TO CHANGE ON RECEIPT OF PUMP INPUTS FROM BHEL-HYD.									
2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. <u>2</u> AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7.									

	Technical specification for Control Valves with Accessories (Pneumatically Operated)		SPECIFICATION NO. PE-TS-367-145-I104	
			VOLUME II-B	
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			SHEET 52 OF 52	

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 (SMART) WITH HART PROTOCOL	MFR. & MODEL NUMBER		Bidder To Specify		
	BYPASS	GAUGES	ENCL. CLASS	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> THREE <input checked="" type="checkbox"/> TWO <input checked="" type="checkbox"/> IP-65
	INPUT SIGNAL (Kg / Cm ²)		<input checked="" type="checkbox"/> 0.2 – 1.0 <input type="checkbox"/> 0.2 – 0.6 <input type="checkbox"/> 0.6 – 1.0		
	OUTPUT SIGNAL (Kg / Cm ²)		TO SUIT ACTUATOR		
AIR FILTER REGULATOR TWO (2) Nos. PER CV	MFR. & MODEL NUMBER		Bidder To Specify		
	AIR SUPPLY PRESS (Kg / Cm ² g)		<input checked="" type="checkbox"/> 7.0		
	OUTPUT PRESS (Kg / Cm ² g)		TO SUIT ACTUATOR		
	FILTER SIZE		5 MICRON		
AIR LOCK	MFR. & MODEL NUMBER		Bidder To Specify		
	SET PRESS (Kg / Cm ²)		Bidder To Specify		
	SUPPLY PRESS (Kg / Cm ²)		<input checked="" type="checkbox"/> 7.0		
	RESET TYPE		AUTO		
	VENT PLUG		REQUIRED		
	ENCLOSURE CLASS		<input checked="" type="checkbox"/> IP 65		
LIMIT SWITCH	MFR. & MODEL NUMBER		Bidder To Specify		
	OPEN posn	INT posn	CLOSE posn	<input checked="" type="checkbox"/> 1 NO.	<input checked="" type="checkbox"/> 1 NO.
	CONTACT TYPE		SPDT 2 NO + 2 NC		
	RATING (AC / DC)		5A 240V AC AND 0.2A 220V DC		
	ENCLOSURE CLASS		<input checked="" type="checkbox"/> IP 55 <input type="checkbox"/>		
POSITION TRANSMITTER (PART OF POSITIONER)	MFR. & MODEL NUMBER		PART OF POSITIONER		
	TYPE		<input checked="" type="checkbox"/> Electronic (2-Wire) Contactless <input type="checkbox"/> OTHER		
	SUPPLY		<input checked="" type="checkbox"/> 24V DC		
	OUTPUT RATING		<input checked="" type="checkbox"/> 4-20mA		
	ACCURACY		± 1% FS		
SOLENOID VALVE	MFR. & MODEL NUMBER		Bidder To Specify		
	RATING		<input checked="" type="checkbox"/> 24V DC <input type="checkbox"/> 220V DC <input type="checkbox"/> 240V AC <input type="checkbox"/>		
	TYPE		3-WAY (UNIVERSAL OPERATION TYPE)		
	OPERATION	QUANTITY	<input type="checkbox"/> Stayput <input checked="" type="checkbox"/> Interlock <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2		
	COIL INSULATION CLASS		CLASS - H		
HANDWHEEL	ENCLOSURE CLASS		<input checked="" type="checkbox"/> IP 65		
	ORIENTATION		<input type="checkbox"/> TOP MOUNTED <input checked="" type="checkbox"/> SIDE MOUNTED		
JUNCTION BOX	NO. OF WAYS		<input type="checkbox"/> 24-WAYS <input type="checkbox"/> AS REQUIRED <input checked="" type="checkbox"/> 36-Ways		
	SIZE		AS REQUIRED		
	CABLE GLANDS (Size / Quantity)		AS REQUIRED (Double Compression Type).		
	ENCLOSURE CLASS		<input checked="" type="checkbox"/> IP 65		
1/P CONVERTER (PART OF POSITIONER)	INPUT SIGNAL	POWER SUPPLY	PART OF POSITIONER		
	SPLIT RANGE		-----		
	ENCLOSURE CLASS		-----		
	LINEARITY		-----		
	HYSTERESIS		-----		
Cu. Tubing & Fittings / per CV	This is in addition to cu. Tubing and fittings which are integral part of CV		15 Meters of 1/4 " PVC coated Cu. Tubing, with 1 set of Fittings for each CV for connection to IA Header on one end and accessories on another end of CV.		
					COMPANY SEAL
					NAME
					SIGNATURE



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: **PE-TS-367-145-I 004**

VOLUME II B

SECTION D


REV. NO. 00


DATE : 05.12.2011


SHEET OF

SECTION – D

DATA SHEET – C

	Technical specification for Control Valves with Accessories (Pneumatically Operated) Bellary TPS Unit#3, 1x700MW - KPCL		SPEC NO.: PE-TS-367-145-I 004	
			VOLUME II B	
			SECTION D	
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			SHEET	
			NAME	
			SIGNATURE	
			DATE	
Tag No..... Quantity.....			Data Sheet No. PES-145-06-DS2-0	
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 DV			
	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) (Spec. 3.1.14)			
	VACUUM SERVICE			
ANTI CAVITATION TRIM				
PNEUMATIC ACTUATOR	MODEL NO. & SIZE			
	CLOSE AT : OPEN AT (Kg / Cm ² g)			
	*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN			
	*VALVE POSN. ON SIGNAL AIR FAILURE			
	*VALVE POSN. ON SUPPLY AIR FAILURE			
ACCESSORIES	POSITIONER (SMART)			
	AIR FILTER REGULATOR			
	AIR LOCK RELAY			
	POSITION LIMIT SWITCH			
	POSITION TRANSMITTER			
	SOLENOID VALVE			
	E / P CONVERTER			
	JUNCTION BOX			
	HAND WHEEL (SIDE MOUNTED)			
	LOCAL POSITION INDICATOR			

	Technical specification for Control Valves with Accessories (Pneumatically Operated) Bellary TPS Unit#3, 1x700MW - KPCL				SPEC NO.: PE-TS-367-145-I 004				
					VOLUME II B				
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					REV. NO. 00		DATE : 05.12.2011		
					SHEET				
Tag No..... Quantity..... Data Sheet No. PES-145-06-DS2-0									
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	LINEARITY								
	HYSTERESIS								
	SENSITIVITY								
	ACCURACY (OVERALL)								
SERVICE CONDITION*	SL. NO.	LOAD	FLOW (T/HR)	INLET PR. (KG/CM² (A))	OUTLET PR. (KG/CM² (A))	TEMP DEG. C	CALCULA TED CV	% VALVE LIFT	VALVE O/L VELOCITY
VALVE TYPE									
* MAX SHUT OFF PRESS ((KG/CM ² g)									
* BODY DESIGN : PRESS ((KG/CM ² g) TEMP (DEG. C)									
* IBR FORM III-C									
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.									

	Technical specification for Control Valves with Accessories (Pneumatically Operated)		SPECIFICATION NO. PE-TS-367-145-I 004	
			VOLUME II-B	
	Bellary TPS Unit#3, 1x700MW - KPCL		SECTION D	
			REV. NO. 00	DATE: 05.12.2011
			SHEET OF	

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

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

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

POSITIONER (SMART) WITH HART PROTOCOL	MFR. & MODEL NUMBER		
	BYPASS	GAUGES	ENCL. CLASS
	INPUT SIGNAL (Kg / Cm ²)		
	OUTPUT SIGNAL (Kg / Cm ²)		
AIR FILTER REGULATOR TWO (2) Nos. PER CV	MFR. & MODEL NUMBER		
	AIR SUPPLY PRESS (Kg / Cm ² g)		
	OUTPUT PRESS (Kg / Cm ² g)		
	OUTPUT GAUGE		
	FILTER SIZE		
AIR LOCK	MFR. & MODEL NUMBER		
	SET PRESS (Kg / Cm ²)		
	SUPPLY PRESS (Kg / Cm ²)		
	RESET TYPE		
	VENT PLUG		
LIMIT SWITCH	MFR. & MODEL NUMBER		
	OPEN posn	INT posn	CLOSE posn
	CONTACT TYPE		
	RATING (AC / DC)		
	ENCLOSURE CLASS		
POSITION TRANSMITTER (PART OF POSITIONER)	MFR. & MODEL NUMBER		
	TYPE		
	SUPPLY		
	OUTPUT RATING		
	ACCURACY		
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		
I/P CONVERTER (PART OF POSITIONER)	INPUT SIGNAL	POWER SUPPLY	
	SPLIT RANGE		
	ENCLOSURE CLASS		
	LINEARITY		
	HYSTERESIS		
Cu. Tubing & Fittings / per CV	15 Meters of 1/4 " PVC coated Cu. Tubing, with 1 set of Fittings for connection to IA Header on one end and accessories on another end of CV		
			COMPANY SEAL
			NAME
			SIGNATURE
			DATE



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: **PE-TS-367-145-I 004**

VOLUME II B

SECTION D



REV. NO. 00 DATE : 05.12.2011

SHEET OF

SECTION – D

QUALITY PLAN

THIS IS APPLICABLE FOR
1x700MW BELLARY-3
S.T.P.P DOC. NO.
PE-QP-367-145-I006,
REV.00

JOB NO. 999				DEPT CODE		NAME		SIGN		DATE	
STATUS STANDARD				DESN		AKD		-sd-		12.03.04	
DISTRIBUTION				CND		DJ		-sd-		12.03.04	
TO				APPD		JRC		-sd-		12.03.04	
No. OF											
REV. 03		DATE 10.05.07		ALTD AKD		CND DJ		APPD JRC			
1.		REVISED ALREADY.		TITLE		STANDARD QUALITY PLAN FOR CONTROL VALVES					
				DEPT.		SCALE		DRAWING NO.			
				SIGN				PE-QP-999-145-1006			
				DATE				SHEET 00 OF 06 REV. 05			



QUALITY PLAN NO.:	PE-QP-999-145-I 006
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VOLUME	IIB
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SECTION	D
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DATE: 24.07.2010

SHEET	1
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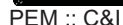
OF 6

1.0	MATERIAL													
1.1	Body & Bonnet casting / forgings, plug, stem.	1.	Physical, Chemical properties	MA	Physical, Chemical tests	One/ Heat(HT Batch)	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	3	---	2,1		
		2.	Heat Treatment	MA	Review of H.T. Chart	Each H.T.	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	3/2	2	1	IBR Certification (if applicable) to be verified by BHEL	
		3.	Internal quality of castings	MA	RT for Body & UT for Bonnet(NDT)	100%	ASME B 16.34	ASME B 16.34	Test Report / FILM	3/2	2	1	Only for rating ANSI 900 and above. Applicable for Body and Bonnet only. For Lower rating only if called for in specification.	
		4.	Surface Quality	MA	1.	Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2,1	
					2.	MT/PT	100%	ASME B 16.34	ASME B 16.34	Test Certificate	3	2	1	After Machining on machined surface only
		5.	Pressure test for shell	MA	Hyd. Test	100%	ISA-S-75.19/ ASME B 16.34	ISA-S-75.19/ ASME B 16.34	Test Certificate	2	2	1	For Body & Bonnet after machining	

RT- Radiographic Test PT – Dye penetrant Test
UT – Ultrasonic Test MT- Magnetic Test

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

1 - BHEL
2 - Vendor
3 - Sub-vendor



QUALITY PLAN NO.:	PE-QP-999-145-I 006
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VOLUME	IIB
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SECTION	D
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SHEET 2 OF 6


Remarks

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

RT- Radiographic Test PT – Dye penetrant Test
UT – Ultrasonic Test MT- Magnetic Test

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

1 - BHEL
2 - Vendor
3 - Sub-vendor

<div></div> <div>PEM :: C&I</div>		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)						QUALITY PLAN NO.: PE-QP-999-145-I 006				
								VOLUME IIB				
								SECTION D				
								REV. NO. 05		DATE: 24.07.2010		
								SHEET 3		OF 6		
Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
1.5	Pressure Gauges	1. Performance	MA	Review of calibration certificates	100%	Mfr. Standard	Mfr. Standard	Test Certificate	3	---	2,1	
		2. Marking	MA	Visual	100%	Mfr. standard	Mfr. standard	Records	3	---	2,1	
2.0	IN PROCESS INSPECTION											
2.1	Body & Bonnet after machining, Plug with actuator stem	1. Surface flaws	MA	Visual & MT/PT	100% (on accessible surfaces)	ASME B 16.34	ASME B 16.34	Test Records	2	---	1	Butt weld ends shall be included.
		2. Dimensional checks	MA	Measurement	100%	Mfr. Standard	Mfr. Standard	Records	2	---	1	
		3. Hard facing (wherever applicable)	MA	Hardness Measurement	One sample/Lot	Mfr. Standard	Mfr. Standard	Records	2	---	1	
2.2	Lapping	Machining surface contact	MA	Blue Matching	One sample/lot	-----	Proper Physical Contact	Test Records	2			
3.0	TESTS ON COMPLETED VALVE											
3.1	Actuator Chamber	Leakage & Strength	MA	Pneumatic test	100%	Mfr. Standard	No Leakage	Test Certificate	2	1	1	Refer Note-4
3.2	Body	Leakage and Pressure test (Body Mount Leakage)	MA	Hydro test	100%	ISA - S-75.19	No Leakage	Test Certificate	2	1	1	Refer Note-4
3.3	Seat leakage test for completed valve	Seat Leakage	MA	Pneumatic Test	100%	FCI-70.2	FCI-70.2	Test Certificate	2	1	1	Refer Note-4
4.0	OPERATION TEST ON COMPLETED VALVE (Final inspection)	1. Valve Travel	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		2. Opening/Closing time	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4


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


RT- Radiographic Test
 UT - Ultrasonic Test

PT - Dye penetrant Test
 MT- Magnetic Test

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

1 - BHEL
 2 - Vendor
 3 - Sub-vendor

 PEM :: C&I		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)						QUALITY PLAN NO.: PE-QP-999-145-I 006				
								VOLUME IIB				
								SECTION D				
								REV. NO. 05 DATE: 24.07.2010				
								SHEET 4 OF 6				
Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
		3. Linearity/cam characteristic	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		4. Repeatability	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		5. Hysteresis	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		6. Sensitivity	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		7. Accuracy (Overall)	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		8. Control Valve characteristics / CV Test	MA	♦ Measurement (Press. vs. discharge and discharge vs. opening 0-100% in steps of 10%)	One per type	As per specs/ Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Certificate	2	--	1	♦ Size = Body & port size Or Body size & CV for non std port. Refer Note 1.
		9. Operation of limit switch & solenoids and other accessories	MA	Function	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Report	2	1	1	On assembled valve Refer Note-4
		10. Overall dimensions	MI	Visual and dimensional	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Records	2	1	1	Refer Note-4
		11. Pre defined valve position in case of air failure	MA	Visual	100%	As per spec & Appd drg	As per spec & Appd drg	Test Certificate	2	1	1	
		12. Cleanliness, painting, stamping (for direction of flow), Tag No.	MA	Visual and dimensional	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Certificate	2	1	1	
LEGEND: * CR - Critical characteristics RT- Radiographic Test PT – Dye penetrant Test MA - Major characteristics UT – Ultrasonic Test MT- Magnetic Test MI - Minor characteristics ^{\$} P - Agency Performing the Test. 1 - BHEL W - Agency Witnessing the Test. 2 - Vendor V - Agency Verifying the Test. 3 - Sub-vendor												

<div><div>24/07/2010</div><div></div><div>PEM :: C&I</div></div>		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)						QUALITY PLAN NO.: PE-QP-999-145-I 006				
								VOLUME IIB				
								SECTION D				
								REV. NO. 05		DATE: 24.07.2010		
								SHEET 5		OF 6		
Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
5.0	AUXILIARY ITEMS											
5.1	Positioner	Overall leakage after assembly including Nozzles leakage	MA	Leak Test (in the steady state input signal)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	Overall leakage including tubing
5.2	Air filter regulator	1. Normal air consumption	MA	Measurement	Each type	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	
		2. Overall leakage	MA	Visual (soap solution)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	
5.3	Air lock relay	Performance Test	MA	Leakage test	100%	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	
5.4	Electronic position transmitter(not applicable if provided integral to smart positioner)	1. Accuracy	MA	Operation	100%	Approved data sheet /	Approved data sheet /	Test Certificate	2	1	1	On completed valve
5.5	Current to Pneumatic converter(not applicable for smart positioner)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	2,1	
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	2,1	
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
		4. Hysterisis	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	


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

RT- Radiographic Test
UT – Ultrasonic Test

PT – Dye penetrant Test
MT- Magnetic Test

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

1 - BHEL
2 - Vendor
3 - Sub-vendor

<div><div>04/05/2010</div><div></div><div>PEM :: C&I</div></div>		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)						QUALITY PLAN NO.: PE-QP-999-145-I 006					
								VOLUME		IIB			
								SECTION		D			
								REV. NO.		05		DATE: 24.07.2010	
								SHEET		6		OF 6	
Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks	
									P	W	V		
5.6	Smart Positioner (As Applicable)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	2,1		
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	2,1		
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1		
		4. Hysteresis	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1		
		5. Calibration with Hand Held Communicator	MA	Measurement	Each type	Approved data sheet / Mfr. Standard	Approved data sheet / Mfr. Standard	Test Certificate	2	1	1		
6.0	PAINTING	Soundness of Painting	MA	Visual and Measurement	100%	BHEL specn. / Mfr. Standard	BHEL specn. / Mfr. Standard	Inspection Report	2	---	1	Refer Note-2	
7.0	PACKING	Soundness of Packing against transit damage	MA	Visual	100%	Mfr. Standard	Mfr. Standard	Inspection Report	2	---	---	Refer Note-3	

NOTES:

- Cv test will be conducted if Test Certificate for a similar Model / Size / Cv is not available. Validity of the certificate considered as last 3 years. Cv test conducted at IIT/FCRI/any govt. approved laboratory shall not be witnessed by BHEL.
- In the absence of BHEL spec. for painting, vendor to obtain BHEL's approval on their painting specification / procedure.
- Sea worthy packing, if applicable.
- The quantum of check shall be 100% for manufacturer and 10% for BHEL/BHEL nominated inspection agency.
- IBR certificates in Form III-C shall be submitted if called for in the specification/datasheet.
- Copies of all TC's (Test Certificates) for materials duly correlated with Heat Nos., TC's for electrical items and mechanical tests (Leak/Operation) shall be submitted to BHEL for verification and acceptance.

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



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: **PE-TS-367-145-I 004**

VOLUME II B

SECTION D

REV. NO. 00 DATE : 05.12.2011

SHEET OF

SECTION – D

BILL OF QUANTITY



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: PE-TS-367-145-I 004

VOLUME II B

SECTION D

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BILL OF QUANTITY

S.NO	ITEM DESCRIPTION		Qty/Unit
[A]	CONTROL VALVES COMPLETE WITH PNEUMATIC ACTUATOR AND ALL ACCESSORIES MOUNTED , PIPED AND TERMINATED ON JB		
S. No.	TAG NO.	SERVICE	
1	ASV-8	D/A Pegging from Aux. Steam Header	01
2	CRHV-6	D/A Pegging from CRH Line	01
3	CDV-22 & CDV-25	Main Condensate Control	02
4	CDV-10, CDV-12 & CDV-14	CEP A/B/C Minimum Recirculation	03
5	CDV-39	GSC min. flow recirculation	01
6	CDV-43	Excess Return to CST	01
7	CDV-67	Condensate Spray to SD F/T	01
8	CDV-72	Condensate for Valve Gland Sealing	01
9	DRV-2 & DRV-8	HPH-7A/7B Normal Drain to HPH-6A/6B	02
10	DRV-5 & DRV-11	HPH-7A/7B Alt.Drain to HP Drain F/T	02
11	DRV-15 & DRV-22	HPH-6A/6B Normal Drain to Deaerator	02
12	DRV-18 & DRV-25	HPH-6A/6B Alt. Drain to HP Drain F/T	02
13	DRV-28	LPH-3 Normal Drain to LPH-2	01
14	DRV-31	LPH-3 Alt. Drain to LP Drain F/T	01
15	DRV-34	LPH-2 Normal Drain to LPH-1	01
16	DRV-37	LPH-2 Alt. Drain to LP Drain F/T	01
17	DRV-48	Deaerator Overflow to LP Drain F/T	01
18	DRV-53 & DRV-59	HPH-8A/8B Normal Drain to HPH-7A/7B	02
19	DRV-56 & DRV-62	HPH-8A/8B Alt. Drain to HP Drain F/T	02
20	DRV-65	LPH-4 Normal Drain to LPH-3	01
21	DRV-68	LPH-4 Alt. Drain to LP Drain F/T	01
22	DMV-2	DM Normal MU to Hotwell	01
23	DMV-9	Emergency MU to Hotwell	01
24	FDV-14	Low Load Feed Control	01
[B]	15 Meters of 10mm OD x 1.5mm thick PVC Coated annealed Cu. Tubing (for each CV) (To be supplied Loose)		495 METERS
[C]	FITTINGS: for each CV (To be Supplied Loose)	(i) BRASS FITTING-Double Compression Type for Connection to Air Filter Regulator	1 LOT
		(ii) BRASS FITTING- Double Compression Type for Connection to Solenoid Valve	1 LOT
		(iii) BRASS FITTING- Double Compression Type for Connection to IA Header isolation vlv.	1 LOT
[D]	START-UP/COMMISSIONING SPARES : (TOTAL PRICE FOR 1 SETS OF BODY AND BONNET GASKET & 1 SETS OF GLAND PACKINGS PER CV)		1 LOT
[E]	MANDATORY SPARES		1 LOT
[G]	HARDWARE FOR CONNECTION B/W CV POSITIONER & HMS SYSTEM AT POSITIONER END (RS-232/485 CONVERTER, MULTIPLEXER & HART MODEM, ETC.)		1 LOT
[H]	PC(INDUSTRIAL GRADE) &DIAGNOSTIC SOFTWARE: Software for diagnostic & configuration with facility of configuring all valve tags in a unit through polling & without any change in wiring.		1 LOT



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

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SPARES



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Bellary TPS Unit#3, 1x700MW - KPCL

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[A] LIST OF COMMISSIONING SPARES

S.No.	ITEM DESCRIPTION	QUANTITY REQUIRED
1	Gaskets	One (1) set with each control valve Tag
2	Gland Packing	One (1) set with each control valve Tag

[B] LIST OF MANDATORY SPARES

S. NO	ITEM DESCRIPTION	QUANTITIES FOR ONE UNIT
1.	Plug & Stem Assembly	1 No. of each type
2.	Seat Ring	1 No. of each type
3.	Packing & Gaskets	1 No. of each type
4.	Pilot Relay	1 No. of each type
5.	Actuator Diaphragm	1 No. of each type
6.	O-Rings	2 No. of each type
7.	Feedback Linkages	1 No. of each type
8.	Positioner	2 No.s
9	Airlock Relays	1 No. of each type

NOTE : - The Actual Quantity shall be worked out during detailed Engineering.



Technical specification for
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SECTION D

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SECTION – D

SCHEDULE OF SUBMISSION OF DRAWINGS/DOCUMENTS



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: **PE-TS-367-145-I 004**

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SHEET OF

SCHEDULE OF SUBMISSION OF DRAWINGS / DOCUMENTS, EQUIPMENT MANUFACTURE INSPECTION AND DESPATCH

- | 1. <u>ZERO DATE</u> | <u>DATE of LOI / FOI / TOI</u> |
|--|---------------------------------------|
| 2. Submission of Data Sheets / documents / catalogues / Valve sizing calculations / Noise calculations for approval. | 2 Weeks from the Zero date. |
| 3. Technical finalisation, freezing of inputs of manufacture by way of vetting of documents and technical discussions and resubmissions of documents (if required) | 8 Weeks from the Zero date. |
| 4. Inspection of Equipment as per Approved (Category-I) drawings / documents. | 18 Weeks from the Zero date. |
| 5. Release of MDCC by BHEL | 20 Weeks from the Zero date. |
| 6. Dispatch (Packaging & Dispatch) | 21 Weeks from the Zero date. |
| 7. Final documents submission as per Contract | 22 Weeks from the Zero date. |

NOTE: Delays due to non-fulfillment of the requirements of approved Quality Plan and approved Data sheets; Drawings, Catalogues and Sizing Calculations observed during inspection shall be to the Vendor's account.

Delays due to INCOMPLETE (Partly) submission of Data sheets, Drawings, Catalogues and Sizing Calculations also be considered as **"DOCUMENTS NOT SUBMITTED"**

(Signature and Stamp of the Bidder)

KARNATAKA POWER CORPORATION LIMITED
BELLARY TPS Unit#3, 1x700MW

TECHNICAL SPECIFICATION
FOR
CONTROL VALVES WITH ACCESSORIES
(Pneumatically Operated)

VOLUME III

SPECIFICATION No: PE-TS-367-145-I 004



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



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: **PE-TS-367-145-I 004**

VOLUME III

SECTION

REV. NO. 00 DATE : 05.12.2011

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VOL-III

S. No.	DESCRIPTION	No. of sheets
1	COMPLIANCE CERTIFICATE	1
2	SCHEDULE OF PRICES	1
3	SCHEDULE OF UNIT PRICES	1
4	CV TEST CHARGES	1
5	INSPECTION SCHEDULE	1

COMPLIANCE CERTIFICATE
For
Control Valve with accessories
(To be Signed & Stamped by the Bidder)

Project: Bellary TPS Unit#3, 1x700MW - KPCL

Specification no.: PE-TS-367-145-I004

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 on produced for BHEL / Customer's concurrence. BHEL / Customer reserves the right to accept/rejects any variation to the specification.

Signature with date	
Name	
Company seal	



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: PE-TS-367-145-I 004

VOLUME III

SECTION

REV. NO. 00

DATE : 05.12.2011

SHEET OF

SCHEDULE OF PRICES

S.NO	ITEM DESCRIPTION		UNIT PRICE (Ex-Works)	TOTAL PRICE for ONE Units (Ex-works)
[A] CONTROL VALVES COMPLETE WITH PNEUMATIC ACTUATOR AND ALL THE ACCESSORIES				
S. No.	TAG NO.	SERVICE		
1.	ASV-8	D/A Pegging from Aux. Steam Header		
2.	CRHV-6	D/A Pegging from CRH Line		
3.	CDV-22 & CDV-25	Main Condensate Control		
4.	CDV-10,CDV-12 & CDV-14	CEP A/B/C Minimum Recirculation		
5.	CDV-39	GSC min. flow recirculation		
6.	CDV-43	Excess Return to CST		
7.	CDV-67	Condensate Spray to SD F/T		
8.	CDV-72	Condensate for Valve Gland Sealing		
9.	DRV-2 & DRV-8	HPH-7A/7B Normal Drain to HPH-6A/6B		
10	DRV-5 & DRV-11	HPH-7A/7B Alt.Drain to HP Drain F/T		
11	DRV-15 & DRV-22	HPH-6A/6B Normal Drain to Deaerator		
12	DRV-18 & DRV-25	HPH-6A/6B Alt. Drain to HP Drain F/T		
13	DRV-28	LPH-3 Normal Drain to LPH-2		
14	DRV-31	LPH-3 Alt. Drain to LP Drain F/T		
15	DRV-34	LPH-2 Normal Drain to LPH-1		
16	DRV-37	LPH-2 Alt. Drain to LP Drain F/T		
17	DRV-48	Deaerator Overflow to LP Drain F/T		
18	DRV-53 & DRV-59	HPH-8A/8B Normal Drain to HPH-7A/7B		
19	DRV-56 & DRV-62	HPH-8A/8B Alt. Drain to HP Drain F/T		
20	DRV-65	LPH-4 Normal Drain to LPH-3		
21	DRV-68	LPH-4 Alt. Drain to LP Drain F/T		
22	DMV-2	DM Normal MU to Hotwell		
23	DMV-9	Emergency MU to Hotwell		
24	FDV-14	Low Load Feed Control		
[B]	15 METERS OF Cu. TUBING FOR CONNECTION BETWEEN IA HEADER ON ONE END & ACCESSORIS ON THE OTHER END OF CV. + 1 SET OF FITTINGS FOR EACH VALVE.			
[C]	START-UP/COMMISSIONING SPARES (TOTAL PRICE FOR 1 SETS OF BODY AND BONNET GASKET & 1 SETS OF GLAND PACKINGS PER CV)			
[D]	MANDATORY SPARES			
[E]	HARDWARE FOR CONNECTION B/W CV POSITIONER & HMS SYSTEM AT POSITIONER END (RS-232/485 CONVERTER, MULTIPLEXER & HART MODEM, ETC.)			
[F]	PC(INDUSTRIAL GRADE) AND DIAGNOSTIC SOFTWARE: Software for diagnostic & configuration with facility of configuring all valve tags in a unit through polling & without any change in wiring.			
[G]	CV TEST CHARGES (ONE PER TYPE PER SIZE, CV VALUE. TAG NOS. TO BE GROUPED ACCORDINGLY AND INDICATED.)			
[H]	DOCUMENTATION CHARGES FOR THE FINAL DOCUMENTS & SOFT COPIES.			



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

Bellary TPS Unit#3, 1x700MW - KPCL

SPEC NO.: **PE-TS-367-145-I 004**

VOLUME III

SECTION

REV. NO.

00

DATE : 05.12.2011

SHEET

OF

UNIT PRICES

CONTROL VALVE ACCESSORIES

S. No.	ITEMS	UNIT PRICE (Ex-Works)
1.	SMART POSITIONER (EACH TYPE)	
2.	VALVE TRIM OF EACH TYPE (Separate list to be attached if required)	
3.	DIAPHRAGMS,O-RINGS,SEALS ETC OF ALL TYPE,MAKE ETC	
4.	AIR FILTER REGULATORS	
5.	AIR LOCK RELAY	
6.	POSITION LIMIT SWITCH	
7.	VOLUME BOOSTER	
8.	SOLENOID VALVE	
9.	E/P CONVERTER	
10.	PRESSURE GAUGES OF EACH TYPE	
11.	JUNCTION BOX (24 WAYS)	
12.	HANDWHEEL	
13.	HART CALIBRATOR	
14.	PERSONAL COMPUTER (INDUSTRIAL GRADE)	
15.	SOFTWARE FOR POSITIONER(DIAGONOSTIC)	
16.	HARDWARE FOR CONNECTION B/W PC & CV POSITIONER (RS-232/485 CONVERTER, MULTIPLEXER & HART MODEM, ETC.)	
17.	ACTUATOR OF EACH TYPE (Separate list to be attached if required)	
18.	BRASS FITTING FOR CONNECTION TO AIR FILTER REGULATOR	
19.	BRASS FITTING FOR CONNECTION TO SOLENOID VALVE	
20.	BRASS FITTINGS FOR CONNECTING TO AIR HEADER	
21.	EQUAL COPPER TEE	
22.	COPPER TUBING PER METRE	

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE

		109		
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL



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SHEET

OF

CV TEST CHARGES

S.NO	ITEM DESCRIPTION		QTY	CV TEST CHARGES (Ex-works)
	TAG NO.	SERVICE		
1	ASV-8	D/A Pegging from Aux. Steam Header	1	
2	CRHV-6	D/A Pegging from CRH Line	1	
3	CDV-22 & CDV-25	Main Condensate Control	1	
4	CDV-10, CDV-12 & CDV-14	CEP A/B/C Minimum Recirculation	1	
5	CDV-39	GSC min. flow recirculation	1	
6	CDV-43	Excess Return to CST	1	
7	CDV-67	Condensate Spray to SD F/T	1	
8	CDV-72	Condensate for Valve Gland Sealing	1	
9	DRV-2 & DRV-8	HPH-7A/7B Normal Drain to HPH-6A/6B	1	
10	DRV-5 & DRV-11	HPH-7A/7B Alt.Drain to HP Drain F/T	1	
11	DRV-15 & DRV-22	HPH-6A/6B Normal Drain to Deaerator	1	
12	DRV-18 & DRV-25	HPH-6A/6B Alt. Drain to HP Drain F/T	1	
13	DRV-28	LPH-3 Normal Drain to LPH-2	1	
14	DRV-31	LPH-3 Alt. Drain to LP Drain F/T	1	
15	DRV-34	LPH-2 Normal Drain to LPH-1	1	
16	DRV-37	LPH-2 Alt. Drain to LP Drain F/T	1	
17	DRV-48	Deaerator Overflow to LP Drain F/T	1	
18	DRV-53 & DRV-59	HPH-8A/8B Normal Drain to HPH-7A/7B	1	
19	DRV-56 & DRV-62	HPH-8A/8B Alt. Drain to HP Drain F/T	1	
20	DRV-65	LPH-4 Normal Drain to LPH-3	1	
21	DRV-68	LPH-4 Alt. Drain to LP Drain F/T	1	
22	DMV-2	DM Normal MU to Hotwell	1	
23	DMV-9	Emergency MU to Hotwell	1	
24	FDV-14	Low Load Feed Control	1	

NOTE:

- CHARGES TO BE INDICATED AGAINST EACH TAG NO.
- CV TEST TO BE CONDUCTED FOR ONE PER TYPE PER SIZE, CV VALUE. TAG NOS. TO BE GROUPED ACCORDINGLY AND INDICATED.



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DATE : 05.12.2011

SHEET OF

INSPECTION SCHEDULE

(PLACE & ADDRESS OF TESTING/ INSPECTION AND ITS SCHEDULE DATE & DURATION IN NUMBER OF DAYS ITEM/COMPONENTWISE TO BE LISTED)

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL