



MOUDA STPP PHASE-II (2X 660 MW)

TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH ACCESSORIES (Pneumatically operated)

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JOB NO. 387	TITLE TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH ACCESSORIES (Pneumatically operated)	DOC. NO. PE-TS-387-145-I 106 NO OF SHEETS				
	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA	DEPT CODE I		NAME	SIGN	DATE
			DESN	RM		06.11.12
			CHD	RKR		06.11.12
			APPD	MAM/AK		06.11.12

	<p style="text-align: center; color: magenta; font-weight: bold;">PREAMBLE</p>	SPECIFICATION NO. PE-SS-999-100-Q-001
		VOLUME
		SECTION
		REV. NO. DATE
		SHEET 1 OF 1
<p>1.0 The tender document contains three (3) volume s. The bidder shall meet the requirements of all the three volumes.</p> <p>1.1 <u>Volume-I (CONDITIONS OF CONTRACT)</u></p> <p>This consists of four parts as below :-</p> <p>Volume-IA : This part contains instructions to bidders for making bids to BHEL.</p> <p>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.</p> <p>Volume-IC : This part contains special conditions of contract.</p> <p>Volume-ID : This part contains commercial conditions for erection & commissioning site work, as applicable.</p> <p>1.2 <u>Volume-II TECHNICAL SPECIFICATIONS</u></p> <p>Technical requirements are stipulated in Volume-II which comprises of :-</p> <p>Volume-IIA : General Technical Conditions</p> <p>Volume-IIB : Technical Specification including Drawings, if any.</p> <p>1.2.1 <u>Volume-IIB</u></p> <p>This volume is sub-divided into following sections :-</p> <p>Section-A : This section outlines the scope of enquiry.</p> <p>Section-B : This section provides "Project Information".</p> <p>Section-C : This section indicates technical requirements specific to the contract, not covered in Section-D.</p> <p>Section-D : This section comprises of technical specifications of equipments complete with data sheet A, B and C.</p> <p style="padding-left: 40px;"><u>Data Sheet - A</u> specifies data and other requirements pertaining to the Equipment.</p> <p style="padding-left: 40px;"><u>Data Sheet - B</u> Specifies data to be filled by the bidder (Data Sheet-B is contained in Volume-III).</p> <p style="padding-left: 40px;"><u>Data Sheet - C</u> Indicates data/documents to be furnished after the award of contract as per agreed schedule by the vendor (as applicable).</p> <p>1.2.2 <u>Volume-III TECHNICAL SCHEDULES</u></p> <p>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.</p> <p>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.</p>		

NATIONAL THERMAL POWER CORPORATION
2 X 660MW MOUDA STAGE-II
(FOR TWO UNIT)

TECHNICAL SPECIFICATION
FOR
CONTROL VALVES WITH ACCESSORIES
(Pneumatically Operated)

VOLUME II-B & III

SPECIFICATION No: PE-TS-387-145-I 106



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

**NATIONAL THERMAL POWER CORPORATION
2 X 660MW MOUDA STAGE-II
(FOR TWO UNIT)**

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

VOLUME II-B

SPECIFICATION No: PE-TS-387-145-I 106



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

**2 X 660 MW MOUDA STPP PHASE-2**
**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**
SPEC NO.: **PE-TS-387-145-I106**

VOLUME II B

SECTION

REV. NO.

00

DATE :

SHEET

01

OF

01

CONTENTS**VOL-II B**

SECTION	TITLE	NO. OF SHEET(S)
A	Scope of Enquiry	1
B	Project Information	3
C	- Specific Technical Requirements	8
	- Typical Hook-up Diagram for Control valve	1
D -	Specification for Control Valves	
	- Equipment specification (PES-145-06)	11+3
	- Data sheets A & B for Control Valves	58
	- Data sheets A & B for Control Valve Accessories	2
	- Data sheets C for Control Valves	4
	- Quality Plan for Control Valves	5
	- Bill of Quantity	1
	- Spares	1


2 X 660 MW MOUDA STPP PHASE-2
**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
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SPEC NO.: **PE-TS-387-145-I106**

VOLUME II B

SECTION

REV. NO.

00

DATE :

SHEET

01

OF

01

VOL- III

1.	SCHEDULE OF DRAWINGS, DATA SHEETS, DOCUMENTS, CATALOGUES SUBMITTED WITH THE BID.	1
2.	SCHEDULE OF PRICES	1
3.	SCHEDULE OF UNIT PRICES	2
4.	INSPECTION SCHEDULE	1
5.	DEVIATION SCHEDULE	1
6.	SCHEDULE OF SUBMISSION OF DRAWINGS/ DOCUMENTS, EQUIPMENT MANUFACTURE, INSPECTION AND DISPATCH	1
7.	CV TEST CHARGES	1

**2 X 660MW MOUDA STPP PHASE-2****TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION A

REV. NO. 00

DATE : 07.11.12

SHEET OF

SECTION – A

SCOPE OF ENQUIRY



Technical specification for
Control Valves with Accessories
(Pneumatically Operated)

2 X 660MW MOUDA STPP PHASE-2

SPEC NO.: **PE-TS-387-145-I 106**

VOLUME II B

SECTION A

REV. NO. 00

DATE : 07.11.2012

SHEET OF

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 **2X660MW MOUDA STPP PROJECT, PHASE-2**.
- .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 " **COMPLAINT MOD E** " means bidder to comply with the requirement of specification, quality plan, delivery schedule, quantities, start-up/commissioning 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 in line with approved Quality Plan 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.

**2 X 660MW MOUDA STPP PHASE-2****TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION B

REV. NO.

00

DATE :07.11.12

SHEET

OF

SECTION – B
PROJECT INFORMATION

CRITERIA FOR LAYOUT

PLOT PLAN LAYOUT REQUIREMENTS

ITEM	SPECIFICATION REQUIREMENT
A. Site conditions to be considered	
1. Prevalent wind direction during summer (for deciding cooling tower orientation)	South and South-East Also see wind-rose in plot plan.
2. Prevalent wind direction(s) during dry seasons (for deciding the location of coal stock pile and ash dump/unloading areas, minimising the pollution effect due to dust)	See wind-rose in plot plan.
3. Location of	
a) Water intake point.	Towards East
b) Water discharge point.	Towards South and South-East
c) Plant drainage outfall point(s).	Towards South and South-East
d) Railway entries & exits.	Towards South
e) Road entries & exits.	Towards South
f) Electrical power transmission grid system.	Towards North-East
g) Preferred/selected ash dump area.	Towards West
h) Nearest residential area.	Towards South
B. Layout Requirements	
1. Maximum permissible slope in	
a) Rail track	1 in 400
b) Road	1 in 30
c) Sides of unpaved embankment	1 in 2

ITEM	SPECIFICATION REQUIREMENT
2. Required road width	
a) Main roads	8.0 Metres with 2.5m wide shoulders on either side
b) Auxiliary interconnections	4.0 Metres with 1.0m wide shoulders on either side
c) Road to the power house unloading bay :	
• Only for entry to the unloading bay	Yes
• To pass through the unloading bay	No
3. Required minimum horizontal distance between the nearest points of	
a) Plant boundary and the boundary of residential area	(Local municipality/factory rule)
b) Electrical transformer and any other	As per the Tariff Advisory building/facility Committee Rules
c) Fire water supply installation and any building/facility subject to fire risk.	As per the Tariff Advisory Committee Rules and compliance of FM & UL
d) Inflammable liquid (fuel oil, etc.) storage & handling installation and their fencing and other buildings/facilities.	Rules of the Indian Explosive (Indian Explosives Act) and Indian Petroleum Code
4. Required minimum vertical clearance	
a) Under pipes/cable racks at road crossings	8.0 Metres
b) Soil coverage over underground pipes	1.0 Metre (minimum)
c) Pipe/Cable trench	Not Acceptable
5. Railway Wagon clearance	Rules of the Indian Railways
6. Minimum Clearance between any road edge and building/structure/ any fixed installation.	3 Metres

ITEM	SPECIFICATION REQUIREMENT
7. Required level, above the local developed grade level, of	
a) top of all roads	150 mm
b) all outdoor paved areas	150 mm
c) Temporary storage areas, workshops, offices, residence etc. required at the time of erection work.	Yes
d) Green belt around power plant area	As per environmental guidelines of MOEF, Govt. of India.

BUILDING/ EQUIPMENT LAYOUT REQUIREMENTS

ITEM	SPECIFICATION REQUIREMENT
A. Minimum clear space required at all working and walking areas for operating & maintenance personnel	
1. Horizontal, in all directions	
a) Adjacent to any electrical equipment, electrical cables, running (rotating/reciprocating) equipment, safety valve or vent/drain pipe outlet, pipe/ equipment of surface temperature exceeding 60°C.	1200 mm
b) Adjacent to any other plant facilities (including walls/structures)	1000 mm
2. Vertical (head-room clearance)	
a) Under any pipe/equipment surface of temperature exceeding 60°C and any electrical cables or other electrical items.	2.0 Metre
b) Under any other plant facilities (including structures, pipes etc.)	2.0 Metre
3. For all areas where any equipment (including trucks, trolleys and other material handling equipment) will move or maneuver.	Minimum 500 mm clear in all direction from the outer edges of the equipment
4. Minimum clear hand space required for	
a) The application of thermal insulation	100 mm
b) Welding work	150 mm
c) Bolt tightening	150 mm

B. Floors, platforms, staircase, ladders, walls, doors & windows

ITEM	SPECIFICATION REQUIREMENT
1. Statutory Requirement	As per the regulations of Tariff Advisory Committee, Indian National Building Code, Indian Factories Act, Local Municipal Rules, etc.
2. Operation & Maintenance Requirement	
a) Adequate floor space shall be kept to permit dismantling, temporary storing and in-situ maintenance of plant & equipment parts, satisfying the clear space requirements stated above. A separate unloading bay for such purpose is required.	Yes
b) Floors or fixed/portable platforms with stairs/ ladders shall be provided for easy approach to any plant item, including valves, instruments, etc. to be operated, observed and/or to be frequently (more than once a month) maintained.	Yes
3. Plinth level of all buildings, above the local developed for power house building.	300 mm, however, 500 mm grade level
4. Minimum access opening required (with rolling shutter) transportation,	3.5M wide x 4M high or, wherever entry of truck, for material more depending upon the is envisaged equipment size to be handled.

C. Other Maintenance Requirement

1. Generator stator handling

In case the Generator stator cannot be handled by the turbine house crane, all provisions for its overhauling, including the arrangement to slide the stator on the turbine house floor, the foundation work for stator jacking /lowering assembly, dismantling of building end walls/structures etc. shall be kept.

Yes

ITEM	SPECIFICATION REQUIREMENT
2. Maintenance of the internals/impellers of all important equipment, like boiler feed pumps, feed water heaters, Surface Condenser, fans of the boiler draft plant, Intake and circulating water pumps, cooling water pumps, coal mills, air compressors, blowers, heat exchangers, fuel oil pumps, filters etc.	Shall be possible without disconnecting or dismantling any piping/ducting.
3. Overhauling and handling of the casings for the above items	Shall be possible without disturbing/dismantling any piping/ducting not directly connected to them.
4. Crane Approach	
Wherever required the unobstructed approach of the crane hook/other hoisting equipment hook to various plant & equipment shall be possible.	Yes
D. Unit Equipment Room	
All electronic equipment other than those directly associated with control, operation or presentation of displays shall be mounted external to the control room in air conditioned control equipment room.	Yes
The bidder shall describe in his bid the proposed layout philosophy of the Control Equipment Room and the arrangement of equipment best suited for the system offered by him and as per good ergonomically consideration Central control Room shall be designed & constructed by owner. Bidder shall furnish GA and other relevant drawings/data sheet of all the HMI & other Auxiliary items well in advance to facilitate the above work.	
Necessary Air Conditioning shall be provided for Control Equipment Room and SWAS room etc.	Yes
E. Toilet and drinking water facility	Required in all buildings and on all floors wherever operating personnel are to be deployed.



TECHNICAL REQUIREMENTS

15.07.00

Primer/Painting Schedule

Sl. No	Description		Surface Preparation	Primer Coat			Intermediate Coat			Finish Coats			Total Min. Painting DFT (Microns)	Colour Shade
				System	Coat	Min. DFT / coat (Microns)	System	Coat	Min. DFT/ Coat (Microns)	System	Coat	Min. DFT/ Coat (Microns)		
1.	All insulated Pippings, fittings/ components, Pipe clamps, Vessels/Tanks, Equipments etc.		SP3/SP4	PS 9*	1	20	-	-	-	PS9*	1	20	40	As per NTPC Colour shade/ coding scheme
2.	All un-insulated Piping, fittings/ components, Pipe clamps, Vessels/Tanks, Equipments etc.	Design temperature <60 °C	SP3/SP4	PS 5	2	25	-	-	-	PS 4	3	35	155	
		Design temperature 60 °C-200 °C	SP3/SP4	PS 9*	1	20	-	-	-	PS9*	1	20	40	
		Design temperature > 200 °C	SP3/SP4	PS9*	1	20	-	-	-	PS9*	1	20	40	
3	Constant Load Hanger (CLH), Variable Load Hanger (VLH) and other supports		SP4*	PS19	1	40	-	-	-	PS17	1	30	70	
4.	Valves													
	Cast /Forged	Design temperature <95 °C	SP1/SP2/SP3	PS9	1	20	-	-	-	PS9	1	20	40	

MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE	TECHNICAL SPECIFICATION SECTION - VI PART-B	A-10 POWER CYCLE PIPING	PAGE 40 OF 41
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TECHNICAL REQUIREMENTS

		Design temperature 95 °C-200 °C	SP1/SP2/SP3	PS 9*	1	20	-	-	-	PS9*	1	20	40	
		Design temperature > 200 °C	SP1/SP2/SP3	PS9*	1	20				PS9*	1	20	40	
5.	All Structural Steel components	Outside TG building and in SG envelope	SP4*	Inorgani c Ethyl Zinc Silicate	1	75	PS18	1	75	a))Epoxy coat b)Final coat of paint PS17	2 1	35 30	250	
		Within TG building	SP4*	-do-	1	35	PS18	1	35	a))Epoxy coat b)Final coat of paint PS17	2 1	25 30	150	
6.	Weld Edges		SP6 (Hand cleaning by wire brushing)	PS13 (Weldab le primer)	1	25	-	-	-	-	-	-	-	
§ The first 2 finished coats (total min.DFT of 70 microns) shall be done at shop and the 3 rd finish coat (min.DFT 35 Microns) shall be applied at site.														

16.00.00 Testing Requirements:

The detailed testing requirements for power cycle piping and its components are given in the subsection for Quality Assurance(QA) .The requirements pertaining to testing given in this subsection if in variance with that given in QA subsection, then the more stringent of the two shall be followed.

MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE	TECHNICAL SPECIFICATION SECTION - VI PART-B	A-10 POWER CYCLE PIPING	PAGE 41 OF 41
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2 X 660MW MOUDA STPP PHASE-2

**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION C

REV. NO. 00


DATE :07.11.12


SHEET OF

SECTION – C

FOLLOWING DOCUMENTS ARE ENCLOSED

C-1. SPECIFIC TECHNICAL REQUIREMENTS	- 8 Sheets
C-2. HOOK UP DIAGRAM FOR CONTROL VALVE	- 1 Sheet

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<p style="text-align: center;">CONTROL VALVES AND ACTUATORS</p> <p>1.00.00 CONTROL VALVES, ACTUATORS & ACCESSORIES</p> <p>1.01.00 General Requirements</p> <p>1.01.01 The control valves and accessories equipment furnished by the Bidder shall be designed, constructed and tested in accordance with the latest applicable requirements of code for pressure piping ANSI B 31.1, the ASME Boiler & pressure vessel code, Indian Boiler Regulation (IBR), ISA, and other standards specified elsewhere as well as in accordance with all applicable requirements of the “Federal Occupational Safety and Health Standards, USA” or acceptable equal standards. All the Control Valves, their actuators and accessories to be furnished under this Sub-section will be fully suitable and compatible with the modulating loops covered under the Specification.</p> <p>1.01.02 All the control valves and accessories offered by the Bidder shall be from reputed, experienced manufacturers of specified type and range of valves.</p> <p>1.01.03 This specification does not cover special type of control valves such as combined pressure and temperature control valve for Aux PRDS applications, Separator Drain Control Valves etc.</p> <p>1.02.00 CONTROL VALVE SIZING & CONSTRUCTION</p> <p>1.02.01 The design of all valve bodies shall meet the specification requirements and shall conform to the requirements of ANSI (USA) for dimensions, material thickness and material specification for their respective pressure classes.</p> <p>1.02.02 The valve sizing shall be suitable for obtaining maximum flow conditions with valve opening at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 10% of total valve stem travel. All the valves shall be capable of handling at least 120% of the required maximum flow. Further, the valve stem travel range from minimum flow condition to maximum flow condition shall not be less than 50% of the total valve stem travel. The sizing shall be in accordance with the latest edition of ISA handbook on control valves. While deciding the size of valves, Bidder shall ensure that valves trim exit outlet velocity as defined in ISA handbook does not exceed 8 m/sec for liquid services, 150 m/sec. for steam services and 50% of sonic velocity for flashing services. Bidder shall furnish the sizing calculations clearly indicating the outlet velocity achieved with the valve size selected by him as well as noise calculations, which will be subject to Employer’s approval during detailed engineering.</p> <p>1.02.03 Control valves for steam and water applications shall be designed to prevent cavitation, wire drawing, flashing on the downstream side of valve and down stream piping. Thus for cavitation/flashing service, only valve with anti cavitation trim shall</p>			
MOUDA STPP-II (2X660MW) /	TECHNICAL SPECIFICATION SECTION-VI PART-B	IIIC-08 CONTROL VALVE AND ACTUATORS	PAGE 1 OF 7	


CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<p>be provided. Detailed calculations to establish whether cavitation will occur or not for any given application shall be furnished.</p>			
1.02.04	<p>Control valves for application such as HP/LP heater Emergency level control, Emergency Make-up to Condenser hotwell, GSC minimum flow, Deaerator Drain to condenser hotwell, condensate spill to condensate reserve tank, condenser normal make-up and valve gland sealing supplying pressure control, CEPS minimum flow control, BFP recirculation control valve shall have permissible leakage rate as per leakage Class V. All other control valve shall have leakage rate as per leakage Class-IV.</p>			
1.02.05	<p>The control valve induced noise shall be limited to 85 dBA at 1 meter from the valve surface under actual operating conditions. The noise abatement shall be achieved by valve body and trim design and not by use of silencers.</p>			
2.00.00	VALVE CONSTRUCTION			
2.01.00	<p>All valves shall be of globe body design & straightaway pattern with single or double port, unless other wise specified or recommended by the manufacturer to be of angle body type. Rotary valve may alternatively be offered when pressure and pressure drops permit.</p>			
2.02.00	<p>Valves with high lift cage guided plugs & quick-change trims shall be supplied.</p>			
2.03.00	<p>Cast Iron valves are not acceptable.</p>			
2.04.00	<p>Bonnet joints for all control valves shall be of the flanged and bolted type or other construction acceptable to the Employer. Bonnet joints of the internal threaded or union type will not be acceptable.</p>			
2.05.00	<p>Plug shall be of one-piece construction cast, forged or machined from solid bar stock. Plug shall be screwed and pinned to valve stems or shall be integral with the valve stems.</p>			
2.06.00	<p>All valves connected to vacuum on down stream side shall be provided with packing suitable for vacuum applications (e.g. double vee type chevron packing)</p>			
2.07.00	<p>Valve characteristic shall match with the process characteristics.</p>			
2.08.00	<p>Extension bonnets shall be provided when the maximum temperature of flowing fluid is greater than 280 deg. C.</p>			
2.09.00	<p>Flanged valves shall be rated at no less then ANSI press class of 300 lbs.</p>			
MOUDA STPP-II (2X660MW) /		TECHNICAL SPECIFICATION SECTION-VI PART-B	IIIC-08 CONTROL VALVE AND ACTUATORS	PAGE 2 OF 7

CLAUSE NO.	TECHNICAL REQUIREMENTS				<div>एनडीपीसी NTPC</div>
3.00.00	VALVE MATERIALS				
	Sr. No.	Service	Body material	Trim Material	
	1	Non-corrosive, non-flashing and non-cavitation service except DM service	Carbon steel ASTM-A216 Gr. WCB for fluid temperature below 275 Deg. C Alloy steel ASTM-A217Gr. WC9 for fluid temperature above 275 Deg. C	316SS stellited with stellited facedguide posts and bushings.	
	2.	Severe flashing/cavitation services	Alloy steel ASTM-A217 Gr. WC9	440 C	
	3.	Low flashing/cavitation service	Alloy steel ASTM-A217 Gr. WC6	17-4 PH SS	
4.00.00	4.	DM water service	316 SS	316 SS	
	<p>NOTE Valve body rating shall meet the process pressure and temperature requirement as per ANSI B16.34.</p> <p>However, Bidder may offer valves with body and trim materials better than specified materials and in such cases Bidder shall furnish the comparison of properties including cavitation resistance, hardness, tensile strength, strain energy, corrosion resistance and erosion resistance etc. of the offered material vis-a-vis the specified material for Employer's consideration and approval.</p>				
	END PREPARATION				
Valve body ends shall be either butt welded/socket welded, flanged (Rubber lined for condensate service) or screwed as finalised during detailed engineering and as per Employer's approval. The welded ends wherever required shall be butt welded type as per ANSI B 16.25 for control valves of sizes 65 mm and above. For valves size 50 mm and below welded ends shall be socket welded as per ANSI B 16.11. Flanged ends wherever required shall be of ANSI pressure-temperature class equal to or greater than that of the control valve body.					
MOUDA STPP-II (2X660MW) /			TECHNICAL SPECIFICATION SECTION-VI PART-B	IIIC-08 CONTROL VALVE AND ACTUATORS	PAGE 3 OF 7

CLAUSE NO.	TECHNICAL REQUIREMENTS		<div>एनटीपीसी NTPC</div>	
5.00.00	VALVE ACTUATORS <p>All control valves shall be furnished with pneumatic actuators. The Bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut off pressure and leakage class requirements. The valve actuators shall be capable of operating at 60 deg.C continuously.</p> <p>Valve actuators and stems shall be adequate to handle the unbalanced forces occurring under the specified flow conditions or the maximum differential pressure specified. An adequate allowance for stem force, at least 0.15 Kg/sq.cm. per linear millimeter of seating surface, shall be provided in the selection of the actuator to ensure tight seating unless otherwise specified.</p> <p>The travel time of the pneumatic actuators shall not exceed 10 seconds.</p>			
6.00.00	CONTROL VALVE ACCESSORY DEVICES			
6.01.00	All pneumatic actuated control valve accessories such as air locks, hand wheels/hand-jacks, limit switches, microprocessor based electronic Positioner, diffusers, external volume chambers, position transmitters (capacitance or resistance type only), reversible pilot for Positioner, tubing and air sets, solenoid valves and junction boxes etc. shall be provided as per the requirements.			
7.00.00	SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER			
	Electrical	Input Signal	4-20 mA	
		Power Supply	Loop Powered from the output card of Control System.	
		Hart Protocol	Compatibility For Remote Calibration & Diagnostics (Super-Imposed HART signal on Input Signal 4-20 mA)	
		Valve Position Sensing	Position Sensing (Non Contact-Type), 4-20 mA O/P Signal For Control System to be provided	
	Environment	Operating Temp	(-)30 To 80 Deg. C	
		Humidity	0-95 %	
		Protection Class	IP-65 Minimum	
	Remote Configuration and Diagnostics	a. The following functions shall be provided in the positioner: Remote Configuration, Calibration and Testing of the Actuator and advanced Diagnostic Features Like Stroke Counter or		
MOUDA STPP-II (2X660MW) /		TECHNICAL SPECIFICATION SECTION-VI PART-B	IIC-08 CONTROL VALVE AND ACTUATORS	PAGE 4 OF 7

CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>
		Travel Counter, Leakage In Actuators, On Line Partial Closure Test, Valve Signature Analysis, Step Response Test, Valve Friction/ Jamming Detection etc. (See Note* below)		
		b. Factory Valve Signature Tests Reports (Pr Vs Valve Travel And Travel Vs I/P Signal) are to be provided.		
	Tests Certificates	Test certificates as per Manufacturer Standard/Relevant Standard are to be submitted		
	Configuration/	Remote Calibration, Auto & Manual Calibration Shall Be Possible		
	Operating	Operating Range	Full Range & Split Range Signal Range	
	Modes	Valve Action	Direct & Reverse. Valve Action	
		Flow Characterisation	Possible To Fit Valve Characteristic Curve Linear & Equal Percentage	
	Fail Safe/Fail Freeze	Fail Safe/Fail Freeze Feature is to Be Provided.		
	Pneumatic	Air Capacity	Sufficient To Handle The Valves Selected/Boosters To Be Supplied If required.	
		Air Supply Pressure	To Suit The Air Supply Pressure/Quality Available.	
		Process Connection	1/4 Inch NPT	
	Performance	Characteristic Deviation	<=0.5 % Of Span	
		Ambient Temp Effect	<=0.01 %/Deg C Or Better	
	EMC & CE Compliance	Required International Standard EN/IEC.	To Like	En50081-2 & En50082 Or Equivalent
Accessories	In Built Operator Panel	Display With Push Buttons For Configuration And Display On The Positioner Itself (Password Protected/Hardware Lock)		
	Hand Held Hart Calibrator	Universal Hart Calibrator To Be Provided, One Per Unit		
MOUDA STPP-II (2X660MW) /		TECHNICAL SPECIFICATION SECTION-VI PART-B		IIC-08 CONTROL VALVE AND ACTUATORS
				PAGE 5 OF 7

CLAUSE NO.	TECHNICAL REQUIREMENTS		<div>एनडीपीसी NTPC</div>						
	<table><tr><td>Press Gauge Block</td><td>For Supply & Output Pr., Filter Regulator Other Accessories Shall Be Provided As On Required Basis For Making System Complete.</td></tr><tr><td>Electrical Cable Entry</td><td>1/2-Npt,Side Or Bottom Entry To Avoid Water Ingress</td></tr><tr><td>Valves Mounting Assembly</td><td>For Sliding Stem/Rotary/Single Acting/Double Acting On Required Basis</td></tr></table>	Press Gauge Block	For Supply & Output Pr., Filter Regulator Other Accessories Shall Be Provided As On Required Basis For Making System Complete.	Electrical Cable Entry	1/2-Npt,Side Or Bottom Entry To Avoid Water Ingress	Valves Mounting Assembly	For Sliding Stem/Rotary/Single Acting/Double Acting On Required Basis		
Press Gauge Block	For Supply & Output Pr., Filter Regulator Other Accessories Shall Be Provided As On Required Basis For Making System Complete.								
Electrical Cable Entry	1/2-Npt,Side Or Bottom Entry To Avoid Water Ingress								
Valves Mounting Assembly	For Sliding Stem/Rotary/Single Acting/Double Acting On Required Basis								
	<p>* Note:</p> <p>Employer is providing a centralized HART management system including the HART multiplexing/interfacing system. The HART signals shall be picked up from marshalling terminals of DDCMIS (SG/TG DDCMIS as well as BOP DDCMIS), as applicable. The details of the above mentioned employer's HART management system are as below:</p> <p>The following functionalities are provided through software of the HART management system:</p> <p>1. For electronic transmitters, temperature transmitters and analysers:</p> <ul style="list-style-type: none">a. Constant scanning to monitor faults or changes to instrument configuration.b. Employer-defined and standard calibration and configuration procedures for all transmitters.c. Constant signal data collection facilities to maintain continuously updated records.d. Automatic tracking of configuration changes made in the field, such as may be introduced by hand-held communicator. All configuration function associated with hand-held communicators shall be available in the system.e. Event and log reports on screen as well as on printer.f. Any addition/deletion of transmitter will be reported on printer and logged in hard disk. <p>2. For electronic positioners:</p> <ul style="list-style-type: none">a. Remote Configuration, Calibration and Testing of the Actuatorb. Advanced Diagnostic Features Like Stroke Counter or Travel Counter, Leakage In Actuators, On Line Partial Closure Test, Valve Signature Analysis, Step Response Test, Valve Friction/ Jamming Detection etc.								
MOUDA STPP-II (2X660MW) /		TECHNICAL SPECIFICATION SECTION-VI PART-B	IIIC-08 CONTROL VALVE AND ACTUATORS						
			PAGE 6 OF 7						


CLAUSE NO.	TECHNICAL REQUIREMENTS			
8.00.00	<p>Above functionalities are achieved by the Employer's HART management system by providing industry standard softwares. If the bidder has any observations on the above, the same is to be brought out in the bid. Further, Bidder has to list out in his bid the softwares that are compatible with his electronic positioners.</p>			
	<p>TEST AND EXAMINATION</p>			
	<p>All valves shall be tested in accordance with the quality assurance programme agreed between the Employer and Contractor, which shall meet the requirements of IBR and other applicable codes mentioned elsewhere in the specifications. The tests shall include but not be limited to the following:</p>			
	8.01.00 Non Destructive Test as per ANSI B-16.34.			
	8.02.00 Hydrostatic shell test in accordance with ANSI B 16.34 prior to seat leakage test.			
	8.03.00 Valve closure test and seat leakage test in accordance with ANSI-B 16.34 and as per the leakage class indicated above.			
8.04.00	<p>Functional Test: The fully assembled valves including actuators control devices and accessories shall be functionally tested to demonstrate times from open to close position.</p>			
	<p>CV Test: Please refer Sub-section-IV:110. (Type test requirements).</p>			
8.05.00	<p>CONTROL VALVE QUANTITIES</p>			
	<p>Bidder shall furnish all the control valves under this main plant package as finalised during detailed engineering stage without any price repercussions whatsoever depending on the process requirements. All the control valves provided by the Bidder for this project shall meet the specifications requirements specified herein. Specification for control valves in this Sub-section has to be read in conjunction with other relevant Sub-sections of this specification.</p>			
MOUDA STPP-II (2X660MW) /		TECHNICAL SPECIFICATION SECTION-VI PART-B	IIIC-08 CONTROL VALVE AND ACTUATORS	PAGE 7 OF 7

SUB-SECTION – IIIC – 10

TYPE TEST REQUIREMENTS

MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) /
NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) /
RAGHUNATHPUR TPP-II (2X660MW)
STEAM TURBINE GENERATOR PACKAGE

TECHNICAL SPECIFICATION
SECTION-VI
PART-B


CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<p style="text-align: center;">TYPE TEST REQUIREMENTS</p> <p>1.00.00 TYPE TEST REQUIREMENTS</p> <p>1.01.00 General Requirements</p> <p>1.01.01 The Contractor shall furnish the type test reports of all type tests as per relevant standards and codes as well as other specific tests indicated in this specification. A list of such tests are given for various equipment in table titled 'TYPE TEST REQUIREMENT FOR C&I SYSTEMS' at the end of this chapter and under the item Special Requirement for Solid State Equipments/Systems. For the balance equipment instrument, type tests may be conducted as per manufactures standard or if required by relevant standard.</p> <p>(a) Out of the tests listed, the Bidder/ sub-vendor/ manufacturer is required to conduct certain type tests specifically for this contract (and witnessed by Employer or his authorized representative) even if the same had been conducted earlier, as clearly indicated subsequently against such tests.</p> <p>(b) For the rest, submission of type test results and certificate shall be acceptable provided.</p> <p>i. The same has been carried out by the Bidder/ sub-vendor on exactly the same model /rating of equipment. (For control valves, this shall be same size, type & design).</p> <p>ii. There has been no change in the components from the offered equipment & tested equipment.</p> <p>iii. The test has been carried out as per the latest standards alongwith amendments as on the date of Bid opening.</p> <p>(c) In case the approved equipment is different from the one on which the type test had been conducted earlier or any of the above grounds, then the tests have to be repeated and the cost of such tests shall be borne by the Bidder/ sub-vendor within the quoted price and no extra cost will be payable by the Employer on this account.</p> <p>1.01.02 As mentioned against certain items, the test certificates for some of the items shall be reviewed and approved by the main Bidder or his authorized representative and the balance have to be approved by the Employer.</p> <p>1.01.03 The schedule of conduction of type tests/ submission of reports shall be submitted and finalized during pre-award discussion.</p> <p>1.01.04 For the type tests to be conducted, Contractor shall submit detailed test procedure for approval by Employer. This shall clearly specify test setup, instruments to be</p>			
MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI PART-B	IIIC-10 TYPE TEST REQUIREMENTS	PAGE 1 OF 10

CLAUSE NO.	TECHNICAL REQUIREMENTS	<div>एनटीपीसी NTPC</div>		
1.01.05	<p>used, procedure, acceptance norms (wherever applicable), recording of different parameters, interval of recording precautions to be taken etc. for the tests to be carried out.</p> <p>The Bidder shall indicate in the relevant BPS schedule, the cost of the type test for each item only for which type tests are to be conducted specifically for this project. The cost shall only be payable after conduction of the respective type test in presence of authorize representative of Employer. If a test is waived off, then the cost shall not be payable.</p>			
2.00.00	SPECIAL REQUIREMENT FOR SOLID STATE EQUIPMENTS/ SYSTEMS			
2.01.00	<p>The minimum type test reports, over and above the requirements of above clause, which are to be submitted for each of the major C&I systems shall be as indicated below:</p> <p>i) Surge Withstand Capability (SWC) for Solid State Equipments/ Systems</p> <p>All solid state systems/ equipments shall be able to withstand the electrical noise and surges as encountered in actual service conditions and inherent in a power plant. All the solid state systems/ equipments shall be provided with all required protections that needs the surge withstand capability as defined in ANSI 37.90.1/ IEEE-472. Hence, all front end cards which receive external signals like Analog input & output modules, Binary input & output modules etc. including power supply, data highway, data links shall be provided with protections that meets the surge withstand capability as defined in ANSI 37.90.1/ IEEE-472. Complete details of the features incorporated in electronics systems to meet this requirement, the relevant tests carried out, the test certificates etc. shall be submitted along with the proposal. As an alternative to above, suitable class of EN 61000-4-12 which is equivalent to ANSI 37.90.1/ IEEE-472 may also be adopted for SWC test.</p> <p>ii) Dry Heat test as per IEC-68-2-2 or equivalent.</p> <p>iii) Damp Heat test as per IEC-68-2-3 or equivalent.</p> <p>iv) Vibration test as per IEC-68-2-6 or equivalent.</p> <p>v) Electrostatic discharge tests as per EN 61000-4-2 or equivalent.</p> <p>vi) Radio frequency immunity test as per EN 61000-4-6 or equivalent.</p> <p>vii) Electromagnetic Field immunity as per EN 61000-4-3 or equivalent.</p> <p>Test listed at item no. v, vi, vii, above are applicable for electronic cards only as defined under item (i) above.</p>			
MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI PART-B	IIIC-10 TYPE TEST REQUIREMENTS	PAGE 2 OF 10

CLAUSE NO.	TECHNICAL REQUIREMENTS					<div>एनटीपीसी NTPC</div>
3.00.00	TYPE TEST REQUIREMENT FOR C&I SYSTEMS					
	Sl. No	Item	Test Requirement	Standard	Test To Be Specifically Conducted	NTPC's Approval Req. On Test Certificate
	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
	1	Elect. Metering instruments	As per standard (col 4)	IS-1248	No	Yes
	2	Thermocouple	Degree of protection test	IS-2147	No	No
	3	CJC Box	Degree of protection test	IS-2147	No	No
	4	RTD	As per standard (col 4)	IEC-60751	No	No
	5	Electronic transmitter	As per standard (col 4)	BS-6447 / IEC-60770	No	Yes
	6	E/P converter	As per standard (col 4)	Mfr. standard	No	Yes
	7	Instrumentation Cables Twisted & Shielded (Refer Note-B below)				
		-Conductor	Resistance test	VDE-0815	No	Yes
			Diameter test	IS-10810	No	Yes
			Tin Coating test (Persulphate test)	IS-8130	No	Yes
	-Insulation	Loss of mass	VDE 0472	No	Yes	
MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE			TECHNICAL SPECIFICATION SECTION-VI PART-B		IIC-10 TYPE TEST REQUIREMENTS	PAGE 3 OF 10


CLAUSE NO.	TECHNICAL REQUIREMENTS				<div>एनटीपीसी NTPC</div>
		Ageing in air ovens**	VDE 0472	No	Yes
		Tensile strength and elongation test before and after ageing**	VDE 0472	No	Yes
		Heat shock	VDE 0472	No	Yes
		Hot deformation	VDE 0472	No	Yes
		Shrinkage	VDE 0472	No	Yes
		Bleeding & blooming	IS-10810	No	Yes
	-Inner sheath***	Loss of mass	VDE 0472	No	Yes
		Heat shock	VDE 0472	No	Yes
		Cold bend/cold impact test	VDE 0472	No	Yes
		Hot deformation	VDE 0472	No	Yes
		Shrinkage	VDE 0472	No	Yes
	-Outer sheath	Loss of mass	VDE 0472	No	Yes
		Ageing in air ovens**	VDE 0472	No	Yes
		Tensile strength and elongation test before and after ageing**	VDE 0472	No	Yes
MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI PART-B		IIIC-10 TYPE TEST REQUIREMENTS	
				PAGE 4 OF 10	


CLAUSE NO.	TECHNICAL REQUIREMENTS				एन टी पी सी NTPC
	<div>Heat shock</div> <div>VDE 0472</div> <div>No</div> <div>Yes</div> <div>Hot deformation</div> <div>VDE 0472</div> <div>No</div> <div>Yes</div> <div>Shrinkage</div> <div>VDE 0472</div> <div>No</div> <div>Yes</div> <div>Bleeding & blooming</div> <div>IS-10810</div> <div>No</div> <div>Yes</div> <div>Colour fastness to water</div> <div>IS-5831</div> <div>No</div> <div>Yes</div> <div>Cold bend/ cold impact test</div> <div>VDE-0472</div> <div>No</div> <div>Yes</div> <div>Oxygen index test</div> <div>ASTMD-2863</div> <div>No</div> <div>Yes</div> <div>Smoke Density Test</div> <div>ASTMD-2843</div> <div>No</div> <div>Yes</div> <div>Acid gas generation test</div> <div>IEC-60754-1</div> <div>No</div> <div>Yes</div> <div>-fillers</div> <div>Oxygen index test</div> <div>ASTMD-2863</div> <div>No</div> <div>Yes</div> <div>Acid gas generation test</div> <div>IEC-60754-1</div> <div>No</div> <div>Yes</div> <div>-AL-MYLAR shield</div> <div>Continuity test</div> <div>No</div> <div>Yes</div> <div>Shield thickness</div> <div>No</div> <div>Yes</div> <div>Overlap test</div> <div>No</div> <div>Yes</div> <div>-Over all cable</div> <div>Flammability Test</div> <div>IEEE 383</div> <div>No</div> <div>Yes</div>				
MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI PART-B		IIIC-10 TYPE TEST REQUIREMENTS	PAGE 5 OF 10

CLAUSE NO.	TECHNICAL REQUIREMENTS				
	Swedish Chimney Test	SEN 4241475	No	Yes	
	Noise interference	IEEE Transactions	No	Yes	
	Dimensional checks	IS 10810	No	Yes	
	Cross talk	VDE-0472	No	Yes	
	Mutual capacitance	VDE-0472	No	Yes	
	HV test	VDE-0815	No	Yes	
	Drain wire continuity		No	Yes	
	* For Drain wire only				
	**These tests shall be carried out as per VDE0207 Part 6 & ASTM D-2116 for TEFLON insulated & outer sheathed cables				
	***Applicable for armoured cables only				
8	DC Power Supply System (Applicable for each model and rating)				
	Degree of protection test	IS-13947	Yes	Yes	
	Short circuit current capability	Approved procedure	Yes	Yes	
	Voltage Proof Test	UL 950, IEC950	Yes	Yes	
	Burn In test	Approved procedure	Yes	Yes	
	Efficiency	Approved procedure	Yes	Yes	
	Audible Noise Test	Approved procedure	Yes	Yes	
MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI PART-B		IIIC-10 TYPE TEST REQUIREMENTS	
				PAGE 6 OF 10	

CLAUSE NO.	TECHNICAL REQUIREMENTS				<div>एनटीपीसी NTPC</div>
		Fuse Clearing Capability	Approved procedure	Yes	Yes
		Total harmonic content	Approved procedure /CIGRE's	Yes	Yes
		Radio Frequency interference	IEC-CISPR22, IEC-61000-4-12(9b), IEC-61000-4-3, IEC-61000-4-5, IEC-61000-4-6	Yes	Yes
		Over Load Test	Approved procedure	Yes	Yes
		Restart Test	Approved procedure	Yes	Yes
		Output voltage tolerance	Approved procedure	Yes	Yes
		Parallel operation	Approved procedure	Yes	Yes
		ESD immunity Test	IEC-61000-4-2-9(1)	Yes	Yes
		Electrical Fast transient / Burst Immunity Test	IEC-61000-4-4	Yes	Yes
		Surge Protection	IEC61312, IEC61024, VDE 100-534	Yes	Yes
MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI PART-B		IIC-10 TYPE TEST REQUIREMENTS	PAGE 7 OF 10

CLAUSE NO.		TECHNICAL REQUIREMENTS				<div>एन टी पी सी</div> <div>NTPC</div>	
			Insulation Test	Approved procedure	Yes	Yes	
			Load Tests.	Approved procedure	Yes	Yes	
			Preliminary light load test (without Battery supply)	Approved procedure	Yes	Yes	
			Load sharing	Approved procedure	Yes	Yes	
9	Battery (Refer Note-A below)	As per standard (col 4)	IS-10918	No	Yes		
10	Voltage Stabiliser	Over Load Test	Approved procedure	No	Yes		
		Temp rise test without redundant fans	Approved procedure	No	Yes		
		Input voltage variation test	Approved procedure	No	Yes		
11	DDCMIS						
	CLCS Systems	Model test	Approved procedure	No	No		
	BMS	Safety requirements	VDE0116 Sec 8.7	No	Yes		
12	Conductivity Type Level Switch	Degree of protection test	IS-2147	No	No		
13	Local Gauges	Degree of protection test	IS-2147	No	No		
MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE			TECHNICAL SPECIFICATION SECTION-VI PART-B		IIIC-10 TYPE TEST REQUIREMENTS		PAGE 8 OF 10

CLAUSE NO.	TECHNICAL REQUIREMENTS						
	14	Process actuated Switches	Degree of protection test	IS-2147	No	No	
	15	Control Valves	CV test	ISA 75.02	No	Yes	
	16	PLCs	As per standard (Col 4)	IEC 1131	No	No	
	17	LIE / LIR	Degree of protection test	IS-2147	Yes	Yes	
	18	Flue gas O2 analyser, other Flue Gas analysers	Degree of protection test	IS-2147	No	Yes	
	19	Flow Nozzles & Orifice plates	Calibration	ASME PTC BS 1042	Yes	Yes	
<p>Note:</p> <p>Type Tests are to be conducted only for the items, which are being supplied as a part of this Package.</p> <p>A. For batteries with electric power supply system of TG C&I, the contractor shall submit for Employer's approval the reports of all the type tests as per IS-10918 carried out within last five years from the date of bid opening and the tests should have been either conducted at an independent laboratory or should have been witnessed by a client. The complete type test reports shall be for any rating of battery in a particular group, based on plate dimensions being manufactured by supplier.</p> <p>For batteries with electric power supply system of auxiliary plants, type test reports for batteries shall be as per standard practice of manufacturer.</p> <p>B. All cables to be supplied shall be of type tested quality. The Contractor shall submit for Employer's approval the reports of all the type tests pertaining to cables as listed in this specification and carried out within last five years from the date of bid opening. These reports should be for the tests conducted on the cables similar to those proposed to be supplied under this contract and</p>							
MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE			TECHNICAL SPECIFICATION SECTION-VI PART-B		IIIC-10 TYPE TEST REQUIREMENTS		PAGE 9 OF 10

CLAUSE NO.	TECHNICAL REQUIREMENTS 		
	<p>the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.</p> <p>In case the Contractor is not able to submit report of the type test(s) for cables conducted within last five years from the date of bid opening, or in case the type test report(s) are not found to be meeting the specification requirements, the Contractor shall conduct all such tests under this contract free of cost to the Employer and submit the reports for approval.</p>		
MOUDA STPP-II (2X660MW) / SOLAPUR STPP (2X660MW) / NABINAGAR STPP (3X660MW) / MEJA TPP (2X660MW) / RAGHUNATHPUR TPP-II (2X660MW) STEAM TURBINE GENERATOR PACKAGE		TECHNICAL SPECIFICATION SECTION-VI PART-B	IIIC-10 TYPE TEST REQUIREMENTS <div>PAGE 10 OF 10</div>



2 X 660MW MOUDA STPP PHASE-2

**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION C

REV. NO.

00


DATE :07.11.12

SHEET

OF

SECTION – C-1


SPECIFIC TECHNICAL REQUIREMENTS

	2 X 660MW MOUDA STPP PHASE-2 TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH PNEUMATIC ACTUATOR ALONGWITH ACCESSORIES	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION C-1	
		REV. NO. 00	DATE: 07.11.12
		SHEET 1	OF 4

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. **BIDDER TO NOTE THAT DATA SHEET-B, FOR MAT " SCHEDULE OF SUBMISSION OF DRAWINGS / DOCUMENTS, EQUIPMENT MANUFACTURE, INSPECTION AND DESPATCH" ENCLOSED IN SECTION-D, TO BE SIGNED AND STAMPED AND SUBMITTED WITH THE BID. QUALITY PLAN ENCLOSED IN VOLUME-IIB SHOULD BE FURNISHED DULY SIGNED AND STAMPED.**
2. **ALL THE FORMATS IN VOLUME-III SHOULD FILLED-UP AND FURNISHED WITH THE BID, COMPLETE IN ALL RESPECT. CATALOGUE, LEAFLETS RELATED WITH THE MODELS OF CONTROL VALVES AS WELL AS EACH ACCESSORY MUST BE FURNISHED WITH THE OFFER. IN THE ABSENCE OF THOSE, THE BID WOULD BE CONSIDERED INCOMPLETE AND LIABLE FOR REJECTION.**
3. THE HOOK-UP DIAGRAM FOR CONTROL VALVE, ATTACHED IN SECTION-C. SHOULD BE READ IN PLACE OF HOOK-UP DIAGRAM ATTACHED IN VOLUME-IIB, SECTION-D (EQUIPMENT SPECIFICATION, SHEET 12 OF 12).
4. VALVE BODY SIZES SHALL BE 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 LIFTS**
5. NO SPECIFIC REQUIREMENT HAS BEEN SPECIFIED FOR BONNET TYPE IN THE DATA SHEET-A. TYPE OF BONNET SHALL BE OFFERED ACCORDING TO THE REQUIREMENT OF SERVICE CONDITIONS, HOWEVER EXTENSION BONNETS SHALL BE PROVIDED WHEN THE MAXIMUM TEMPERATURE OF FLOWING FLUID IS GREATER THAN 280 DEG. C.
6. **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 MENTION OF THE SAME HAS NOT BEEN MADE IN THE DATA SHEETS-A.**
7. TOLERANCE ON END TO END, CENTER TO CENTER, CENTER TO FACE SHALL BE IN ACCORDANCE WITH ASME B 16.10
8. THE CONTROL VALVE SIZING (Cv/Kv) SHALL BE BASED ON FOLLOWING GUIDELINES:
 - a). THE VALVES SHALL PASS NORMAL RATE OF FLOW (MCR CONDITION) WITH 65 TO 75 PERCENT OPENING FOR LINEAR CHARACTERISED VALVES AND BETWEEN 75 TO 85 PERCENT OPENING FOR EQUAL PERCENTAGE CHARACTERISED VALVES.
 - b). THE VALVES SHALL HAVE ADEQUATE RANGEABILITY TO PASS THE MINIMUM AND MAXIMUM FLOWS BETWEEN 10% TO 80% OPENING OF THE VALVES, UNLESS CAGE TRIM VALVES HAVING WIDE RANGEABILITY ARE CHOSEN.
 - d). THE VALVE SELECTION SHALL BE BASED ON THE HIGHEST SIZE DICTATED BY THE ABOVE CONSIDERATIONS UNLESS NOISE, FLASHING OR OTHER FACTORS DICTATE THE FINAL SELECTION.
9. IF CAVITATING CONDITION IS FORSEEN MULTISTAGE(& MULTISTAGE BREAK DOWN TRIMS) or LABYRINTH TRIM SHALL BE OFFERED.
10. EXTENSION BONNET SHALL BE PROVIDED FOR SERVICES ABOVE 280 DEGREE C.
10. ACTUATOR FOR CEP MIN. RECIRCULATION VALVE (CDV – 10, CDV – 12 AND CDV – 14) SHALL BE PISTON TYPE. YOKE MATERIAL FOR CDV-10, 12 & 14 SHALL BE OF CARBON STEEL.
11. TYPE OF FLOW ACTION ("UNDER THE SEAT" OR "OVER THE SEAT") WILL BE SELECTED BY THE VENDOR, HOWEVER WHEREVER DOWNSTREAM SIDE IS SUBJECTED TO VACUUM, FLOW ACTION SHALL BE "FLOW TO CLOSE" (OVER THE SEAT). SEPARATE INDICATION FOR THE SAME HAS NOT BEEN PROVIDED.


	2 X 660MW MOUDA STPP PHASE-2 TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH PNEUMATIC ACTUATOR ALONGWITH ACCESSORIES	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION C-1	
		REV. NO. 00	DATE: 07.11.12
		SHEET 2	OF 4

12. CONTROL VALVE ACCESSORIES SHALL BE FITTED ON THE VALVE BODY. INTEGRAL PNEUMATIC TUBING SHALL BE 1/4 " PVC COATED COPPER, AND FITTINGS SHALL BE OF BRASS. APPLICABLE ACCESSORIES SHALL BE TERMINATED AT THE JUNCTION BOX (MOUNTED ON THE BODY).
13. THE SIZING PROCEDURE FOLLOWED SHALL BE AS PER LATEST EDITION OF ANSI/ISA OR EQUIVALENT STANDARD.
14. TOLERANCE ON END TO END, CENTER TO CENTER, CENTER TO FACE SHALL BE IN ACCORDANCE WITH ANSI B16.10
15. ALL JB & VALVES SHALL BE WITH DOUBLE COMPRESSION TYPE NIPPLED BRASS CABLE GLANDS.
16. ALL LOCAL CABLING UPTO JBS SHALL BE IN BIDDER'S SCOPE. JBS TO BE MOUNTED ON THE VALVE.
17. FACILITY TO ADJUST THE MAXIMUM TRAVEL OF THE STEM SHALL BE INCORPORATED.

18. VALVE POSITIONERS SHALL BE SMART ELECTRIC-TO-PNEUMATIC DESIGN TYPE

SMART POSITIONER

- I) SYSTEM AS INPUT AND PROVIDE A COMPATIBLE SIGNAL FOR DRIVING THE PNEUMATIC ACTUATOR.
- II) THE SMART POSITIONER SHALL ACCEPT 4-20 MA SIGNAL FROM THE CONTROL IN ADDITION TO THE ELECTRICAL-TO-PNEUMATIC SIGNAL CONVERSION AND POSITIONING FUNCTIONS, SMART ELECTRO PNEUMATIC DIGITAL POSITIONERS SHALL BE WITH AUTO CALIBRATION FACILITY AND COMPATIBLE WITH HART COMMUNICATION AND HART SYSTEM MAINTENANCE TOOL ALSO. IT SHALL ALSO PERFORM DETAILED DIAGNOSTICS & MAKE AVAILABLE THE ACTUATOR/CONTROL VALVE FAULTS VIA A HART INTERFACE. THE HART SIGNAL FOR THE DETAILED FAULTS SHALL BE SUPERIMPOSED ON THE 4-20 MA CONTROL SIGNAL ITSELF. THE FAULTS TO BE COVERED SHALL INCLUDE VALVE JAMMING, AIR SUPPLY FAILURE, LEAKAGE ETC.
- III) THE POSITIONER SHALL INCLUDE POSITION FEEDBACK MEASUREMENT FOR ITS POSITIONING FUNCTION. IT SHALL HAVE PROVISION OF 4-20 MA POSITION FEEDBACK OUTPUT TO THE CONTROL SYSTEM.
- IV) SMART POSITIONERS SHALL HAVE INTEGRAL NON-CONTACT TYPE POSITION TRANSMITTER.
- V) IT SHALL HAVE FACILITY OF CHARACTERISATION OF THE VALVE (I.E. EQUAL PERCENTAGE, QUICK OPENING, LINEAR, ETC.) IN THE POSITIONERS ITSELF.
- VI) BIDDER TO CLEARLY MENTION IN THE IR OFFER IF ANY SOFTWARE IS REQUIRED TO BE INSTALLED ON THE HMI PC (HMI IN BHEL'S SCOPE) TO COMMUNICATE WITH THE SMART POSITIONERS AND TO ACCESS THE DIAGNOSTIC FEATURES OF THE SMART POSITIONERS. BIDDER TO FURNISH OPTIONAL PRICE FOR SUCH SOFTWARE IN THEIR OFFER.
- VII) THE POSITIONER SHALL HAVE THE FACILITY OF DETECTION OF CONTROL SIGNAL FAILURE AND MAKING THE VALVE EITHER STAYPUT/OPEN/CLOSE AS PER PROCESS REQUIREMENT UPON THIS CONDITION.
- VIII) POSITIONERS SHALL BE THREE WAY TYPE WITH EQUALIZING LEVER FOR BYPASS.

	2 X 660MW MOUDA STPP PHASE-2 TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH PNEUMATIC ACTUATOR ALONGWITH ACCESSORIES	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION C-1	
		REV. NO. 00	DATE: 07.11.12
		SHEET 3	OF 4

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 IN DIVIDUAL) 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.

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 ITEM 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.


20. 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.

21 DOCUMENTATION:

A. ALONG WITH THE BIDS :

4 SETS OF THE FOLLOWING DOCUMENTS, AND ONE (1) SET OF CDS TO BE ENCLOSED WITH THE BIDS.

1. DATA SHEET-B, COMPLETELY FILLED-UP ALONGWITH ENCLOSURES.
2. HOOK-UP DIAGRAM OF CONTROL VALVE WITH ACTUATOR & ACCESSORIES.
3. VALVE & ACTUATOR ASSEMBLY DIMENSIONAL DRAWINGS WITH WEIGHTS.
4. QUALITY PLAN DULY SIGNED AND STAMPED.
5. ALL CALCULATIONS LIKE CV, NOISE LEVEL, VALVE OUTLET VELOCITY, ACTUATOR SIZING ETC.
6. ALL RELEVANT CATALOGUES FOR THE MODELS OF THE VALVES AS WELL AS ACCESSORIES OFFERED.
7. BAR CHART TO INDICATE THE TIME SCHEDULE FOR PROCUREMENT, MANUFACTURE, TESTING AND DISPATCH.

	2 X 660MW MOUDA STPP PHASE-2 TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH PNEUMATIC ACTUATOR ALONGWITH ACCESSORIES	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION C-1	
		REV. NO. 00	DATE: 07.11.12
		SHEET 4	OF 4

(B) AFTER THE AWARD OF CONTRACT:

6 SETS OF THE FOLLOWING DOCUMENTS + 2 CDS FOR APPROVAL:

1. ASSEMBLY (DIMENSIONAL) DRAWINGS.
2. VALVE EDGE PREPARATION DETAILS.
3. DATA SHEET-C COMPLETELY FILLED-UP..
4. HOOK-UP DIAGRAM OF CONTROL VALVE WITH ACTUATOR & ACCESSORIES.
5. VALVE & ACTUATOR ASSEMBLY DIMENSIONAL DRAWINGS WITH WEIGHTS.
6. QUALITY PLAN DULY SIGNED AND STAMPED.
7. ALL CALCULATIONS LIKE CV, NOISE LEVEL, VALVE OUTLET VELOCITY, ACTUATOR SIZING ETC.
8. ALL RELEVANT CATALOGUES FOR THE MODELS OF THE VALVES AS WELL AS ACCESSORIES FINALIZED.
9. BAR CHART TO INDICATE THE TIME SCHEDULE FOR PROCUREMENT, MANUFACTURE, TESTING AND DISPATCH.

(C) FINAL DOCUMENTATION:

1. CATEGORY –I & IV APPROVED FINAL DRAWINGS / DATA SHEETS VALVE SIZING CALCULATIONS, NOISE LEVEL CALCULATIONS OUTLET VELOCITY CALCULATIONS
– 10 SETS WITH 4 CD-ROMS
2. ALL TEST CERTIFICATES – 10 SETS.
3. OPERATION & MAINTENANCE MANUALS FOR CONTROL VALVES, ACTUATORS AND ALL THE ACCESSORIES – 10 SETS WITH 4 CD-ROMS

NOTE: - IN CASE OF ANY CONTRADICTION IN THE TECHNICAL REQUIREMENT BETWEEN SECTION- C AND SECTION –D, SECTION-C WILL PREVAIL.



2 X 660MW MOUDA STPP PHASE-2

**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION C

REV. NO.

00

DATE :07.11.12

SHEET

OF

SECTION – C-2

HOOK UP DIAGRAM FOR CONTROL VALVE

MOUDA STPP PHASE-2

2 X 660 MW



2 X 660MW MOUDA STPP PHASE-2

**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION D

REV. NO.

00

DATE : 07.11.12

SHEET

OF

SECTION-D

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

**2 X 660MW MOUDA STPP PHASE-2****TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION D

REV. NO.

00

DATE : 07.11.12

SHEET

OF

SECTION – D**EQUIPMENT SPECIFICATION**

<div style="text-align: center;"> SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR) </div>	SPECIFICATION NO.: PES – 145 - 06	
	VOLUME II	B
	SECTION D	
	REV. NO.	00 DA TE : 15-04-2009
	SHEET	1 OF 12

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 stems 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	
		VOLUME II B	
		SECTION D	
		REV. NO. 00 DA	TE : 15-04-2009
		SHEET 2	OF 12
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.		

<div></div>	<div>SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)</div>	SPECIFICATION NO.: PES – 145 - 06	
		VOLUME II B	
		SECTION D	
		REV. NO. 00 DA	TE : 15-04-2009
		SHEET 3	OF 12

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.

<div></div>	<div>SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)</div>	SPECIFICATION NO.: PES – 145 - 06		
		VOLUME II B		
		SECTION D		
		REV. NO.	00 DA	TE : 15-04-2009
		SHEET	4	OF 12

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 converter and air-lock. The flow capacity of the Air filter regulator shall be variable with a knob. Output gauges 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 converter shall have span adjustment facility. I/P converter 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

<div></div>	<div>SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)</div>	SPECIFICATION NO.: PES – 145 - 06		
		VOLUME II B		
		SECTION D		
		REV. NO.	00 DA	TE : 15-04-2009
		SHEET	5	OF 12

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.

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	:	\pm 1% of span
ii)	Linearity	:	\pm 2% of span
iii)	Sensitivity	:	\pm 0.5% of span.
iv)	Repeatability	:	\pm 1% of span
v)	Accuracy (Overall)	:	\pm 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)	\pm 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.

	SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)	SPECIFICATION NO.: PES – 145 - 06		
		VOLUME II B		
		SECTION D		
		REV. NO.	00 DA	TE : 15-04-2009
		SHEET	6	OF 12

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.

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:

i) Mechanical & Electrically interlocked reversing contractors suitable for class AC4 duty or Thyristor as per data sheet.

ii) Thermal overload relay.

iii) Step down control transformer with fuses.

iv) Interposing relay.

v) Monitoring relay..

vi) Open, Close & Stop push buttons.

vii) Indicating lamps.

viii) Local-Remote lockable selector switch with spare potential free contacts, wired for remote interface.

ix) 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.

	SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)	SPECIFICATION NO.: PES – 145 - 06	
		VOLUME II B	
		SECTION D	
		REV. NO. 00 DA	TE : 15-04-2009
		SHEET 7	OF 12
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		
	<ul style="list-style-type: none"> 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.		

	SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)	SPECIFICATION NO.: PES – 145 - 06	
		VOLUME II B	
		SECTION D	
		REV. NO. 00 DA	TE : 15-04-2009
		SHEET 8	OF 12

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

- i) The actuator and the accessories will be neatly wired up to the terminal boxes.
- ii) The internal wiring shall be minimum of 1 mm² stranded PVC insulated copper conductor.
- iii) 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

- i) 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.
- ii) 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.
- iii) The terminal box shall be totally enclosed conforming to degree of protection IP-65.

3.7.2 Actuator Terminal Box

- i) All terminals of limit and torque switches, space heater, position transmitters, thermostat/thermistors shall be brought to a common terminal box. The enclosure shall be to degree of protection IP-65.
- ii) 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).
- iii) 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.

<div></div>	<div>SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)</div>	SPECIFICATION NO.: PES – 145 - 06		
		VOLUME II		B
		SECTION D		
		REV. NO.	00 DA	TE : 15-04-2009
		SHEET	9	OF 12

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.

i)

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

	SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)	SPECIFICATION NO.: PES – 145 - 06	
		VOLUME II B	
		SECTION D	
		REV. NO. 00 DA	TE : 15-04-2009
		SHEET 10	OF 12

agreed Q P, taking care of customer requirements mentioned in Sec -C and submit Q P for final approval by BHEL / Customer.

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.

	SPECIFICATION FOR CONTROL VALVE (WITH PNEUMATIC / ELECTRIC ACTUATOR)	SPECIFICATION NO.: PES – 145 - 06	
		VOLUME II B	
		SECTION D	
		REV. NO. 00 DA	TE : 15-04-2009
		SHEET 11	OF 12

iii) Data sheet-C, completely filled-up along with all the enclosures including the sizing calculations & noise calculations.

iv) Quality Plan.

v) Test Certificates.

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.

55

8.0 APPLICABLE DATA SHEET FORMS

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

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



SPECIFICATION FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)

SPECIFICATION NO.: PES – 145 – 06A

VOLUME

SECTION

REV. NO.

01

DATE : 30.09.2009

SHEET

1

OF

3

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, if specified in customer's specification) <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.
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SPECIFICATION FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)

SPECIFICATION NO.: PES – 145 – 06A

VOLUME

SECTION

REV. NO.

01

DATE : 30.09.2009

SHEET

2

OF

3

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
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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)**

SPECIFICATION NO.: PES – 145 – 06A

VOLUME

SECTION

REV. NO.

01

DATE : 30.09.2009

SHEET

3

OF

3

11.0 Accessories

In Built Operator Panel	Display with push buttons for Configuration and display on the positioner itself. Universal Hart Calibrator To Be Provided,
Hand Held Hart Calibrator	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.

**2 X 660MW MOUDA STPP PHASE-2****TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION D

REV. NO.

00

DATE : 07.11.12

SHEET

OF

SECTION – D**DATA SHEETS A&B**

BHEL PEM	DOCUMENT TITLE	DOCUMENT PE-TS-387-145-N106 NUMBER
	DATA SHEET FOR CONTROL VALVES	REVISION 00 DATE 07.11.2012 NUMBER
	NTPC – 2 x 660 MW MOUDA STPP; TG PACKAGE	SHEET OF


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 contractual agreement with NTPC.
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 PE-TS-387-145-I104 NUMBER
	DATA SHEET FOR CONTROL VALVES	REVISION 00 DATE 31.01.2013 NUMBER
	NTPC – 2 x 660 MW MOUDA STPP ST-II; TG PACKAGE	SHEET 2 OF 50

INDEX

S.No.	SERVICE	Qty. / Unit	Qty. for Two Units
1.	D/A Pegging from Aux. Steam Header (ASV-8)	01	02
2.	D/A Pegging from CRH Line (CRHV-6)	01	02
3.	CEP A/B/C Minimum Recirculation (CDV-10, CDV-12 & CDV-14)	03	06
4.	Main Condensate Control (CDV-22 & CDV-25)	02	04
5.	GSC min. flow recirculation (CDV-39)	01	02
6.	Excess Dump Control (CDV-43)	01	02
7.	Condensate for SD F/T (CDV-67)	01	02
8.	Condensate for Valve Gland Sealing (CDV-72)	01	02
9.	HPH-7A/7B Drain to HPH-6A/6B (DRV-2 & DRV-8)	02	04
10.	HPH-7A/7B Drain to HP Drain F/T (DRV-5 & DRV-11)	02	04
11.	HPH-6A/6B Drain to Deaerator (DRV-15 & DRV-22)	02	04
12.	HPH-6A/6B Drain to HP Drain F/T (DRV-18 & DRV-25)	02	04
13.	LPH-3 Drain to LPH-2 (DRV-28)	01	02
14.	LPH-3 Drain to LP Drain F/T (DRV-31)	01	02
15.	LPH-2 Drain to LPH-1 (DRV-34)	01	02
16.	LPH-2 Drain to LP Drain F/T (DRV-37)	01	02
17.	Deaerator Overflow (DRV-48)	01	02
18.	HPH-8A/8B Drain to HPH-7A/7B (DRV-53 & DRV-59)	02	04
19.	HPH-8A/8B Drain to HP Drain F/T (DRV-56 & DRV -62)	02	04
20.	LPH-4 Drain to LPH-3 (DRV-65)	01	02
21.	LPH-4 Drain to LP Drain F/T (DRV-68)	01	02
22.	DM Normal Makeup to Hotwell (DMV-2)	01	02
23.	Emergency MU to Hotwell (DMV-9)	01	02
24.	DMCW System(03PGC15AA101)	01	02

 BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR) (FOR ONE UNIT) 2 X 660 MW MOUDA PROJECT		DRAWING NO.: PE-TS-387-145-I106
			VOLUME : IIB
			SECTION : D
			REV. NO. 00
			DATE : 07.11.12
		SHEET	OF

GENERAL TECHNICAL REQUIREMENTS FOR CONTROL VALVE WITH PNEUMATIC ACTUATOR ALONGWITH ACCESSORIES:

1. VALVES SELECTION WILL BE BASED ON ENCLOSED CONTROL VALVE DESIGN PARAMETERS.
2. TRIM MATERIAL AND BODY MATERIAL HAS BEEN SPECIFIED. HOWEVER, ANY SUBSTITUTE MATERIAL IF RECOMMENDED BY THE MANUFACTURER, WILL BE PROVIDED IF FOUND TECHNICALLY ACCEPTABLE AFTER EVALUATION. THE SAME SHALL BE INDICATED IN VENDOR'S DOCUMENT.
3. CONTROL VALVES SHALL BE SIZED BASED ON ALLOWABLE PRESSURE DROP AT MAXIMUM FLOW CONDITION AND TO ALLOW MCR FLOW BETWEEN 75% TO 90% AND MINIMUM FLOW AT 10% TO 25% OF VALVE OPENING.
4. CHARACTERISTICS OF CONTROL VALVES HAVE BEEN SELECTED BASED ON APPLICATION / SERVICES. HOWEVER, IN CASE SUPPLIER IS NOT ABLE TO OFFER THE REQUIRED CHARACTERISTICS DUE TO DESIGN CONSIDERATIONS, MODIFIED TRIM (MOD.EQ PERCENTAGE OR MOD LINEAR) WILL BE SELECTED AFTER TECHNICAL EVALUATION.
5. ANTICAVITATION TRIMS SHALL BE PROVIDED FOR VALVES WITH CAVITATION SERVICES AND HARDENED TRIMS FOR FLASHING SERVICES
6. VALVE BODY AND TRIM DESIGN SHALL ACHIEVE THE NOISE ABATEMENT. HOWEVER, IF THE REQUIRED NOISE LEVEL IS NOT ACHIEVABLE DUE TO DESIGN CONSTRAINTS, EXTERNAL LOW NOISE PACK (CARTRIDGE/SILENCER) MAY BE USED IN THE DOWN STREAM SIDE OF THE VALVE.
7. CONTROL VALVE ACCESSORIES SHALL BE FITTED ON THE VALVE BODY. INTEGRAL PNEUMATIC TUBING SHALL BE ¼" OD PVC COATED COPPER, AND FITTINGS SHALL BE OF BRASS. APPLICABLE ACCESSORIES SHALL BE TERMINATED AT THE JUNCTION BOX (MOUNTED ON THE BODY).
8. TYPE OF BONNET SHALL BE ACCORDING TO THE SERVICE CONDITIONS. EXTENSION BONNETS SHALL BE PROVIDED WHEN THE MAXIMUM TEMPERATURE OF THE FLOWING FLUID IS GREATER THAN 280 DEG C.
9. TYPE OF FLOW ACTION ("UNDER THE SEAT" OR "OVER THE SEAT") WILL BE SELECTED BY THE VENDOR, HOWEVER WHEREVER DOWNSTREAM SIDE IS SUBJECTED TO VACUUM, FLOW ACTION SHALL BE "FLOW TO CLOSE" (OVER THE SEAT).
10. BHEL'S STANDARD QUALITY PLAN SHALL BE USED & VENDOR'S ACCEPTANCE ON THE SAME SHALL BE OBTAINED.
11. CONTROL VALVE DRAWINGS / DOCUMENTS / DATASHEET GIVING DETAILS OF MODEL NO, VALVE SIZE, AND CALCULATIONS FOR VALVE SIZING, NOISE & VELOCITY AND TECHNICAL DETAILS OF VARIOUS ACCESSORIES (OF THE SUCCESSFUL BIDDER) SHALL BE FURNISHED FOR INFORMATION AND RECORDS AFTER COMPLETION OF ENGINEERING AND SUPPLIES.
12. MANDATORY SPARES SHALL BE AS PER LIST ATTACHED.

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME IIB	
			SECTION D	
			REV. NO. 00	DATE : 07.11.12
			SHEET 1	OF 48
Tag No. ....ASV-8... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0				
DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE		.....
	SERVICE	D/A PEGGING FROM AUX. STEAM HEADER		.....
GENERAL*	LOCATION	<input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR		.....
	DUTY	<input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING		.....
GENERAL*	PIPE SIZE (inlet / outlet)	323.9 x 9.53 | 559 x 10		.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 672 GR B70		.....|.....
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*	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*	BODY MATERIAL	<input checked="" type="checkbox"/> A216 WCB <input type="checkbox"/> A217 WC6 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS		.....
		<input type="checkbox"/> A351 CF8M		.....
BODY*	PACKING: MATERIAL SINGLE / DOUBLE	<input type="checkbox"/> PTFE <input checked="" type="checkbox"/> GRAFOIL <input type="checkbox"/> DOUBLE <input checked="" type="checkbox"/> SINGLE		.....|.....
	BONNET TYPE	<input type="checkbox"/> STD <input type="checkbox"/> EXTENDED <input type="checkbox"/> FINNED		.....
BODY*	TRIM FORM	<input checked="" type="checkbox"/> LINEAR <input type="checkbox"/> EQ. PERCENTAGE		.....
		<input type="checkbox"/> QUICK OPEN (ON/OFF)		.....
BODY*	TRIM MATERIAL: SEAT | PLUG	SS 316 STELLITED | SS 316 STELLITED		.....|.....
	: CAGE | GUIDE BUSH	SS 316 STELLITED | SS 316 STELLITED		.....|.....
BODY*	FLOW (Bidder to Specify)	<input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT		.....
	OUTLET VELOCITY	<input type="checkbox"/> < 7 M/SEC(WATER) <input type="checkbox"/> MAC NO. < 1/3 (STM)		.....
BODY*	REQUIRED LEAKAGE CLASS	<input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VI		.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA		.....
BODY*	VACUUM SERVICE	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		.....
	ANTI CAVITATION TRIM	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	Bidder to Specify		.....|.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2		.....|.....
PNEUMATIC ACTUATOR	*TRAVEL TIME FOR	<10 SEC		.....
	OPEN TO CLOSE, CLOSE TO OPEN			.....
PNEUMATIC ACTUATOR	*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	SMART POSITIONER	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	AIR FILTER REGULATOR	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
ACCESSORIES	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		.....
ACCESSORIES	POSITION TRANSMITTER	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	SOLENOID VALVE	<input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		.....
ACCESSORIES	E/P CONVERTER	PART OF POSITIONER		.....
	JUNCTION BOX	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
ACCESSORIES	HAND WHEEL (SIDE MOUNTED)	<input checked="" type="checkbox"/> REQUIRED		.....
	LOCAL POSITION INDICATOR	<input checked="" type="checkbox"/> REQUIRED		.....
ACCESSORIES	ELECTRO PNEUMATIC POSITIONER	<input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		.....

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME IIB	
			SECTION D	
			REV. NO. 00	DATE : 07.11.12
			SHEET 3	OF 48
Tag No. ....CRHV-6... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0				
DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT	NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE		.....
	SERVICE	D/A PEGGING FROM CRH LINE		.....
GENERAL*	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)	355.6 x 15.09 | 965 x 37		.....
	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 WC9 <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 type="checkbox"/> DOUBLE <input checked="" 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		.....
	TRIM MATERIAL: SEAT | PLUG	<input type="checkbox"/> QUICK OPEN (ON/OFF)		.....
	SS 316 STELLITED | SS 316 STELLITED		.....
	SS 316 STELLITED | SS 316 STELLITED		.....
BODY*	FLOW (Bidder to Specify)	<input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT		.....
	OUTLET VELOCITY	<input 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 checked="" type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VI		.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	LESS THAN 85 dBA		.....
	VACUUM SERVICE	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		.....
	ANTI CAVITATION TRIM	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		.....
			
			
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	Bidder to Specify		.....
	CLOSE AT : OPEN AT (KG/CM2g)	0.2 | 1.0		.....
	*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN	<10 SEC |		.....
	*VALVE POSN. ON SIGNAL AIR FAILURE	<input type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input checked="" type="checkbox"/> TO CLOSE		.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	<input checked="" type="checkbox"/> STAYPUT		.....
ACCESSORIES	SMART POSITIONER	<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	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	SOLENOID VALVE	<input type="checkbox"/> REQUIRED <input checked="" 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		.....
ELECTRO PNEUMATIC POSITIONER	<input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		.....

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME IIB			
							SECTION D			
							REV. NO. 00		DATE : 07.11.12	
							SHEET 4		OF 48	
Tag No. ....CRHV-6... Qty.: ...1 per Unit... Date Sheet No. PES-145-06-DS1-0										
DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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.	15% BMCR	42.6	14.4	3.65	340.7				
	2.	65% BYPASS MDBFP	160.23	33.9	3.8	344				
	3.	START-UP	105	14.4	1.7	340.7				
	4.	HP/LP BYPASS HOUSE LOAD	214.91	35.43	3.8	362.4				
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP			
	* MAX SHUT OFF PRESS (KG/CM2g) 73.1 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 73.1 | 360 * IBR FORM III-C <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED						..... ..... .....		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							.....Bidder to Specify		
NOTES: 1. * TO BE FILLED BY MSE 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.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME	IIB
			SECTION	D
			REV. NO.	00 DATE : 07.11.12
			SHEET	5 OF 48
Tag No. : CDV-10, CDV-12, CDV-14 Qty.: 3 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0				
DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	NTPC–2 x 660 MW MOUDA STPP; TG PACKAGE CEP A/B/C MINIMUM RECIRCULATION <input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 219.1 x 8.18 | 219.1 x 8.18 SA 106 GR C | SA 106 GR C		
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW (Bidder to Specify) 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 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) 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 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 SEC <input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT		
ACCESSORIES	SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	<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 <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input checked="" 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 <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME IIB			
							SECTION D			
							REV. NO. 00		DATE : 07.11.12	
							SHEET 6		OF 48	
Tag No. : CDV-10, CDV-12 Qty.: 3 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0 CDV-14										
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 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.	MIN.	30	38.5	0.6	46.6				
	2.	NORMAL	300	31.3	0.6	46.6				
	3.	MAX.	300	38.1	1.5	50				
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP			
	* MAX SHUT OFF PRESS (KG/CM2g) 47 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 47/VACUUM | 55 * IBR FORM III-C <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED						..... ..... .....		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							..... Bidder to Specify.....		
NOTES: 1. * TO BE FILLED BY MSE 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.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME IIB			
							SECTION D			
							REV. NO. 00		DATE : 07.11.12	
							SHEET 8		OF 48	
Tag No. : CDV-22 & CDV-25 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0 DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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.	DESIGN POINT	1900	29.5	27.5	50				
	2.	60% LOAD	916.83	31.9	14.8	46.6				
	3.	100% MCR	1513	32.1	22.3	46.6				
	4.	VWO	1598.6	31.5	23.6	46.6				
	5.	MIN. (10% LOAD)	151.3	35.2	8.5	48.1				
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP			
	* MAX SHUT OFF PRESS (KG/CM2g) 47 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 47 | 55 * IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED						..... ..... .....		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						..... Bidder to Specify.....			
NOTES: 1. * TO BE FILLED BY MSE 2. + 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.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME	IIB
			SECTION	D
			REV. NO.	00 DATE : 07.11.12
			SHEET	9 OF 48
Tag No. :...CDV-39... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0 DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	NTPC–2 x 660 MW MOUDA STPP; TG PACKAGE GSC MIN. FLOW RECIRCULATION <input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 219.1 x 8.18 | 219.1 x 8.18 SA 106 GR C | SA 106 GR C		
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW(Bidder to Specify) 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 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 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) 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 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 SEC <input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT		
ACCESSORIES	SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	<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 <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input checked="" 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 <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		

[illegible]

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-387-145-I106		
		VOLUME	IIB	
		SECTION	D	
		REV. NO.	00	DATE : 07.11.12
		SHEET	13	OF 48

Tag No. :...CDV-67... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0

DATA SHEET – A & B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY	NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE CONDENSATE SPRAY TO SD FLASH TANK <input type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input checked="" type="checkbox"/> ON/OFF <input type="checkbox"/> MODULATING	.........................
	PIPE SIZE (inlet / outlet)	33.4 x 4.55 | 33.4 x 4.55	.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B	.....
	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*	BODY SIZE: PORT SIZE: DESIGN CV	Bidder to Specify	.....
	END CONNECTION & RATING (ANSI)	<input type="checkbox"/> BWE <input checked="" 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 type="checkbox"/> LINEAR <input type="checkbox"/> EQ. PERCENTAGE	.....
	TRIM MATERIAL: SEAT | PLUG	<input checked="" type="checkbox"/> QUICK OPEN (ON/OFF)	.....
	: CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS 17-4 PH SS | 17-4 PH SS	.....
	FLOW(Bidder to Specify)	<input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT	.....
	OUTLET VELOCITY	<input type="checkbox"/> < 7 M/SEC (WATER) <input type="checkbox"/> MAC NO. < 1/3(STM)	.....
PNEUMATIC ACTUATOR	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	.....
ACCESSORIES	MODEL NO. & SIZE	Bidder to Specify	.....
	CLOSE AT : OPEN AT (KG/CM2g)	1.0 | 0.2	.....
	*TRAVEL TIME FOR	< 10 SEC	.....
	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	.....
	SMART POSITIONER	<input type="checkbox"/> REQUIRED <input checked="" 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	<input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED	.....
SOLENOID VALVE	<input type="checkbox"/> REQUIRED <input checked="" 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	.....
ELECTRO PNEUMATIC POSITIONER	<input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED	.....

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME IIB			
							SECTION D			
							REV. NO. 00		DATE : 07.11.12	
							SHEET 14		OF 48	
Tag No. ....CDV-67... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0										
DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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	32.6	0.5	50				
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP			
* MAX SHUT OFF PRESS (KG/CM2g) 47 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 47/VACUUM | 55 * IBR FORM III-C <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED						..... ..... .....			
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							...Bidder to Specify.....			
NOTES: 1. * TO BE FILLED BY MSE 2. + 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. 3. # WITHOUT POSITIONER, LINEARITY SHALL BE $\pm 5\%$ ONLY.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME		IIB	
							SECTION		D	
							REV. NO.		00 DATE : 07.11.12	
							SHEET		16 OF 48	
Tag No. ....CDV-72.... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0 <div style="text-align:center;">DATA SHEET – A & B</div>										
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	32	3.0	47.1				
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP			
	* MAX SHUT OFF PRESS (KG/CM2g) 47 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 47 | 55 * IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED						..... .....|..... .....		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						Bidder to Specify				
NOTES: 1. * TO BE FILLED BY MSE 2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ____1____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7. 3. VALVE MATERIAL SHALL BE A217WC6 AND ANTI-CAVITATION TYPE TRIM IN CASE THE VALVE IS SUBJECTED TO CAVITATION FOR THE GIVEN CONDITION.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME	IIB
			SECTION	D
			REV. NO.	00 DATE : 07.11.12
			SHEET	17 OF 48
Tag No. : DRV-2 & DRV-8 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0				
DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
GENERAL*	PROJECT SERVICE LOCATION DUTY	NTPC–2 x 660 MW MOUDA STPP; TG PACKAGE HPH-7A/7B NORMAL DRAIN TO HPH-6A/6B		
	PIPE SIZE (inlet / outlet)	<input type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING		
	PIPE MATERIAL (inlet / outlet)	273 x 12.7 | 323.9 x 12.7		
		SA 106 GR C | SA 106 GR C		
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL	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 WC6 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS <input type="checkbox"/> A351 CF8M		
	PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM	<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)		
	TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH	17-4 PH SS | 17-4 PH SS 17-4 PH SS | 17-4 PH SS		
	FLOW(Bidder to Specify) OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	<input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT <input type="checkbox"/> < 7 M/SEC (WATER) <input type="checkbox"/> MAC NO. < 1/3(STM) <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VI LESS THAN 85 dBA <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES <input checked="" 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 0.2 | 1.0 < 10 SEC <input type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input checked="" type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT		
ACCESSORIES	SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	<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 <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 <input checked="" type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)					SPECIFICATION NO.: PE-TS-387-145-I106				
						VOLUME		IIB		
						SECTION		D		
						REV. NO.		00	DATE : 07.11.12	
						SHEET		20	OF	48
Tag No. : DRV-5 & DRV-11 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0										
DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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	50.6	23.3	0.3	220.1				
	2.	60% MCR	72.2	33.7	0.3	238.8				
	3.	100% MCR	157	53.2	0.3	266.1				
	4.	VWO	170.5	56.3	0.3	269.3				
	5.	BMCR	175.1	55.8	0.5	268.68				
	VALVE TYPE						<input checked="" type="checkbox"/> CAVITATION <input checked="" type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP			
	* MAX SHUT OFF PRESS (KG/CM2g) 73.1 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 73.1/VACUUM | 275 * IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED						..... .....|..... .....		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							...Bidder to Specify.....			
NOTES: 1. * TO BE FILLED BY MSE 2. + 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.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME IIB	
			SECTION D	
			REV. NO. 00	DATE : 07.11.12
			SHEET 21	OF 48
Tag No. : DRV-15 & DRV-22 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0 DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
GENERAL*	PROJECT	NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE		.....
	SERVICE	HPH-6A/6B NORMAL DRAIN TO DEAERATOR		.....
GENERAL*	LOCATION	<input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR		.....
	DUTY	<input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING		.....
GENERAL*	PIPE SIZE (inlet / outlet)	273 x 6.35 | 323.9 x 9.53		.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B		.....
BODY*	MODEL NO.	Bidder to Specify		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS	<input checked="" type="checkbox"/> GLOBE <input type="checkbox"/> ANGLE <input type="checkbox"/> TOP <input checked="" type="checkbox"/> CAGE | ONE		.....
BODY*	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*	BODY MATERIAL	<input type="checkbox"/> A216 WCB <input checked="" type="checkbox"/> A217 WC6 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS		.....
	Packing: MATERIAL SINGLE / DOUBLE	<input type="checkbox"/> A351 CF8M		.....
BODY*	BONNET TYPE	<input type="checkbox"/> PTFE <input checked="" type="checkbox"/> GRAFOIL <input type="checkbox"/> DOUBLE <input checked="" type="checkbox"/> SINGLE		.....
	TRIM FORM	<input type="checkbox"/> STD <input type="checkbox"/> EXTENDED <input type="checkbox"/> FINNED		.....
BODY*	TRIM MATERIAL: SEAT | PLUG	<input checked="" type="checkbox"/> LINEAR <input type="checkbox"/> EQ. PERCENTAGE		.....
	: CAGE | GUIDE BUSH	<input type="checkbox"/> QUICK OPEN (ON/OFF)		.....
BODY*	FLOW(Bidder to Specify)	17-4 PH SS | 17-4 PH SS		.....
	OUTLET VELOCITY	17-4 PH SS | 17-4 PH SS		.....
BODY*	REQUIRED LEAKAGE CLASS	<input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT		.....
	NOISE LEVEL (dBA) (spec. 3.1.14)	<input type="checkbox"/> < 7 M/SEC (WATER) <input type="checkbox"/> MAC NO. < 1/3(STM)		.....
BODY*	VACUUM SERVICE	<input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VI		.....
	ANTI CAVITATION TRIM	LESS THAN 85 dBA		.....
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		.....
	CLOSE AT : OPEN AT (KG/CM2g)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		.....
PNEUMATIC ACTUATOR	*TRAVEL TIME FOR	0.2 | 1.0		.....
	OPEN TO CLOSE, CLOSE TO OPEN	< 10 SEC		.....
PNEUMATIC ACTUATOR	*VALVE POSN. ON SIGNAL AIR FAILURE	<input type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input checked="" type="checkbox"/> TO CLOSE		.....
	*VALVE POSN. ON SUPPLY AIR FAILURE	<input checked="" type="checkbox"/> STAYPUT		.....
ACCESSORIES	SMART POSITIONER	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	AIR FILTER REGULATOR	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
ACCESSORIES	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		.....
ACCESSORIES	POSITION TRANSMITTER	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	SOLENOID VALVE	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
ACCESSORIES	E/P CONVERTER	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	JUNCTION BOX	PART OF POSITIONER		.....
ACCESSORIES	HAND WHEEL (SIDE MOUNTED)	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	LOCAL POSITION INDICATOR	<input checked="" type="checkbox"/> REQUIRED		.....
ACCESSORIES	ELECTRO PNEUMATIC POSITIONER	<input checked="" type="checkbox"/> REQUIRED		.....
		<input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		.....

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME IIB			
							SECTION D			
							REV. NO. 00		DATE : 07.11.12	
							SHEET 22		OF 48	
Tag No. : DRV-15 & DRV-22 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0 DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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	54.31	7.4	6.5	160.3				
	2.	60% MCR	94.875	11.8	8.5	175.8				
	3.	100% MCR	196.5	20.5	12.6	196.3				
	4.	VWO	212.7	21.9	13.2	198.8				
	5.	BMCR	218.6	21.6	13.0	197.8				
	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							...Bidder to Specify.....			
NOTES: 1. * TO BE FILLED BY MSE 2. + 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.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-387-145-I106		
		VOLUME	IIB	
		SECTION	D	
		REV. NO.	00	DATE : 07.11.12
		SHEET	23	OF 48
Tag No. : DRV-18 & DRV-25 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0 DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)	
GENERAL*	PROJECT	NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE		
	SERVICE	HPH-6A/6B ALT. DRAIN TO HPD F/T		
	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)	273 x 6.35 | 323.9 x 9.53		
	PIPE MATERIAL (inlet / outlet)	SA 106 GR B | SA 106 GR B		
BODY*	MODEL NO.	Bidder to Specify		
	TYPE OF BODY: GUIDING : NO. OF PORTS	<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 WC9 <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	440 C | 440 C		
	: CAGE | GUIDE BUSH	440 C | 440 C		
FLOW (Bidder to Specify)	<input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT			
OUTLET VELOCITY	<input 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 OPEN TO CLOSE, CLOSE TO OPEN	< 10 SEC		
	*VALVE POSN. ON SIGNAL AIR FAILURE	<input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE		
	<input checked="" type="checkbox"/> STAYPUT			
ACCESSORIES	SMART POSITIONER	<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	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		
	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		
	ELECTRO PNEUMATIC POSITIONER	<input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME IIB			
							SECTION D			
							REV. NO. 00		DATE : 07.11.12	
							SHEET 24		OF 48	
Tag No. : DRV-18 & DRV-25 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0 DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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	66.23	10.5	0.3	181.3				
	2.	60% MCR	93.44	14.9	0.3	197.3				
	3.	100% MCR	194.5	23.7	0.3	219.5				
	4.	VWO	212.7	25.1	0.3	222.3				
	5.	BMCR	218.6	24.8	0.5	221.5				
	VALVE TYPE						<input checked="" 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/VACUUM | 230 * IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED						..... ..... .....		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							...Bidder to Specify.....			
NOTES: 1. * TO BE FILLED BY MSE 2. + 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.										

[illegible]

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME IIB			
							SECTION D			
							REV. NO. 00		DATE : 07.11.12	
							SHEET 26		OF 48	
Tag No. ....DRV-28... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0 DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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	50.81	1.0	0.7	79.8				
	2.	60% MCR	80.581	1.3	1.0	88.2				
	3.	100% MCR	148.5	1.8	1.3	98.5				
	4.	VWO	159	1.8	1.4	99.8				
	5.	LPH-1 OUT	166.9	1.5	1.2	93.1				
	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						... Bidder to Specify.....			
NOTES: 1. * TO BE FILLED BY MSE 2. + 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.										

[illegible]

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106				
							VOLUME		IIB		
							SECTION		D		
							REV. NO.		00	DATE : 07.11.12	
							SHEET		28	OF	48
Tag No. ....DRV-31... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0											
DATA SHEET – A & B											
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)			
PERFORMANCE OF VALVE	LINEARITY 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	58.1	1.6	0.3	97.5					
	2.	60% MCR	79.5	1.8	0.3	106.33					
	3.	100% MCR	148.5	2.4	0.3	117.8					
	4.	VWO	159	2.5	0.3	119.3					
	5.	LPH-2 OUT	202.8	1.9	0.5	113.1					
	VALVE TYPE						[■] CAVITATION [■] FLASHING [] HIGH DP				
	* MAX SHUT OFF PRESS (KG/CM2g) 7 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 7/VACUUM | 130 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED						..... .....|..... .....			
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						...Bidder to Specify.....				
NOTES: 1. * TO BE FILLED BY MSE 2. + 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.											


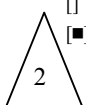
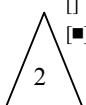
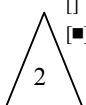
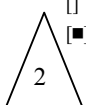
BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME	IIB
			SECTION	D
			REV. NO.	00 DATE : 07.11.12
			SHEET	29 OF 48
Tag No. ....DRV-34... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0				
DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	NTPC–2 x 660 MW MOUDA STPP; TG PACKAGE LPH-2 NORMAL DRAIN TO LPH-1 <input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 323.9 x 6.35 | 355.6 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(Bidder to Specify) 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 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 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) 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 type="checkbox"/> < 7 M/SEC (WATER) <input type="checkbox"/> MAC NO. < 1/3(STM) <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VI LESS THAN 85 dBA <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input checked="" 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 0.2 | 1.0 < 10 SEC <input type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input checked="" type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT		
ACCESSORIES	SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	<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 <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 <input checked="" type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		

[illegible]


BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-387-145-I106		
		VOLUME	IIB	
		SECTION	D	
		REV. NO.	00	DATE : 07.11.12
		SHEET	33	OF 48

Tag No. ....DRV-48... Qty.: ...1 per Unit ...	Date Sheet No. PES-145-06-DS1-0
DATA SHEET – A & B	
<div style="display: flex; justify-content: space-between;"> <div style="width: 70%;"> DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER) </div> <div style="width: 25%;"> DATA SHEET – B (TO BE FILLED UP BY BIDDER) </div> </div>	
GENERAL*	<div style="display: flex;"> <div style="width: 30%;"> PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet) </div> <div style="width: 60%;"> NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE DEAERATOR OVERFLOW TO LP DRAIN F/T <input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input checked="" type="checkbox"/> ON/OFF <input type="checkbox"/> MODULATING 219.1 x 6.35 | 323.9 x 9.53 SA 106 GR B | SA 106 GR B </div> </div>
BODY*	<div style="display: flex;"> <div style="width: 30%;"> 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(Bidder to Specify) OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM </div> <div style="width: 60%;"> 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 type="checkbox"/> LINEAR <input type="checkbox"/> EQ. PERCENTAGE <input checked="" 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 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 type="checkbox"/> YES <input checked="" type="checkbox"/> NO </div> </div>
PNEUMATIC ACTUATOR	<div style="display: flex;"> <div style="width: 30%;"> 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 </div> <div style="width: 60%;"> Bidder to Specify 1.0 | 0.2 < 10 SEC <input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT </div> </div>
ACCESSORIES	<div style="display: flex;"> <div style="width: 30%;"> SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER </div> <div style="width: 60%;"> <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 <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 <input checked="" type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED </div> </div>

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME		IIB	
							SECTION		D	
							REV. NO.		00	DATE : 07.11.12
							SHEET		34	OF	48
Tag No. ....DRV-48... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0										
DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)				± 5% # ± 5% ± 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.-1 10% BMCR	212	15.0	0.3	188.7				
	2.	MAX.-2 10% BMCR	212	6.3	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						..... Bidder to Specify.....		
NOTES: 1. * TO BE FILLED BY MSE 2. + DESIGN CV SHALL BE BASED ON SERVICE CONDITIONS INDICATED AT SL. NO. ____1____ AND SHALL BE CHECKED FOR ALL OTHER CONDITIONS AS PER SPECIFICATION CLAUSE NUMBER 3.1.7. 3. # WITHOUT SMART POSITIONER, LINEARITY SHALL BE ± 5% ONLY.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME IIB	
			SECTION D	
			REV. NO. 00	DATE : 07.11.12
			SHEET 35	OF 48
Tag No. : DRV-53 & DRV-59 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0				
<div style="text-align: center;">  DATA SHEET – A & B </div>				
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)	NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE HPH-8A/8B NORMAL DRAIN TO HPH-7A/7B <input type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input type="checkbox"/> MODULATING 168.3 x 14.27 219.1 x 12.7 SA 106 GR C SA 106 GR C	<div style="text-align: center;">  </div>	
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(Bidder to Specify) 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 type="checkbox"/> ANGLE <input type="checkbox"/> TOP <input type="checkbox"/> CAGE | ONE Bidder to Specify <input type="checkbox"/> BWE <input type="checkbox"/> SWE <input type="checkbox"/> FLANGED <input type="checkbox"/> A216 WCB <input type="checkbox"/> A217 WC9 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS <input type="checkbox"/> A351 CF8M <input type="checkbox"/> PTFE <input type="checkbox"/> GRAFOIL <input type="checkbox"/> DOUBLE <input type="checkbox"/> SINGLE <input type="checkbox"/> STD <input type="checkbox"/> EXTENDED <input type="checkbox"/> FINNED <input 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 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 type="checkbox"/> V <input type="checkbox"/> VI LESS THAN 85 dBA <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO	<div style="text-align: center;">  </div>	
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 0.2 1.0 < 10 SEC <input type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input type="checkbox"/> STAYPUT	<div style="text-align: center;">  </div>	
ACCESSORIES	POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED PART OF POSITIONER <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	<div style="text-align: center;">  </div>	

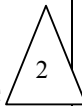
BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME IIB			
							SECTION D			
							REV. NO. 00		DATE : 07.11.12	
							SHEET 36		OF 48	
Tag No. : DRV-53 & DRV-59 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0 DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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	15.74	32.4	22.5	223.6				
	2.	60% MCR	27.62	47.3	33.0	243.3				
	3.	100% MCR	60.7	75.5	53.1	271.0				
	4.	VWO	66.3	80.6	56.3	274.6				
	5.	BMCR	68.0	80.0	55.9	273.9				
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input checked="" type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP			
	* MAX SHUT OFF PRESS (KG/CM2g) 88 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 88 | 285 * IBR FORM III-C <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED						..... ..... .....		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						...Bidder to Specify.....				
NOTES: 1. * TO BE FILLED BY MSE 2. + 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.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-1106	
			VOLUME	IIB
			SECTION	D
			REV. NO.	00 DATE : 07.11.12
			SHEET	37 OF 48
Tag No. : DRV-56 & DRV-62 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0				
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  2 </div> <div> DATA SHEET – A & B </div> </div>				
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)	NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE HPH-8A/8B ALT. DRAIN TO HP DRAIN F/T <input type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input type="checkbox"/> MODULATING 168.3 x 14.27 | 219.1 x 12.7 SA 106 GR C | SA 106 GR C	<div style="border-left: 1px solid black; height: 100px;"></div>	
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(Bidder to Specify) 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 type="checkbox"/> ANGLE <input type="checkbox"/> TOP <input type="checkbox"/> CAGE | ONE Bidder to Specify <input type="checkbox"/> BWE <input type="checkbox"/> SWE <input type="checkbox"/> FLANGED <input type="checkbox"/> A216 WCB <input type="checkbox"/> A217 WC9 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS <input type="checkbox"/> A351 CF8M <input type="checkbox"/> PTFE <input type="checkbox"/> GRAFOIL <input type="checkbox"/> DOUBLE <input type="checkbox"/> SINGLE <input type="checkbox"/> STD <input type="checkbox"/> EXTENDED <input type="checkbox"/> FINNED <input 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 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 type="checkbox"/> V <input type="checkbox"/> VI LESS THAN 85 dBA <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO	<div style="border-left: 1px solid black; height: 100px;"></div>	
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 SEC <input type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input type="checkbox"/> STAYPUT	<div style="border-left: 1px solid black; height: 100px;"></div>	
ACCESSORIES	SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED PART OF POSITIONER <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	<div style="border-left: 1px solid black; height: 100px;"></div>	

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME		IIB	
							SECTION		D	
							REV. NO.		00	DATE : 07.11.12
							SHEET	38	OF	48
Tag No. : DRV-56 & DRV-62 Qty.: 2 per Unit (One against each Tag No.) Date Sheet No. PES-145-06-DS1-0										
DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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	19.0	33.6	0.3	240.9				
	2.	60% MCR	26.9	28.2	0.3	260.6				
	3.	100% MCR	60.7	76.1	0.3	290.2				
	4.	VWO	66.3	81.1	0.3	293.9				
	5.	BMCR	67.9	80.6	0.5	293.3				
	VALVE TYPE						[■] CAVITATION [■] FLASHING [] HIGH DP			
	* MAX SHUT OFF PRESS (KG/CM2g) 88 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 88/VACUUM | 300 * IBR FORM III-C [] REQUIRED [■] NOT REQUIRED									
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						..... Bidder to Specify		
NOTES: 1. * TO BE FILLED BY MSE 2. + 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.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME IIB	
			SECTION D	
			REV. NO. 00	DATE : 07.11.12
			SHEET 39	OF 48
Tag No. ....DRV-65... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0				
DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE LPH-4 NORMAL DRAIN TO LPH-3 <input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 168.3 x 7.11 | 219.1 x 8.18 SA 106 GR B | SA 106 GR C	<div style="text-align: center;">2</div>	
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(Bidder to Specify) 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 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 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) 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 type="checkbox"/> < 7 M/SEC (WATER) <input type="checkbox"/> MAC NO. < 1/3(STM) <input type="checkbox"/> II <input type="checkbox"/> III <input checked="" type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VI LESS THAN 85 dBA <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input checked="" 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 0.2 | 1.0 < 10 SEC <input type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input checked="" type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT		
ACCESSORIES	SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	<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 <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 <input checked="" type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106					
							VOLUME		IIB			
							SECTION		D			
							REV. NO.		00		DATE : 07.11.12	
							SHEET		40		OF 48	
Tag No. ....DRV-65... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0												
DATA SHEET – A & B												
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)				
PERFORMANCE OF VALVE	LINEARITY 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	36.23	2.7	1.2	98.6						
	2.	60% MCR	50.8	3.7	1.7	107.6						
	3.	100% MCR	95.4	5.4	2.4	119.8						
	4.	VWO	102.1	5.6	2.5	121.4						
	5.	ALL HPH OUT	104.8	5.9	2.7	123.3						
	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						 Bidder to Specify				
NOTES: 1. * TO BE FILLED BY MSE 2. + 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.												

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME IIB	
			SECTION D	
			REV. NO. 00	DATE : 07.11.12
			SHEET 41	OF 48
Tag No. ....DRV-68... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0 DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE LPH-4 ALT. DRAIN TO LP DRAIN F/T <input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 168.3 x 7.11 | 219.1 x 8.18 SA 106 GR B | SA 106 GR C		
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW(Bidder to Specify) 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 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 SEC <input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT		
ACCESSORIES	SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	<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 <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 <input checked="" type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106					
							VOLUME		IIB			
							SECTION		D			
							REV. NO.		00		DATE : 07.11.12	
							SHEET		42		OF 48	
Tag No. :...DRV-68... Qty.: ...1 per Unit ...										Date Sheet No. PES-145-06-DS1-0		
DATA SHEET – A & B												
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)				
PERFORMANCE OF VALVE	LINEARITY 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	36.2	3.3	0.3	128.3						
	2.	60% MCR	50.8	4.2	0.3	140.4						
	3.	100% MCR	95.3	6.0	0.3	155.0						
	4.	VWO	102.1	6.3	0.3	156.8						
	5.	LPH-3 OUT	130.5	5.3	0.5	151.5						
	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 type="checkbox"/> NOT REQUIRED						..... .....|..... .....				
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg							... Bidder to Specify.....					
NOTES:												
1. * TO BE FILLED BY MSE												
2. + 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.												

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME	IIB
			SECTION	D
			REV. NO.	00 DATE : 07.11.12
			SHEET	43 OF 48
Tag No. :...DMV-2... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0				
DATA SHEET – A & B				
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)				DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL*	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet)	NTPC–2 x 660 MW MOUDA STPP; TG PACKAGE DM NORMAL MU TO HOTWELL <input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 168.3 x 3.4 | 168.3 x 3.4 SA 312 TP 304 (ERW ) | SA 312 TP 304 (ERW)		
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(Bidder to Specify) 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 type="checkbox"/> A217 WC6 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS <input checked="" 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 type="checkbox"/> LINEAR <input checked="" type="checkbox"/> EQ. PERCENTAGE <input type="checkbox"/> QUICK OPEN (ON/OFF) SS 316 STELLITED | SS 316 STELLITED SS 316 STELLITED | SS 316 STELLITED <input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT <input 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 SEC <input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT		
ACCESSORIES	SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER	<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 <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input checked="" 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 <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED		

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME IIB			
							SECTION D			
							REV. NO. 00		DATE : 07.11.12	
							SHEET 44		OF 48	
Tag No. :...DMV-2... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0										
DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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.	MIN. (1% MU)	21.2	6.7 #	0.5	33				
	2.	NORMAL (3% MU)	63.6	4.9 #	0.55	33				
	3.	MAX. (5% MU)	106	2.6 #	0.6	33				
	4.	NORMAL (3% MU)	63.6	4.9 #	1.6	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							..... Bidder to Specify		
NOTES: 1. * TO BE FILLED BY MSE 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. 3. # INLET PRESSURE TO BE CONFIRMED BY NTPC.										

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: PE-TS-387-145-I106		
		VOLUME	IIB	
		SECTION	D	
		REV. NO.	00	DATE : 07.11.12
		SHEET	45	OF 48

Tag No. ....DMV-9... Qty.: ...1 per Unit ...	Date Sheet No. PES-145-06-DS1-0
DATA SHEET – A & B	
<div style="display: flex; justify-content: space-between;"> <div style="width: 70%;"> DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER) </div> <div style="width: 25%;"> DATA SHEET – B (TO BE FILLED UP BY BIDDER) </div> </div>	
GENERAL*	<div style="display: flex;"> <div style="width: 35%;"> PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet) </div> <div style="width: 55%;"> NTPC-2 x 660 MW MOUDA STPP; TG PACKAGE DM EMERGENCY MU TO HOTWELL <input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 273 x 4.19 | 273 x 4.19 SA 312 TP 304 (ERW) | SA 312 TP 304 (ERW) </div> </div>
BODY*	<div style="display: flex;"> <div style="width: 35%;"> 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(Bidder to Specify) OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM </div> <div style="width: 55%;"> 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 type="checkbox"/> A217 WC6 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS <input checked="" 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 type="checkbox"/> LINEAR <input checked="" type="checkbox"/> EQ. PERCENTAGE <input type="checkbox"/> QUICK OPEN (ON/OFF) SS 316 STELLITED | SS 316 STELLITED SS 316 STELLITED | SS 316 STELLITED <input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT <input 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 </div> </div>
PNEUMATIC ACTUATOR	<div style="display: flex;"> <div style="width: 35%;"> 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 </div> <div style="width: 55%;"> Bidder to Specify 0.2 | 1.0 < 10 SEC <input type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input checked="" type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT </div> </div>
ACCESSORIES	<div style="display: flex;"> <div style="width: 35%;"> SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR ELECTRO PNEUMATIC POSITIONER </div> <div style="width: 55%;"> <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 <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input type="checkbox"/> REQUIRED <input checked="" 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 <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED </div> </div>

BHEL PEM	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)						SPECIFICATION NO.: PE-TS-387-145-I106			
							VOLUME IIB			
							SECTION D			
							REV. NO. 00		DATE : 07.11.12	
							SHEET 46		OF 48	
Tag No. :...DMV-9... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0										
DATA SHEET – A & B										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY 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.	MIN. (5% MU)	106	5.5 #	0.45	33				
	2.	NORMAL (10% MU)	212	4.8 #	0.5	33				
	3.	CT PUMP DESIGN FLOW	350	3.9 #	0.8	33				
	4.	NORMAL (10% MU)	212	4.8 #	1.5	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							... Bidder to Specify ...			
NOTES: 1. * TO BE FILLED BY MSE 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. 3. # INLET PRESSURE TO BE CONFIRMED BY NTPC.										

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)		SPECIFICATION NO.: PE-TS-387-145-I106	
			VOLUME IIB	
			SECTION	D
			REV. NO.	00	DATE :07.11.2012
		SHEET		OF
Tag No: Applicable for all tag nos. Quantity: As required Data Sheet No. PES-145-06-DS1-0				
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)				
SMART POSITIONER (UNIVERSAL HART PROTOCOL BASED)	MFR. & MODEL NUMBER		Bidder to Specify	
	BYPASS	GAUGES	ENCL. CLASS	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	INPUT SIGNAL		4- 20 mA DC	
	OUTPUT SIGNAL (Kg / Cm ²) T		O SUIT ACTUATOR	
AIR FILTER REGULATOR TWO (2) Nos./CV <=5MICRON (SINTERED BRONZE)	MFR. & MODEL NUMBER		Bidder to Specify	
	AIR SUPPLY PRESS (MAX.) (Kg / Cm ² g)		<input checked="" type="checkbox"/> 7.0 <input type="checkbox"/>	
	OUTPUT PRESS (Kg / Cm ² g)		TO SUIT ACTUATOR	
	OUTPUT GAUGE		<input checked="" type="checkbox"/> REQUIRED (2 Inch) <input type="checkbox"/> NOT REQUIRED	
AIR LOCK	MFR. & MODEL NUMBER		Bidder to Specify	
	SET PRESS (Kg / Cm ²)			
	SUPPLY PRESS (MAX.) (Kg / Cm ²)		<input checked="" type="checkbox"/> 7.0 <input type="checkbox"/>	
	RESET TYPE		AUTO	
	VENT PLUG		REQUIRED	
LIMIT SWITCH	MFR. & MODEL NUMBER		Bidder to Specify	
	OPEN posn	INT posn	CLOSE posn	<input type="checkbox"/> 1 NO. <input type="checkbox"/> --- <input type="checkbox"/> 1 NO.
	CONTACT TYPE		SPDT	
	RATING (AC / DC)		5A 240V AC AND 0.5A 220V DC	
	ENCLOSURE CLASS		<input type="checkbox"/> NEMA-4 <input checked="" type="checkbox"/> IP-65	
POSITION TRANSMITTER	MFR. & MODEL NUMBER		Bidder to Specify (Part of SMART Positioner)	
	TYPE		<input checked="" type="checkbox"/> Electronic (2-Wire) Contactless <input type="checkbox"/> OTHER	
	SUPPLY		<input checked="" type="checkbox"/> 24V DC <input type="checkbox"/> 220V DC <input type="checkbox"/> 110V AC <input type="checkbox"/> 240V AC	
	OUTPUT RATING		<input checked="" type="checkbox"/> 4-20mA <input type="checkbox"/> 0-100 ohms	
	ACCURACY +		_ 2% FS	
	ENCLOSURE CLASS		<input type="checkbox"/> NEMA-4 <input checked="" type="checkbox"/> IP-65	
SOLENOID VALVE	MFR. & MODEL NUMBER		ROTEX / ASCO	
	RATING		<input checked="" type="checkbox"/> 24V DC <input type="checkbox"/> 220V DC <input type="checkbox"/> 240V AC <input type="checkbox"/>	
	OPERATION Q	QUANTITY	<input type="checkbox"/> Stayput <input checked="" type="checkbox"/> Interlock <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	
	COIL INSULATION CLASS		CLASS - H	
	ENCLOSURE CLASS		<input type="checkbox"/> NEMA-4 <input checked="" type="checkbox"/> IP-65	
	BODY & TRIM		SS BAR STOCK & AISI SS-316 respectively	
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 type="checkbox"/> NEMA-4 <input checked="" type="checkbox"/> IP-65	
I/P CONVERTER (Part of SMART Positioner)	INPUT SIGNAL	POWER SUPPLY	4-20mA DC	24V DC
	SPLIT RANGE		<input type="checkbox"/> YES <input type="checkbox"/> NO	
	ENCLOSURE CLASS		<input type="checkbox"/> NEMA-4 <input checked="" type="checkbox"/> IP-65	
	Accuracy	Repeatability	± 0.5 % FS	± 0.5 % FS
Cu. Tubing & Fittings / per CV	This is in addition to cu. Tubing and fittings which are integral part of CV as per ASTM B68 to B75 (USA)		25 Meters of 1/4" PVC coated annealed 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.	

HANDWHEEL

**2 X 660MW MOUDA STPP PHASE-2****TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION D

REV. NO.


00

DATE : 07.11.12

SHEET

OF

SECTION – D**DATA SHEETS – C**


	2 X 660MW MOUDA STPP PHASE- 2 Technical specification for Control Valves with Accessories (Pneumatically Operated)	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION D	
		REV. NO. 00	DATE: 07.11.12
		SHEET OF	

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


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

DATA SHEET – A& B

DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED-UP BY BIDDER)
GENERAL *	PROJECT		
	SERVICE		
	LOCATION	<input type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR	
	DUTY	<input type="checkbox"/> ON/OFF <input type="checkbox"/> MODULATING	
	PIPE SIZE (inlet / outlet)		
	PIPE MATERIAL (inlet / outlet)		
BODY	MODEL NUMBER		
	TYPE OF BODY : GUIDING : NO. OF PORTS	<input type="checkbox"/> GLOBE <input type="checkbox"/> ANGLE <input type="checkbox"/> TOP <input type="checkbox"/> CAGE ONE	
	BODY SIZE : PORT SIZE : DESIGN DV		
	END CONNECTION & RATING (ANSI)	<input type="checkbox"/> BWE <input type="checkbox"/> SWE <input type="checkbox"/> FLANGED	
	BODY MATERIAL	<input type="checkbox"/> A216 WCB <input type="checkbox"/> A217 WC6 <input type="checkbox"/> A217 C5 <input type="checkbox"/> A351 CF8M	
	PACKING MATERIAL SINGLE / DOUBLE	<input type="checkbox"/> PTFE <input type="checkbox"/> GRAFOIL <input type="checkbox"/> DOUBLE <input type="checkbox"/> SINGLE	
	BONNET TYPE	<input type="checkbox"/> STD <input type="checkbox"/> EXTENDED <input type="checkbox"/> FINNED	
	TRIM FORM	<input type="checkbox"/> LINEAR <input type="checkbox"/> EQ. PERCENTAGE	
	TRIM MATERIAL : SEAT | PLUG	<input type="checkbox"/> SS 316 STELLITED <input type="checkbox"/> SS 316 STELLITED	
	TRIM MATERIAL : CAGE | GUIDE	<input type="checkbox"/> 17-4 PH SS <input type="checkbox"/> SS 316 STELLITED	
	FLOW	<input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT	
	OUTLET VELOCITY	<input type="checkbox"/> < 7M/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 type="checkbox"/> V <input type="checkbox"/> VI	
	NOISE LEVEL (dBA) (Spec. 3.1.14)	LESS THAN 85 dBA	
	VACUUM SERVICE	<input type="checkbox"/> YES <input type="checkbox"/> NO	
	ANTI CAVITATION TRIM	<input type="checkbox"/> YES <input type="checkbox"/> NO	
	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		<input type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE	
*VALVE POSN. ON SUPPLY AIR FAILURE		<input type="checkbox"/> STAYPUT	
ACCESSORIES	SMART POSITIONER	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	AIR FILTER REGULATOR	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	AIR LOCK RELAY	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	POSITION LIMIT SWITCH	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	POSITION TRANSMITTER	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	SOLENOID VALVE	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	E / P CONVERTER	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	JUNCTION BOX	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	HAND WHEEL (SIDE MOUNTED)	<input type="checkbox"/> REQUIRED	
	LOCAL POSITION INDICATOR	<input type="checkbox"/> REQUIRED	
	ELECTRO PNEUMATIC POSITIONER	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	

	2 X 660MW MOUDA STPP PHASE- 2 Technical specification for Control Valves with Accessories (Pneumatically Operated)	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION D	
		REV. NO. 00	DATE: 07.11.12
		SHEET OF	

Tag No..... Quantity.....							Data Sheet No. PES-145-06-DS1-0		
DATA SHEET – A & B									
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)							DATA SHEET – B (TO BE FILLED-UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY +		_ 2%						
	HYSTERSIS +		_ 1%						
	SENSITIVITY +		_ 0.5%						
	ACCURACY +		_ 2%						
SERVICE CONDITION*	SL.+ NO.	LOAD	FLOW (T/HR)	INLET PR. (KG/CM² (A))	OUTLET PR. (KG/CM² (A))	TEMP DEG. C	CALCU- LATED CV	% VALVE LIFT	VALVE O/L VELOCITY
		VALVE TYPE					<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input type="checkbox"/> HIGH DP		
		* MAX SHUT OFF PRESS ((KG/CM ² g)							
		* BODY DESIGN : PRESS ((KG/CM ² g) | TEMP (DEG. C)							
		* IBR FORM III-C <input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED							
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.									
NOTES: 1. * = To be filled by MSE. 2. + = Design CV shall be based on Service Conditions indicated at Sl.No. ____ and shall be checked for all other conditions as per specification clause number 3.1.7									


	2 X 660MW MOUDA STPP PHASE- 2 Technical specification for Control Valves with Accessories (Pneumatically Operated)	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION D	
		REV. NO. 00	DATE: 07.11.12
		SHEET OF	

	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	SMART POSITIONER	
	AIR FILTER REGULATOR	
	AIR LOCK RELAY	
	POSITION LIMIT SWITCH	
	POSITION TRANSMITTER	
	SOLENOID VALVE	
	E / P CONVERTER	
	JUNCTION BOX	
	HAND WHEEL (SIDE MOUNTED)	
	LOCAL POSITION INDICATOR	
	ELECTRO PNEUMATIC POSITIONER	

	2 X 660MW MOUDA STPP PHASE- 2 Technical specification for Control Valves with Accessories (Pneumatically Operated)	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION D	
		REV. NO. 00	DATE: 07.11.12
		SHEET OF	

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								
	HYTERSIS								
	SENSITIVITY								
	ACCURACY								
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.									

	2 X 660MW MOUDA STPP PHASE-2 TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH PNEUMATIC ACTUATOR ALONGWITH ACCESSORIES	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION D	
		REV. NO. 00	DATE: 07.11.12
		SHEET	OF

Tag No.....		Quantity.....		Data Sheet No. PES-145-06-DS1-0	
APPLICABLE FOR TAG Nos.WHEREVER STATEMENT "REQUIRED" INDICATED IN THE INDIVIDUAL CV DATA SHEETS					
DATA SHEET – C for ACCESSORIES (for valves with SMART POSITIONER)					
DATA SHEET – C FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)					
SMART POSITIONER	MFR. & MODEL NUMBER				
	APPLICATION				
	BYPASS:GAUGES: (SUPPLY,OUT PUTS)				
	ENCLOSURE CLASS				
	INPUT SIGNAL				
	OUTPUT SIGNAL RANG				
	INCREASE IN AIR SIGNAL				
	POSITION FEED BACK				
	BOOSTER :				
LINEARITY					
AIR FILTER REGULATOR	MFR. & MODEL NUMBER				
	AIR SUPPLY PRESS (Kg / Cm ² g)				
	OUTPUT PRESS (Kg / Cm ² g)				
	OUTPUT GAUGE				
	QTY				
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				
SOLENOID VALVE	MFR. & MODEL NUMBER				
	RATING				
	OPERATION QUANT	TY			
	COIL INSULATION CLASS				
	ENCLOSURE CLASS				
HANDWHEEL	ORIENTATION				
JUNCTION BOX	NO. OF WAYS				
	SIZE				
	CABLE GLANDS (Size / Quantity)				
	ENCLOSURE CLASS				
VOLUME BOOSTER					
Cu. Tubing & Fittings / per CV	12 Meters of 3/8 " 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	
				DATE	

	2 X 660MW MOUDA STPP PHASE-2 TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH PNEUMATIC ACTUATOR ALONGWITH ACCESSORIES	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION D	
		REV. NO. 00	DATE: 07.11.12
		SHEET OF	

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

Data Sheet No. PES-145-06-DS2-0

DATA SHEET C for ACCESSORIES (for ON-OFF type valve)**DATA SHEET – C FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR)
(TO BE FILLED BY THE BIDDER AFTER THE AWARD OF CONTRACT)**

POSITIONER	MFR. & MODEL NUMBER		
	BYPASS GAUGE	SENC. CLASS	
	INPUT SIGNAL (Kg / Cm ²)		
	OUTPUT SIGNAL (Kg / Cm ²)		
AIR FILTER REGULATOR	MFR. & MODEL NUMBER		
	AIR SUPPLY PRESS (Kg / Cm ² g)		
	OUTPUT PRESS (Kg / Cm ² g)		
	OUTPUT GAUGE		
AIR LOCK	MFR. & MODEL NUMBER		
	SET PRESS (Kg / Cm ²)		
	SUPPLY PRESS (Kg / Cm ²)		
	RESET TYPE		
	VENT PLUG		
LIMIT SWITCH	MFR. & MODEL NUMBER		
	OPEN posn	INT posn	CLOSE posn
	CONTACT TYPE		
	RATING (AC / DC)		
	ENCLOSURE CLASS		
POSITION TRANSMITTER	MFR. & MODEL NUMBER		
	TYPE		
	SUPPLY		
	OUTPUT RATING		
	ACCURACY		
	ENCLOSURE CLASS		
SOLENOID VALVE	MFR. & MODEL NUMBER		
	RATING		
	OPERATION QUANT	TY	
	COIL INSULATION CLASS		
	ENCLOSURE CLASS		
HANDWHEEL	ORIENTATION		
JUNCTION BOX	NO. OF WAYS		
	SIZE		
	CABLE GLANDS (Size / Quantity)		
	ENCLOSURE CLASS		
I/P CONVERTER	INPUT SIGNAL	POWER SUPPLY	
	SPLIT RANGE		
	ENCLOSURE CLASS		
Cu. Tubing & Fittings / per CV	12 Meters of 3/8 " 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

**2 X 660MW MOUDA STPP PHASE-2****TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION D


REV. NO. 00

DATE : 07.11.12

SHEET OF

SECTION – D

QUALITY PLAN

SI		Component & Operations	Characteristics	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Format of record	Agency	Remarks	
No						M	C,N			M C N		
1		2	3	4	5	6	7	8	9	D*	10	11
<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;">  <p>APPROVED VENDORS AS PER LOA (Refer Note - 1)</p> </div> <div style="width: 40%; text-align: center;"> QUALITY PLAN (Applicable for mentioned three projects) </div> <div style="width: 30%;"> PROJECT MOUDA STPP ST-II PACKAGE CONTROL VALVE CONTRACT NO. 9575-110 </div> </div>												
				ITEM : CONTROL VALVE (Pneumatic)		BHEL QP No. PE-QP-999-145-I 006 A						
				SUB SYSTEM :		REV. No.: 00						
				Power Cycle and Water System		DATE: 11-11-2009						
						PAGE 1 of 3						
<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> RAW MATERIAL AND BOUGHT OUT ITEMS </div> </div>												
1.1	Body and Bonnet, (Casting/ Forgings), Plug, Stem, Acuator Stem and Seat Rings	a) Physical and Chemical Properties	Maj.	Physical and Chemical Tests	1/ Heat (HT Batch)	1/ Heat (HT Batch)	Tech. Specification/ Approved Drawing	Tech. Specification/ Approved Drawing	TC	√	P V V	
		b) Heat Treatment	Maj.	Review of HT chart	Each HT	Each HT	Tech. Specification/ Approved Drawing	Tech. Specification/ Approved Drawing	TC	√	P V V	
		c) Internal Quality of casting	Maj.	RT for Body and UT for Bonnet	100%	100%	ANSI B 16.34	ANSI B 16.34	TC	√	P V V	Refer NOTE : 2
		d) Surface Quality	Maj.	Visual	100%	100%	MSS SP 55	MSS SP 55	TC	√	P V V	
		e) Pressure Test for Shell	Maj.	Hyd. Test	100%	100%	ANSI B 16.34	ANSI B 16.34	TC	√	P V V	For Body and Bonnet after machining
1.2	Diaphragm	a) Surface Quality	Maj.	Visual	100%	-	Mfr. Standard	Mfr. Standard	TC		P V -	
		b) Hardness	Maj.	Measu.	100%	-	Mfr. Standard	Mfr. Standard	TC		P V -	
		c) Endurance/ Life	Maj.	10,000 Cycles	1/ Type	-	10,000 Cycles / As per Mfr. Standard	No Damage	TC		P V -	
1.3	Springs	a) Composition	Maj.	Chemical	1 sample/lot	1 sample/lot	Material Spec./ Mfr. Std.	Material Spec./ Mfr. Std.	TC		P V -	
		b) Mechanical Properties	Maj.	Mech.	1 sample/lot	1 sample/lot	Material Spec./ Mfr. Std.	Material Spec./ Mfr. Std.	TC		P V -	
		c) Dimension	Maj.	Measu.	1 sample/lot	1 sample/lot	Mfr. Std.	Mfr. Std.	TC		P V -	
		d) Performance	Maj.	Stiffness Ratio	100%	100%	Approved Drg./ Material Spec.	Approved Drg./ Material Spec.	TC		P V -	
		e) Endurance Test	Maj.	Cyclic Test (Endurance)	1/ Type	1/ Type	Approved Drg./ Material Spec.	Approved Drg./ Material Spec.	TC		P V -	
1.4	Functional test (Limit switches, Solenoids, Positioner, AFR, ALR, Position Transmitter)	a) Routine Test	Maj.	HV, IR and Continuity	100%	100%	Mfr. Standard	Mfr. Standard	TC		P V -	
		b) Type tests	Maj.	Review of TC	1/ Type	1/ Type	Mfr. Standard	Mfr. Standard	TC		P V -	
		c) Degree of protection	Maj.	Review of TC	1/ Type	1/ Type	Mfr. Standard	Mfr. Standard	TC		P V -	
		d) Functional Test	Maj.	Verifaition of Operation	-	-	-	-	-	√	V V V	During Final Testing
1.5	Pressure Gauge	a) Performance	Maj.	Review of Calibration TC	100%	100%	Mfr. Standard	Mfr. Standard	TC		P V -	
		d) Marking and Dimension	Maj.	Visual	100%	100%	Approved Drg./ Tech. Spec.	Approved Drg./ Tech. Spec.	TC		P V -	

LEGEND : RECORDS IDENTIFIED WITH "✓" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

M: MANUFACTURER'S SUPPLIER, C: MAIN SUPPLIER, N: NTPC, P: PERFORM, W: WITNESS and V: VERIFICATION AS APPROPRIATE,

ADS - Approved Data Sheet, TC - Test Certificate, TR - Test Records.


CONTRACTOR'S SIGNATURE: *[Signature]* 11/11/09

Power Sector - Project Engineering Management
PPEI Building, HRD & ESI Complex
Plot No. 25, Sector - 16A,
NOIDA - 201 301 (U.P.)


FOR NTPC USE :

REVIEWED BY: *[Signature]* 11/11/09

NAME & SIG. OF APPROVING AUTHORITY AND SEAL
[Signature]
 Engg. Div/ QA & I

		Manufacturer's Name APPROVED VENDORS AS PER LOA (Refer Note - 1)		QUALITY PLAN (Applicable for mentioned three projects)				PROJECT						
				ITEM : CONTROL VALVE (Pneumatic)		BHEL QP No. PE-QP-999-145-I 006 A		PROJECT						
				REV. No.: 00		PACKAGE								
				DATE: 11-11-2009		CONTRACT NO. 9575-110								
		SUB SYSTEM :		Power Cycle and Water System		PAGE 2 of 3								
Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check	Reference Document	Acceptance Norms	Format of record	Agency	Remarks				
1	2	3	4	5	6	7	8	9	D*	10	11			
2 INPROCESS INSPECTION														
2.1	Body and Bonnet after machining, Plug with actuator stem	a) Surface Flaws (MPI for Body and Bonnet only)	Maj.	MPI/ PT	All assessable surfaces	All assessable surfaces	ANSI B 16.34	ANSI B 16.34	TR	P	V	V	Butt weld shall be included	
		b) Dimensional Check	Maj.	Measu.	100%	—	Mfr. Std	Mfr. Std	Log Sheet	P	-	-		
		c) Hardfacing (Wherever applicable)	Maj.	Hardness Measu.	1 Sample/ Lot	1 Sample/ Lot	Mfr. Std	Mfr. Std	TR	P	V	V	Hardfacing is to be done as per Mfr. Std.	
2.2	Guide Bush (Wherever applicable)	a) Dimension	Maj.	Measu.	100%	—	Approved Drg.	Approved Drg.	-do-	P	-	-		
2.3	Lapping	a) Machining surface contact (Blue Matching)	Maj.	Visual	1 Sample/ Lot	—	-	Proper Physical Contact	-do-	P				
3 TESTS ON COMPLETED VALVES														
3	CV TEST (TYPE TEST)	Valve characteristics Pr. Versus Discharge and Discharge Versus Opening.	Maj.	Measu.	1/ Type		As per Specification and Approved Drawing	As per Specification and Approved Drawing	TC	√	P	V	V*	* - NTPC Engg. clearance for CV test shall be reviewed during final inspection.
3.1	Actuator Chamber	a) Strength and leakage	Maj.	Pneu. Test	100%	10%	No leakage	No leakage	TR	√	P	W	W	
3.2	Body	a) Leak and Pressure Test	Maj.	Hydro test	100%	10%	ANSI B 16.34	ANSI B 16.34	TR	√	P	W	W	
3.3	Seat leakage test	a) Seat Leakage	Maj.	Hydro/ Pneu. Test	100%	10%	ANSI B 16.104	ANSI B 16.104/ Approved Data Sheet	TR	√	P	W	W	
3.4	Operation tests	a) Valve Travel	Maj.	Measu.	100%	10%	Spec./ ADS / Approved Drawings	Spec./ ADS / Approved Drawings	TR	√	P	W	W	
		b) Opening and Closing Time	Maj.	Measu.	100%	10%	Spec./ ADS / Approved Drawings	Spec./ ADS / Approved Drawings	TR	√	P	W	W	
		c) Linearity / CAM characteristics	Maj.	Measu.	100%	10%	Spec./ ADS / Approved Drawings	Spec./ ADS / Approved Drawings	TR	√	P	W	W	
		d) Hysteresis	Maj.	Measu.	100%	10%	Spec./ ADS / Approved Drawings	Spec./ ADS / Approved Drawings	TR	√	P	W	W	
		d) Operation of limit switch and solenoids and other accessories	Maj.	Measu.	100%	10%	Spec./ ADS / Approved Drawings	Spec./ ADS / Approved Drawings	TR	√	P	W	W	
		d) Predifined valve positon in case of air and signal failure	Maj.	Visual	100%	10%	Spec./ ADS / Approved Drawings	Spec./ ADS / Approved Drawings	TR	√	P	W	W	
LEGEND : RECORDS IDENTIFIED WITH "√" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M: MANUFACTURER, SUB: SUB SUPPLIER, C: MAIN SUPPLIER, N: NTPC, P: PERFORM, W: WITNESS and V: VERIFICATION AS APPROPRIATE. *CBR: NTPC SHALL IDENTIFY IN COLOUM "N" AS "W", ADS - Approved Data Sheet., TC - Test Certificate, TR - Test Records.							FOR NTPC USE : REVIEWED BY :		NAME & SIG. OF APPROVING AUTHORITY and SEAL एस. सामंता / S. SAMANTA Dy. General Manager (QA) एनटीपीसी लिमिटेड / NTPC Limited A-8A, Sector-24, Noida-201301 (U.P.)					

CONTRACTOR'S SIGNATURE
Power Sector-Project Engineering Management
PPEI Building, HRD & ESI Complex
Plot No. 25, Sector -16A,
NOIDA -201 301 (U.P.)

		Manufacturer's Name APPROVED VENDORS AS PER LOA (Refer Note - 1)		QUALITY PLAN							
				(Applicable for mentioned three projects)							
				ITEM : CONTROL VALVE		BHEL QP No. PE-QP-999-145-I 006 A		PROJECT		VINDHYACHAL STPP STAGE-V	
				(Pneumatic)		REV. No.: 00		PACKAGE		TG PACKAGE	
		SUB SYSTEM :		DATE: 11-11-2009		CONTRACT NO.		9575-110			
		Power Cycle and Water System		PAGE 3 of 3							
SI	Component & Operations	Characteristics	Class	Type of check	Quantum of check	Reference	Acceptance	Format of record	Agency	Remarks	
No				check	M C,N	Document	Norms		M C N		
1	2	3	4	5	6	7	8	9 D*	10	11	
3.5	Final Inspection	a) Overall Dimension	Maj.	Measu.	100%	10%	Approved Drawings	Approved Drawings	TR	✓ P W W	
		b) Cleanliness and Stamping	Maj.	Visual	100%	100%				P V -	
		c) Painting	Maj.	Measu.	100%	-	Spec./ ADS	Spec./ ADS	TR	P - -	

NOTE : 1 - As on Date agreed sub suppliers are as follows.


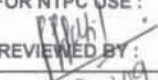
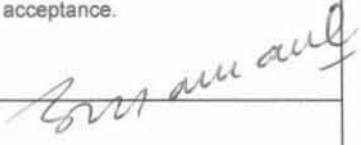
1) M/s IL, Palakkad - 2) M/s Fisher Controls, UK/ USA - 3) M/s CCI, USA - 4) M/s NIPPON FISHER, JAPAN - 5) M/s EMERSON, FRANCE - 6) M/s MIL CONTROLS, ALWAYS - 7) M/s DRESSER MASOLENIEN, FRANCE - 8) M/s COPES VULCAN, UK - 9) M/s FISHER SANMAR, CHENNAI -	For all pneumatic operated valves up to 2500 Class and up to 500 MW except BFP Recirculation vavle For all pneumatic operated valves of 500 MW For all pneumatic operated valves of 500 MW For all pneumatic operated valves of 500 MW except BFP Recirculation valve For all pneumatic operated valves of 500 MW For all pneumatic operated valves up to 2500 Class and up to 500 MW except BFP Recirculation vavle For all pneumatic operated valves of 500 MW For all pneumatic operated valves of 500 MW except BFP Recirculation valve For all pneumatic operated valves up to 2500 Class and for 200 MW and PRDS valves of 500 MW.
--	--

NOTE : 2 - Only for rating class 900 & above and applicable for Body and Bonnet only. Valve stem for dia > 40 MM UT shall be done on 100 % basis as per ASTM A-388 A and ASME B 16.34.
For lower rating as per specification. M/s BHEL to mentioned in the endorsement sheet if any changes are made in the NDT requirement as per specification.

NOTE : 3 - A) Air Filter regulator to be procured from M/s Plaka and M/s Shavo norgen. B) Smart Positioner (If applicable) to be procured from Siemens, Yokogawa, ABB, Dressor, Fisher, Smar, Masolenien.
C) All other bought out items/ accessories are procured from Valve Manufacturer approved sources.

NOTE : 4 - IBR Cetificate in Form III C shall be submitted if called for in the specification/ Data Sheet.

NOTE : 5 - Copies of all TC for materials duly correlated with Heat numbers, TC for electrical items and mechanical tests (Leak/ Operation) shall be furnished to BHEL for verification and acceptance.

 11/11/09 CONTRACTOR'S SIGNATURE.	LEGEND : * RECORDS, IDENTIFIED WITH "✓" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M: MANUFACTURER/ SUB SUPPLIER, C: MAIN SUPPLIER, N: NTPC, P: PERFORM, W: WITNESS and V: VERIFICATION AS APPROPRIATE. "CHP" : NTPC SHALL IDENTIFY IN COLOUM "N" AS "W", ADS - Approved Data Sheet., TC - Test Certificate, TR - Test Records.	FOR NTPC USE : REVIEWED BY :  11/11/09	 NAME & SIG. OF APPROVING AUTHORITY and SEAL Engg. Div/QA & I
--	---	--	--

DILIP JEJURIKAR
 Dy. General Manager (C & I)
Bharat Heavy Electricals Limited
 Power Sector - Project Engineering Management
 PPEI Building, HRD & ESI Complex
 Plot No. 25, Sector - 16A,
 NOIDA-201 301 (U.P.)

एस. सामंता / S. SAMANTA
 उप महाप्रबन्धक (क्यू ए)
 Dy. General Manager (QA)
 एनटीपीसी लिमिटेड / NTPC Limited
 A-8A, Sector-24, Noida-201301 (U.P.)

CLAUSE NO.	QUALITY ASSURANCE - SG AND AUX				Rev-00 Dt: 11/
	TABLE-1 NDT REQUIREMENTS FOR PRESSURE RETAINING COMPONENTS OF VALVES				
	Valve size NB in mm	ANSI Class upto 300	ANSI Class above 300 upto 600	ANSI Class above 600 below 900	ANSI Class 900 & above & below 4500
	Less than 50	Visual	visual	Visual	MPI
	50 & above but below 100	Visual	visual	MPI	MPI & RT (on 10% of valves on 100% area)
	100 & above but less than 300	Visual	MPI	MPI & RT (on 10% of valves on changes of section & weld ends)	MPI & RT (on 100% area)
	300 and above	MPI	MPI	MPI & RT (on change of sections & weld ends)	MPI, RT (on 100% area)
	Note: For body and bonnet forgins UT with MPI may be adopted in place of RT. For austenitic steel MPI may be replaced by LPI.				
	1.01.07	Non Pressure Bearing Attachments Load bearing welds shall be subjected to examination by ultrasonic testing (UT) and magnetic particle inspection (MPI) techniques after stress relief (SR). No load bearing welds shall be subjected to MPI after stress relief. The toes of the welds adjoining the drum shall be ground smooth prior to stress relieving before carrying out this examination.			
	1.01.08	Steam coil air preheater and fuel oil heater Hydraulic pressure test shall be carried out on the heating coils. All pipes, valves steam traps and mountings shall be subjected to hydraulic test as called for under IBR, BS or other approved codes.			
	1.01.09	Soot Blowers (a) Butt weld between nozzle and lance tube shall be subjected to 100 % radiography tests. (b) Soot blower shall be subjected to operational checks as below: (1) Smooth operation			
NTPC-TAMIL NADU ENERGY COMPANY LTD POWER PROJECT (2x500 MW) STEAM GENERATOR WITH ESP PACKAGE		TECHNICAL SPECIFICATION SECTION-VI BID DOCUMENT NO.: CS-0260-101-2		PART - B SUB-SECTION-VII Q-1 QA - SG AND AUX. PAGE 5 OF 13	

सम अमल
एस. सामंता / S. SAMANTA
उप महाप्रबन्धक (क्यू ए)
Dy. General Manager (QA)

11/11/09
DILIP JEJURIKAR
Dy. General Manager (C & I)
Bharat Heavy Electricals Limited
Power Sector - Project Engineering Management
PPEI Building, HRD & ESI Complex
Plot No. 25, Sector - 16A,
NOIDA - 201 301 (U.P.)

**2 X 660MW MOUDA STPP PHASE-2****TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B


SECTION D

REV. NO. 00

DATE : 07.11.12

SHEET OF

SECTION – D**BILL OF QUANTITY**

	2 X 660MW MOUDA STPP PHASE-2		SPECIFICATION NO. PE-TS-387-145-1106	
			VOLUME II-B	
	TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH PNEUMATIC ACTUATOR ALONGWITH ACCESSORIES		SECTION D	
			REV. NO. 00	DATE: 07.11.12
			SHEET 1 OF 1	

BILL OF QUANTITY

S.NO.	ITEM DESCRIPTION		Qty/Unit	Total Qty.
[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	1	2
2.	CRHV-6	D/A Pegging from CRH Line	1	2
3.	CDV-10,CDV-12 & CDV-14	CEP A/B/C Minimum Recirculation	3	6
4.	CDV-22 & CDV-25	Main Condensate Control	2	4
5.	CDV-39	GSC min. flow recirculation	1	2
6.	CDV-43	Excess Dump Control	1	2
7.	CDV-67	Condensate for SD F/T	1	2
8.	CDV-72	Condensate for Valve Gland Sealing	1	2
9.	DRV-2 & DRV-8	HPH-7A/7B Drain to HPH-6A/6B	2	4
10.	DRV-5 & DRV-11	HPH-7A/7B Drain to HP Drain F/T	2	4
11.	DRV-15 & DRV-22	HPH-6A/6B Drain to Deaerator	2	4
12.	DRV-18 & DRV-25	HPH-6A/6B Drain to HP Drain F/T	2	4
13.	DRV-28	LPH-3 Drain to LPH-2	1	2
14.	DRV-31	LPH-3 Drain to LP Drain F/T	1	2
15.	DRV-34	LPH-2 Drain to LPH-1	1	2
16.	DRV-37	LPH-2 Drain to LP Drain F/T	1	2
17.	DRV-48	Deaerator Overflow	1	2
18.	DRV-53 & DRV-56	HPH-8A/8B Drain to HPH-7A/7B	2	4
19.	DRV-59 & DRV-62	HPH-8A/8B Drain to HP Drain F/T	2	4
20.	DRV-65	LPH-4 Drain to LPH-3	1	2
21.	DRV-68	LPH-4 Drain to LP Drain F/T	1	2
22.	DMV-2	DM Normal Makeup to Hotwell	1	2
23.	DMV-9	Emergency MU to Hotwell	1	2
24.	FDV-14	Low Load Feed Control	1	2
25.	03PGC15AA101	DMCW System	1	2
[B]	1/4” of COPPER TUBING (PVC COATED) (To be supplied Loose)		600 METERS	1200 METERS
[C]	FITTINGS: (To be supplied Loose)	(i) BRASS FITTING for Connection to Air Filter Regulator	1 Lot	2 Lot
		(ii) BRASS FITTING for Connection to Solenoid Valve	1 Lot	2 Lot
		(iii) BRASS FITTING for Connection to IA Header isolation valve	1 Lot	2 Lot
		(iv) BRASS EQUAL TEE	1 Lot	2 Lot

**2 X 660MW MOUDA STPP PHASE-2****TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPEC NO.: PE-TS-387-145-I106

VOLUME II B

SECTION D

REV. NO.


00

DATE : 07.11.12

SHEET

OF

SECTION – D**SPARES**

	2 X 660MW MOUDA STPP PHASE-2 TECHNICAL SPECIFICATION FOR CONTROL VALVES WITH PNEUMATIC ACTUATOR ALONGWITH ACCESSORIES	SPECIFICATION NO. PE-TS-387-145-I 106	
		VOLUME II-B	
		SECTION D	
		REV. NO. 00	DATE:
		SHEET 1	OF 1

[A] LIST OF COMMISSIONING SPARES

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

[B] LIST OF MANDATORY SPARES

S.No.	ITEM DESCRIPTION	QUANTITY
1	Position Feedback Transmitter	10% or 2 nos. for each type of CV
2	Trim (Plug & stem assembly, seat rings, guide bushings etc.)	1 No. of each type
3	Packing & Gaskets	1 No. of each type
4	Actuator Diaphragm	1 No. of each type
5	Feedback Linkages	1 No. of each type
6	O rings	2 Nos. of each size of Positioner
7	Pressure Guages of all types	10% of each type
8	Solenoid Valves	20% of each type
9	Positioner Unit	20% of each type
10	Pneumatic and electro-hydraulic actuator assembly	10% or 2 nos. for each type and rating whichever is more (1 LOT)

[C] RECOMMENDED SPARES

Bidder to offer recommended spares as per their recommendation (List to be attached).

**NATIONAL THERMAL POWER CORPORATION
2 X 660MW MOUDA**

(FOR ONE UNIT)

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

VOLUME III

SPECIFICATION No: PE-TS-387-145-I 106



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



2 X 660MW MOUDA STPP PHASE-2

**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPECIFICATION NO.: PE-T S-387-145-I106

VOLUME III

SECTION

REV. NO. 00

DATE: 07.11.12

SHEET Page 1 of 8

CONTENTS

VOL-III

1. SCHEDULE OF PRICES
2. SCHEDULE OF UNIT PRICES
3. CV TEST CHARGES
4. INSPECTION SCHEDULE
5. DEVIATION SCHEDULE
6. SCHEDULE OF SUBMISSION OF DRAWINGS/ DOCUMENTS,
EQUIPMENT MANUFACTURE, INSPECTION AND DISPATCH.
7. COMPLIANCE CERTIFICATE

**2 X 660MW MOUDA STPP PHASE-2**
**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPECIFICATION NO.: PE-T S-387-145-I106

VOLUME III

SECTION

REV. NO. 00

DATE: 07.11.12

SHEET Page 3 of 8

SCHEDULE OF PRICES

S.NO.	ITEM DESCRIPTION			PRICE/UNIT
[A] CONTROL VALVES WITH 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-10,CDV-12 & CDV-14	CEP A/B/C Minimum Recirculation		
4	CDV-22 & CDV-25	Main Condensate Control		
5	CDV-39	GSC min. flow recirculation		
6	CDV-43	Excess Dump Control		
7	CDV-67	Condensate for SD F/T		
8	CDV-72	Condensate for Valve Gland Sealing		
9	DRV-2 & DRV-8	HPH-7A/7B Drain to HPH-6A/6B		
10	DRV-5 & DRV-11	HPH-7A/7B Drain to HP Drain F/T		
11	DRV-15 & DRV-22	HPH-6A/6B Drain to Deaerator		
12	DRV-18 & DRV-25	HPH-6A/6B Drain to HP Drain F/T		
13	DRV-28	LPH-3 Drain to LPH-2		
14	DRV-31	LPH-3 Drain to LP Drain F/T		
15	DRV-34	LPH-2 Drain to LPH-1		
16	DRV-37	LPH-2 Drain to LP Drain F/T		
17	DRV-48	Deaerator Overflow		
18	DRV-53 & DRV-59	HP H-8A/8B Drain to HPH-7A/7B		
19	DRV-56 & DRV-62	HPH-8A/8B Drain to HP Drain F/T		
20	DRV-65	LPH-4 Drain to LPH-3		
21	DRV-68	LPH-4 Drain to LP Drain F/T		
22	DMV-2	DM Normal Makeup to Hotwell		
23	DMV-9	Emergency MU to Hotwell		
24	03PGC15AA101	DMCW System		
[B] 1200 METERS OF 1/4” PVC Coated Cu TUBING FOR CONNECTION BETWEEN IA HEADER ON ONE END AND ACCESSORIES ON THE OTHER END OF CV+1 SET OF FITTINGS FOR EACH VALVE				
[C] START-UP/COMMISSIONING SPARES (1 SET OF BODY AND BONNET GASKET AND GLAND PACKING)				
[D] CV TEST CHARGES				
[E] MANDATORY SPARES – AS PER REQUIREMENT IN SECTION-D (OPTIONAL)				
[F] RECOMMENDED SPARES – FOR THREE (3) YEARS OF OPERATION (ITEM WISE BREAK-UP TO BE ATTACHED BY THE BIDDER)				
[G] DOCUMENTATION CHARGES FOR THE FINAL DOCUMENTS AND SOFT COPIES.				
PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE				
NAME DES	IGNATION	SIGNATURE	DATE	COMPANY SEAL

**2 X 660MW MOUDA STPP PHASE-2**
**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPECIFICATION NO.: PE-T S-387-145-I106

VOLUME III

SECTION

REV. NO. 00

DATE: 07.11.12

SHEET Page 4 of 8

SCHEDULE OF UNIT PRICES

[B] CONTROL VALVE ACCESSORIES		
S. No.	ITEMS	UNIT PRICE
1.	POSITIONER (SMART) OF EACH MODEL AND TYPE	
2.	AIR FILTER REGULATORS	
3.	AIR LOCK RELAY	
4.	POSITION LIMIT SWITCH OF EACH MODEL AND TYPE	
5.	ELECTRONIC POSITION TRANSMITTER OF EACH MODEL AND TYPE	
6.	SOLENOID VALVE	
7.	VOLUME BOOSTER (PNEUMATIC RELAY)	
8.	PRESSURE GAUGES OF EACH TYPE	
9.	JUNCTION BOX (36 WAYS)	
10.	HANDWHEEL	
11.	ACTUATOR OF EACH TYPE (Separate list to be attached if required)	
12.	BRASS FITTING FOR CONNECTION TO AIR FILTER REGULATOR	
13.	BRASS FITTING FOR CONNECTION TO AIR LOCK RELAY	
14.	BRASS FITTINGS FOR CONNECTING TO AIR HEADER	
15.	EQUAL COPPER TEE	
16.	COPPER TUBING PER METRE	
17. \$	VALVE STEM WITH PLUG & SEAT RING EACH SIZE & TYPE	
18. \$	GASKET OF EACH SIZE AND TYPE	
19. \$	BODY SEAL GASKETS OF EACH SIZE AND TYPE	
20. \$	CAGE OF EACH SIZE AND TYPE	
21. \$	GLAND PACKING EACH SIZE AND TYPE	
22. \$	VALVE TRIM OF EACH SIZE AND TYPE(CAGE, PLUG, SEAT, STEM)	
23. \$	DIAPHRAM/ POWER CYLINDER OF EACH SIZE AND TYPE	
24.	VALVE DIAGNOSTIC SOFTWARE FOR SMART POSITIONER(OPTIONAL ITEM)	
25.	HAND HELD HART CALIBRATOR (OPTIONAL ITEM)	

NOTE :

\$: Separate list to be attached for each size and type of these control valve accessories tag number wise.

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL


2 X 660MW MOUDA STPP PHASE-2
**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPECIFICATION NO.: PE-T S-387-145-I106

VOLUME III

SECTION

REV. NO. 00

DATE: 07.11.12

SHEET Page 5 of 8

CV TEST CHARGES

S.NO.	ITEM DESCRIPTION		
[A] CONTROL VALVES WITH ALL THE ACCESSORIES			
S. No.	TAG NO.	SERVICE	CV TEST CHARGES
4.	ASV-8	D/A Pegging from Aux. Steam Header	
5.	CRHV-6	D/A Pegging from CRH Line	
6.	CDV-10,CDV-12 & CDV-14	CEP A/B/C Minimum Recirculation	
7.	CDV-22 & CDV-25	Main Condensate Control	
8.	CDV-39	GSC min. flow recirculation	
9.	CDV-43	Excess Dump Control	
10.	CDV-67	Condensate for SD F/T	
11.	CDV-72	Condensate for Valve Gland Sealing	
12.	DRV-2 & DRV-8	HPH-7A/7B Drain to HPH-6A/6B	
13.	DRV-5 & DRV-11	HPH-7A/7B Drain to HP Drain F/T	
14.	DRV-15 & DRV-22	HPH-6A/6B Drain to Deaerator	
12	DRV-18 & DRV-25	HPH-6A/6B Drain to HP Drain F/T	
13	DRV-28	LPH-3 Drain to LPH-2	
14	DRV-31	LPH-3 Drain to LP Drain F/T	
15	DRV-34	LPH-2 Drain to LPH-1	
16	DRV-37	LPH-2 Drain to LP Drain F/T	
17	DRV-48	Deaerator Overflow	
18	DRV-53 & DRV-59	HPH -8A/8B Drain to HPH-7A/7B	
19	DRV-56 & DRV-62	HPH-8A/8B Drain to HP Drain F/T	
20	DRV-65	LPH-4 Drain to LPH-3	
21	DRV-68	LPH-4 Drain to LP Drain F/T	
22	DMV-2	DM Normal Makeup to Hotwell	
23	DMV-9	Emergency MU to Hotwell	
24	03PGC15AA101	DMCW System	

**2 X 660MW MOUDA STPP PHASE-2**
**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPECIFICATION NO.: PE-T S-387-145-I106

VOLUME III

SECTION

REV. NO. 00

DATE: 07.11.12

SHEET Page 6 of 8

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 DESI	GNATION	SIGNATURE	DATE	COMPANY SEAL

**2 X 660MW MOUDA STPP PHASE-2**
**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPECIFICATION NO.: PE-T S-387-145-I106

VOLUME III

SECTION

REV. NO. 00

DATE: 07.11.12

SHEET Page 7 of 8

DEVIATION SCHEDULE**PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE**

NAME D	ESIGNATION	SIGNATURE	DATE	COMPANY SEAL

**2 X 660MW MOUDA STPP PHASE-2**
**TECHNICAL SPECIFICATION FOR
CONTROL VALVES WITH PNEUMATIC ACTUATOR
ALONGWITH ACCESSORIES**

SPECIFICATION NO.: PE-T S-387-145-I106

VOLUME III

SECTION

REV. NO. 00

DATE: 07.11.12

SHEET Page 8 of 8

**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 finalization, freezing of inputs of manufacture by way of vetting of documents and technical discussions and resubmissions of documents (if required)	6 Weeks from the Zero date.
4.	Inspection of Equipment as per Approved (Category-I) drawings / documents.	24 Weeks from the Zero date.
5.	Release of MDCC by BHEL	26 Weeks from the Zero date.
6.	Dispatch (Packaging & Dispatch)	26 Weeks from the Zero date.
7.	Final documents submission as per Contract	28 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)

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

Project: 2x 660 MW MOUDA STPP PHASE-II.

Specification n no.: PE-TS-387-145-I106

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

Signature with date	
Name	
Company seal	