

NTPC LTD.

**1 x 500 MW FGUTPP-IV
at
UNCHAHAR (UP)**

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

VOLUME - II B & III

SPECIFICATION No: PE-TS –401-142–N101 (REV 00)



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

NTPC LTD.

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at
UNCHAHAR (UP)**

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

VOLUME - II B

SPECIFICATION No: PE-TS –401-142–N101 (REV 00)



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



TITLE

PREAMBLESPECIFICATION NO **PE-SS-999-100-Q-001**VOLUME **II B**

SECTION PREAMBLE

REV NO. **0** DATE 23.04.2014

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1.0 Volume – II B :

This volume is sub- divided into following sections: -

Section – A : This section outlines the scope of enquiry

Section – B : This section provides : “ Project Information”.


Section- C : This section indicates tech. Requirements specific to the contract, not covered in Section – D.

Section – D : This section comprises of tech. Specifications of equipments complete with data sheet A,B&C.

Data Sheet – A specifics data and other requirements pertaining to the equipment.

Data sheet – B specifics data to be filled by the bidder (Data Sheet B is contained in Volume – III.

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

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		VOLUME II-B	
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TITLE

**AUXILIARY STEAM PRESSURE REDUCING
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Quality Plan	Quality Plan for Steam Desuperheater		
	Quality Plan for Control Valve		
Tender Drawings	Auxiliary Pr. Reducing and Desuperheating Station		
Spares	List of Spares		

FILLED-UP QUALITY PLAN AS MINIMUM REQUIREMENTS IS INCLUDED FOR
CONTROL VALVE & STEAM DESUPERHEATER.



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Section – A
Scope of Enquiry



Technical specification for
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SCOPE OF ENQUIRY

1.0 SCOPE

- 1.1 This specification covers the Design, Manufacture, Inspection and testing at manufacturer's works, proper packing for transportation and delivery to site of the Auxiliary Steam Pressure Reducing & Desuperheating Stations, along with accessories as mentioned in different sections of this specification for **1X500 MW FGUTPP-IV**.

The tenderer shall also quote for the following:-

- a) Supervision of erection & commissioning of the equipment.
- b) Recommended spares for 3 years of post-guarantee period operation.
- c) Mandatory spares.

- 1.2 The quality plan enclosed forms the minimum requirement but not limited to be adhered to by the bidder. Bidder to sign and stamp the same and submit along with the offer as an acceptance. Similar to Quality Plan, Bidder is required to furnish Field Quality Plan (FQP). FQP shall indicate all inspection/test to be carried out at site covering the following:

- i). Receipt of material.
- ii). Storage or Conservation.
- iii). Pre-Erection & Erection
- iv). Pre-Commissioning, commissioning & post commissioning.

FQP shall furnish adequate instructions to be followed by erection & commissioning agency at site.

- 1.3 The bidder may quote for his standard, proven design of equipment and shall indicate any deviations from this specification in the enclosed schedule. In the absence of duly filled deviation schedule, it shall be presumed that the offer conforms exactly to this specification. The bidder shall also furnish the performance feedback data of the equipment from similar installations. However, the acceptance of the deviations/options is not binding on the Engineer/Owner.

- 1.4 The bids shall be in English language and SI Units.

- 1.5 **Bidder to note that CV test is required to be conducted on one type per size, CV value. Bidder to group such valves and indicate the same along with the price bid. Unpriced portion to be submitted to engineering.**

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

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

2 GENERAL TECHNICAL INSTRUCTIONS

- 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.



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- 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.
- 5 Bidder to note that none of the formats, technical documents, quality plan etc. should be modified or changed by them. In case bidder makes any modifications/change in BHEL formats, their offer would be liable for rejection.



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SECTION – B

PROJECT INFORMATION

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AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION				

CLAUSE NO.	PROJECT INFORMATION	
1.00.00	BACKGROUND <p>Feroze Gandhi Unchahar Thermal Power Station, FGUTPS was conceived as a Load Centre coal based Power Station of 1050 MW capacity by UPSEB. The land for the project was acquired and stage-I (2x210MW) was implemented by UPSEB. The 2x210 MW Unchahar station was taken over by NTPC from Uttar Pradesh Rajya Vidyut Utpadan Nigam of Uttar Pradesh in 1992. Thereafter, NTPC implemented Stage- II (2x210 MW) and Stage-III (1X 210 MW).</p> <p>The present expansion proposal is to install one additional unit of 500 MW under Stage-IV thus making the ultimate capacity of the FGUTPP 1550 MW.</p>	
1.01.00	LOCATION AND APPROACH <p>The plant is located in Raebareli district of Uttar Pradesh, having latitude and longitude of 25°54'50"N and 81°19'50"E respectively. It is bounded by villages Khnapur, Faridpur and Khaliqpur Khurd. Mustafabad town is located at a distance of about 3 Kms from the plant. Unchahar railway station on Allahabad-Raebareli broad gauge (BG) section of Northern Railway (NR) is 2 Kms away. The nearest airport is located at Lucknow a distance of approximately 110 km from the project site.</p> <p>Vicinity Plan of the project is placed at Annexure-I</p>	
1.02.00	LAND REQUIREMENT <p>During the implementation of FGUTPS, Stage-I, II & III total area of about 2203 acres of land was acquired. The plant facilities, ash disposal and township for this expansion Stage-IV (1x500 MW) would be accommodated within the available land with dismantling and relocation of some buildings. No additional land has been envisaged to be acquired for this expansion project.</p>	
1.03.00	WATER <p>As per agreement between NTPC & Irrigation department, 105 Cusec of water is supplied through S.S Canal to NTPC-Unchahar. The Stage-IV (500MW) consumptive water requirement shall be accommodated within the existing commitment of water to FGUTPP. Sharda sahayak canal and Dalmau Pump House (DPH) on Purwa Branch Canal are available sources of water for the project and therefore, the make up water requirement for the plant is proposed to be drawn from these sources.</p>	
1.04.00	COAL AVAILABILITY AND TRANSPORTATION	
1.04.01	Coal Availability	
FGUTPP STAGE-IV (1X500 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION - VI PART-A
		SUB-SECTION-II PROJECT INFORMATION
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1.0.0 BRIEF SYSTEM DESCRIPTION

1.1.0 Auxiliary steam system is designed to provide steam for the turbine auxiliaries, boiler auxiliaries and fuel oil heating system during start-up, low loads and normal running of unit.

1.2.0 The system comprises of two auxiliary steam pressure reducing and desuperheating stations (PRDS). One "High capacity PRDS" with tapping off steam from main steam line to meet auxiliary steam requirements during unit start-up, low loads & for fuel oil system, and the other "Low Capacity PRDS" with tapping off steam from CRH line to meet auxiliary steam requirements during normal running. Spray water required for desuperheating will be tapped off from Boiler Feed Pump discharge.

1.3.0 These two stations will reduce the pressure and temperature of the steam tapped off from CRH line and main steam line to 18 kg/cm² (abs) & 320°C at the high temperature auxiliary steam header and subsequently to 18 kg/cm² (abs) & 240°C at the low temperature auxiliary steam header through a suitable desuperheater between the high temperature and low temperature auxiliary steam headers.

2.0.0 EQUIPMENT TO BE PROVIDED BY TENDERER

2.1.0 AUXILIARY STEAM PRDS COMPRISING OF :

2.1.1 Control Valves & Accessories:


2.1.1.1 High Capacity Combined Pressure Reducing & Desuperheating Valve AS-22 (from MS line)	:	One No. / Unit
2.1.1.2 Low Capacity PRV on CRH Line (AS-26)	:	One No. / Unit
2.1.1.3 Spray Pressure Control Valves for AS-22 (FD-30 & 44)	:	Two Nos. / Unit
2.1.1.4 Spray Temperature Control Valves for AS-22 (FD-28 & 31)	:	Two Nos. / Unit
2.1.1.5 Spray Pressure Control Valves for DESH-1 (FD-35 & 38)	:	Two Nos. / Unit
2.1.1.6 Spray Temperature Control Valves for DESH-1 (FD-46 & 47)	:	Two Nos. / Unit
2.1.1.7 Block Valve for Spray Header (FD-43)	:	One No. / Unit

2.1.1.5 Each control valve shall be supplied with the accessories specified in the relevant data sheets at Section-D.

2.1.2 Desuperheater:

2.1.2.1 Direct mixing type desuperheater DESH-1	:	One No. / Unit
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2.1.2.2 The desuperheater shall be complete with pipe, spray nozzle along with necessary attachment as specified in section-D. Insertion type desuperheater suitable for mounting on owners pipe are not acceptable.

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3.0.0 SPECIFIC TECHNICAL REQUIREMENTS FOR CONTROL VALVES & ACCESSORIES:-

The requirements in this section are specific for this project and shall over-ride the specification under section-D in case of any contradiction.

- All the formats in Volume-III, SCHEDULE OF SUBMISSION OF DRG./DOC. and QUALITY PLAN (BHEL Format) should filled-up and furnished with the bid, complete in all respect. In the absence of those, the bid would be considered incomplete and liable for rejection.** Catalogue, Leaflets related with the models of Control Valves as well as each Accessory must be furnished with the offer.
- The Hook-up diagram for Control valve, attached in Section-C. the scope demarcation as indicated should be adhered. The connection details at Instrument Air valve shall be furnished to successful bidder after the award of contract.
- Valve Body Sizes shall be quoted to take care of the specification requirements like parameters, and limitations of Fluid outlet velocities, Noise Level etc. **However Port (Trim) Sizes shall be selected to suit CV requirement for achieving percentage valve lift as per Technical Specification.**
- Bidder to note that, **wherever downstream side of the valve is subjected to the Vacuum service, bidder to offer double Gland packing, and in that case, flow direction of working fluid shall be to close the valve.** Separate indication for the same has not been made in the data sheets-A.
- For valves subjected to cavitation service, anti-cavitation trim shall be provided.
- In case during erection/commissioning of the control valve, any spares are required which have not been specified in the Start-up/commissioning spares list, the same will have to be supplied by the bidder free of cost
- Facility to adjust the maximum travel of the stem & starting point of travel shall be incorporated.
- SS nameplate to control valve shall include Tag no./ KKS no./ Sl. No./ Body material/ size/ Press Rating/ Trim material/ Trim type/ action on air failure/ diaphragm air press at full open and close condition
- Hand wheel shall have open/ close direction.
- Limit switch shall be designed for 1,00,000 operations.
- JB shall be 36 ways as per enclosed hook-up diagram.
- The material of filter for Air Filter Regulator shall be Sintered bronze.

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

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

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

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

17. All local cabling upto JB's shall be in Conduit (Flexible/Rigid).

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

19. In order to interface with METSO system , the smart positioner of Control Valves has to be HART Compatible. Vendor to provide DTM(devise type manager) / DTD(device type description) files for engineering.

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

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

(A) Mandatory Spares:

The items listed in list of mandatory spares is indicated in Cl. 5.1.0 of section-C, of this specification, are the essential spares required to be offered by the bidder, and the price for which (Lump sum as well as individual) for each item to be quoted separately under the separate heading. The format for price schedule to be filled-up by the bidder is enclosed in Volume-III


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

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

(B) Recommended Spares:

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

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

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(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 (as minimum) is given in CI 5.0.0 (a). Bidder may include any additional Start-up and commissioning spares, if required.

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.

22. Documentation:

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


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

(B) After the award of contract:

The documentation as listed below for the project

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

- a. Assembly (dimensional) drawings.
- b. Valve Edge preparation details.
- c. Data sheet-C completely filled-up.
- d. Hook-up diagram of Control Valve with Actuator & Accessories.
- e. Valve & Actuator assembly dimensional drawings with weights.
- f. Quality Plan duly signed and stamped.
- g. All calculations like CV, Noise Level, Valve Outlet Velocity, Actuator sizing etc.

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<p>h. All relevant catalogues for the models of the valves as well as accessories finalised.</p> <p>i. Bar chart to indicate the time schedule for procurement, manufacture, testing and dispatch.</p> <p>(B) Final documentation:</p> <p>The documentation as listed below will separate for respective projects</p> <p>1. Category –I & IV Approved final drawings/data sheets, – 20 sets with 4 CD-ROMS Valve sizing calculations, Noise level calculations and Valve Outlet Velocity calculations.</p> <p>2. Test certificates – 20 sets.</p> <p>3. Operation & Maintenance Manuals – 20 sets with 4 CD-ROMS for Control Valve, Actuator and all the Accessories.</p>			



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23. Guidelines for Packing

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



The Following Details are to be marked on the Packing Cases

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

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4.0.0 SPARES, CONSUMABLE AND SPECIFIED TOOLS & TACKLES:

4.1.1 Commissioning Spares & Consumables

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

4.1.2 Recommended Spares

The bidder shall submit a list of recommended spares for all the above valves and desuperheaters for three years of normal operation. These are to be quoted separately & unit prices to be indicated, to enable placement of a separate order later if required.

4.1.3 Special Tools & Tackles

The bidder shall supply one complete set of special tools & tackles required for the erection, assembly, disassembly & maintenance of the equipment. A list of such tools & tackles to be supplied shall be submitted along with the bid.

4.1.4 Bidder to indicate the service life expectancy period for the spare parts under normal working conditions. The spares shall be treated and packed for long storage under climatic conditions prevailing at site. Small items shall be packed in sealed transparent plastic bags with desiccators' packs as necessary.

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

a) Stat-up & Commissioning spares:

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

LIST OF COMMISSIONING SPARES

S.No.	ITEM DESCRIPTION	QUANTITY REQUIRED (per unit)
1	Gaskets	One (1) set with each control valve Tag
2	Gland Packings	One (1) set with each control valve Tag
3	Cu Tubing	15 m. per Valve



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5.1.0 LIST OF MANDATORY SPARES FOR APRDS PACKAGE


Clause No.	LIST OF MANDATORY SPARES FOR SG & AUXILIARIES		एनटीपीसी NTPC	
1.22.00	Auxiliary Steam Pressure Reducing & Desuperheating System (1) High Capacity PRDS System (MS) 1.0 Desuperheater liners 1 Set* (1.1) Steam pressure reducing cum desuperheating valves (i) Stem 1 No. (ii) Disc 1 No. (iii) Body seat rings 2 Nos. for each type, size and rating of valves (iv) Gland packings 3 Nos. for each type, size and rating of valves (v) Pressure seal ring 3 Nos. (vi) Gasket 3 Nos. (1.2) Spray water line control valves (i) Valve trim including cage, plug, stem, seat rings, guide bushings, stem packing 1 No. for each size, type & rating of valves (2.0) Low Capacity PRDS System (CRH) (2.1) Steam pressure reducing valve (i) Stem 1 No. (ii) Disc 1 No. (iii) Body seat rings 2 Nos. for each type/size (iv) Gland packings 3 Nos. for each size, type & rating of valves (v) Pressure seal ring 3 Nos. (vi) Gaskets 3 Nos.			
SINGRAULI STPP STAGE-III (1x500 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION-VI PART - F	SUB-SECTION-F-1 LIST OF MANDATORY SPARES FOR SG & AUXILIARIES	PAGE 20 OF 42

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* One set means one complete replacement for an equipment.

Clause No.	LIST OF MANDATORY SPARES FOR SG & AUXILIARIES		
	(2.2) Spray water line control Valves		
	(i) Valve trim including cage, plug, stem, seat rings, guide bushings, steam packing	1 No. for each size, type & rating of valves	
Clause No.	LIST OF MANDATORY SPARES FOR SG & AUXILIARIES		
10.00.00	CONTROL VALVES, ACTUATORS & ACCESSORIES		
1	Pneumatic and electro-hydraulic actuator assembly	10% or 1 No. of each type, model and rating, whichever is more	
2	Position feed back transmitter	10% or 2 Nos. of each type, whichever is more.	
3	Valve trim (including cage, plug, stem, seat rings, guide bushings etc.)	1 Set for each type of control valve, whichever is more.	
4	Diaphragms, O' rings, seals etc. of all types, make etc.	100%	
5	Pneumatic air-filter/Regulator of each type, make, rating etc.	10% or 2 Nos. whichever is more	
6	Pressure Gauges of all types, make, rating etc.	10% or 2 Nos. of each type whichever is more.	
7	Solenoid valves	10% or 2 Nos. of each type whichever is more.	
8	Air lock relays	10% or 2 Nos. of each type whichever is more.	
9	Pneumatic relays	10% or 2 Nos. of each type whichever is more.	
10	Positioner unit	20% or 2 No. of each type whichever is more	

Note: Bidder shall offer mandatory spares as per above list. Quantity shall be reviewed based on the equipment size, type, rating, make etc. during detailed engineering.

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6.0.0 INFORMATION TO BE FURNISHED ALONGWITH THE OFFER BY THE BIDDER

The bidder shall submit four (04) sets of the following drawings and data along with the bid without which the offer will be deemed incomplete.

- 6.1.0. Calculations for valve sizing, actuator sizing, valve velocities and noise level.
- 6.2.0. Dimensioned outline drawing giving overall dimensions, material.
- 6.3.0. Duly filled technical data sheets 'B' for each control valve & desuperheater in the Proforma enclosed in volume III of this specification.
- 6.4.0. Hook-up diagram of control valves with actuator & accessories.
- 6.5.0. Reference list, Catalogue & Technical bulletins for various items being offered.
- 6.6.0. Any deviations from the specification / data sheet & reasons thereof.
- 6.7.0. Schedules as in Vol. III.
- 6.8.0. Quality Plan for the equipment offered in the format enclosed with this specification.
- 6.9.0. Field quality plan.
- 6.10.0. List of commissioning and recommended spares.
- 6.11.0. List of tools & tackles.
- 6.12.0. List of consumables / lubricants.


7.0.0 DRAWING

For general arrangement and terminal point details refer enclosed drawings nos. PE-DG-401-142-N101 in Volume II B Sec. D.


8.0.0 QUALITY PLAN



The bidder shall furnish quality plan along with the offer and the same shall be finalized before the issue of LOI. Detailed quality plan shall then be submitted by the successful tenderer after the placement of order for final approval by BHEL / its customer. BHEL / its customer shall indicate Customer Hold Points (CHP) in the approved quality plan beyond which work shall not proceed without the approval of BHEL / its customer.

The quality plans enclosed in volume-II-B 'D' of the specification are for bidder's guidance only and are not exhaustive. The bidder shall comply with these and other minimum requirements specified in the specification and shall furnish his own quality plan in BHEL/Customer formats in the event of order based on the guidance given as above for BHEL/Customer's approval.

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9.0.0 Customer Specification

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	<p>6. Recommended practice for sizing large lead storage batteries for generating stations & sub-stations - IEEE-485-1985.</p> <p>7. Printed Circuit Board - IPC TM 650, IEC 326C.</p> <p>8. General Requirements & tests for printed wiring boards, IS:7405 (Part-I) 1973.</p> <p>Control Valves</p> <p>1. Control valve sizing - Compressible & Incompressible fluids - ISA S 75.01-1985.</p> <p>2. Face to face dimensions of control valves - ANSI B 16.00 - 1973.</p> <p>3. ISA Hand Book of Control Valves - (ISBN : B: 1047-087664-234-2).</p> <p>4. Codes for pressure piping - ANSI B 31.1</p> <p>5. Control Valve leak class - ISA RP 39.6</p> <p>Process Connection & Piping</p> <p>1. Codes for pressure piping "power piping" - ANSI B 31.1.</p> <p>2. Seamless carbon steel pipe ASTM - A - 106.</p> <p>3. Forged & Rolled Alloy steel pipe flanges, forged fittings and valves and parts - ASTM - A - 182.</p> <p>4. Material for socket welded fittings - ASTM - A - 105.</p> <p>5. Seamless ferritic alloy steep pipe - ASTM - A - 335.</p> <p>6. Pipe fittings of wrought carbon steel and alloy steel - ASTM - A - 234.</p> <p>7. Composition bronze of ounce metal castings - ASTM - B - 62.</p> <p>8. Seamless Copper tube, bright annealed - ASTM - B - 168.</p> <p>9. Seamless copper tube - ASTM - B - 75.</p> <p>10. Dimension of fittings - ANSI - B - 16.11.</p> <p>11. Valves flanged and butt welding ends - ANSI - B - 16.34.</p> <p>Instrument Tubing</p> <p>1. Seamless carbon steel pipe - ASTM - A 106.</p> <p>2. Material of socketweld fittings - ASTM - A105.</p> <p>3. Dimensions of fittings - ANSI - B - 16.11.</p>	
SINGRAULI STPP STAGE-III (1X500 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION - VI PART-C
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	CLAUSE NO.	TECHNICAL REQUIREMENTS		
		CONTROL VALVES, ACTUATORS & ACCESSORIES		
	1.00.00	CONTROL VALVES, ACTUATORS & ACCESSORIES		
	1.01.00	General Requirements		
	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.		
	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.		
	1.01.03	For control valve such as pressure and temperature control valve for Aux PRDS applications, Separator Drain Control Valves etc., also refer to the corresponding mechanical section in addition to requirements stipulated in this subsection.		
	1.02.00	CONTROL VALVE SIZING & CONSTRUCTION		
	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.		
	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.		
	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 be provided. Detailed calculations to establish whether cavitation will occur or not for any given application shall be furnished.		
	1.02.04	Control valves for application such as SH Spray Control, RH spray Control, Heavy Oil Heating, pressurizing and Control system shall have permissible leakage rate as per leakage Class V. All other control valves shall have leakage rate as per leakage Class-IV.		
	1.02.05	The control valve induced noise shall be limited to 85 dBA at 1 meter from the valve surface under actual operating conditions. The noise abatement shall be achieved by valve body and trim design and not by use of silencers.		
		TECHNICAL SPECIFICATION SECTION - VI PART-B	CONTROL VALVES, ACTUATORS & ACCESSORIES	PAGE 2 OF 7



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2.00.00

VALVE CONSTRUCTION

2.01.00

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.

2.02.00

Valves with high lift cage guided plugs & quick-change trims shall be supplied.

2.03.00

Cast Iron valves are not acceptable.

2.04.00

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.

2.05.00

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.

2.06.00

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)

2.07.00

Valve characteristic shall match with the process characteristics.

2.08.00

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

2.09.00

Flanged valves shall be rated at no less then ANSI press class of 300 lbs.

3.00.00

VALVE MATERIALS

Sr. No.	Service	Body material	Trim Material
1	Non-corrosive, non-flashing and non-cavitation service except DM water	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 faced guide posts and bushings.
2.	Severe flashing/cavitation services	Alloy steel ASTM-A217 Gr. WC9	440 C
3.	Low flashing/cavitation on service	Alloy steel ASTM-A217 Gr. WC6	17-4 PH SS
4.	DM water service	316 SS	316 SS

NOTE Valve body rating shall meet the process pressure and temperature requirement as per ANSI B16.34.

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

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4.00.00	END PREPARATION Valve body ends shall be either butt welded/socket welded, flanged (Rubber lined for condensate service) or screwed as finalized during detailed engineering and as per 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.																		
5.00.00	VALVE ACTUATORS All control valves shall be furnished with pneumatic actuators except for pressure and temperature control valve for auxiliary PRDS application (electro-hydraulic / pneumatically operated) and separator drain control valve (electro-hydraulic type).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. 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. The travel time of the pneumatic actuators shall not exceed 10 seconds.																		
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 <table><tr><td rowspan="4">1</td><td rowspan="4">Electrical</td><td>a) Input Demand Signal</td><td>4-20 mA</td></tr><tr><td>b) Power Supply</td><td>Loop Powered from the output card of Control System.</td></tr><tr><td>c) HART Protocol</td><td>Compatibility for Remote Calibration & Diagnostics (Super-imposed HART signal on input Signal (4-20 mA))</td></tr><tr><td>d. Valve position sensing</td><td>Position sensing, 4-20 mA output signal to be provided for control system.</td></tr><tr><td rowspan="2">2</td><td rowspan="2">Environment</td><td>a) Operating temp.</td><td>(-)30 To 80 Deg. C</td></tr><tr><td>b) Humidity</td><td>0-95 %</td></tr></table>			1	Electrical	a) Input Demand Signal	4-20 mA	b) Power Supply	Loop Powered from the output card of Control System.	c) HART Protocol	Compatibility for Remote Calibration & Diagnostics (Super-imposed HART signal on input Signal (4-20 mA))	d. Valve position sensing	Position sensing, 4-20 mA output signal to be provided for control system.	2	Environment	a) Operating temp.	(-)30 To 80 Deg. C	b) Humidity	0-95 %
1	Electrical	a) Input Demand Signal	4-20 mA																
		b) Power Supply	Loop Powered from the output card of Control System.																
		c) HART Protocol	Compatibility for Remote Calibration & Diagnostics (Super-imposed HART signal on input Signal (4-20 mA))																
		d. Valve position sensing	Position sensing, 4-20 mA output signal to be provided for control system.																
2	Environment	a) Operating temp.	(-)30 To 80 Deg. C																
		b) Humidity	0-95 %																
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CLAUSE NO.	TECHNICAL REQUIREMENTS 		
		c) Protection class	IP-65 Minimum
3	Software for Configuration and Diagnostics	Software	Windows based software. Software shall meet the requirements for Configuration, Diagnostics, Calibration and Testing of the actuator.
		Diagnostic/Test features	Advanced diagnostic features like Stroke counter or Travel counter, Leakage in actuators, Valve Signature analysis, Step Response test, Valve friction /Jamming detection etc to be provided.
4	Test reports/ Certificates	Factory Valve Signature Tests Reports (Pr Vs Valve travel and Travel Vs I/P signal) are to be provided.	
		Test certificates as per Manufacture Standard/Relevant Standard are to be submitted.	
5	Configuration/ Calibration.	Remote & Local Calibration, Auto & Manual Calibration shall be possible.	
6	Operating Range	Full range/ Split range.	
7	Modes	Valve Action	Direct / Reverse Valve Action
		Flow Characterization	Possible to fit Valve Characteristic Curves- Linear , Equal percentage etc.
8	Fail Safe/Fail Freeze	Fail Safe/Fail Freeze feature is to be provided. (In case the fail freeze feature is not intrinsic to the positioner, Bidder shall achieve the same externally through solenoid valve connected in the pneumatic circuit).	
9	Pneumatic	Air capacity	Sufficient to handle the valves & actuators selected/ Boosters to be supplied, if required.
		Air pressure	To suit the air supply pressure/quality available.
		Process connection	¼" NPT
10	Performance	Characteristic deviation	<=0.5 % of span.
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CLAUSE NO.	TECHNICAL REQUIREMENTS			
			c) Protection class	IP-65 Minimum
	3	Software for Configuration and Diagnostics	Software	Windows based software. Software shall meet the requirements for Configuration, Diagnostics, Calibration and Testing of the actuator.
			Diagnostic/Test features	Advanced diagnostic features like Stroke counter or Travel counter, Leakage in actuators, Valve Signature analysis, Step Response test, Valve friction /Jamming detection etc to be provided.
	4	Test reports/ Certificates	Factory Valve Signature Tests Reports (Pr Vs Valve travel and Travel Vs I/P signal) are to be provided.	
			Test certificates as per Manufacture Standard/Relevant Standard are to be submitted.	
	5	Configuration/ Calibration.	Remote & Local Calibration, Auto & Manual Calibration shall be possible.	
	6	Operating Range	Full range/ Split range.	
	7	Modes	Valve Action	Direct / Reverse Valve Action
			Flow Characterization	Possible to fit Valve Characteristic Curves- Linear , Equal percentage etc.
	8	Fail Safe/Fail Freeze	Fail Safe/Fail Freeze feature is to be provided. (In case the fail freeze feature is not intrinsic to the positioner, Bidder shall achieve the same externally through solenoid valve connected in the pneumatic circuit).	
	9	Pneumatic	Air capacity	Sufficient to handle the valves & actuators selected/ Boosters to be supplied, if required.
			Air pressure	To suit the air supply pressure/quality available.
Process connection			¼" NPT	
10	Performance	Characteristic deviation	<=0.5 % of span.	
		TECHNICAL SPECIFICATION SECTION - VI PART-B	CONTROL VALVES, ACTUATORS & ACCESSORIES	PAGE 5 OF 7



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		Ambient temp effect	<=0.01 %/ deg C or better.
10	EMC & CE Compliance	Required to International Standard like EN/IEC.	EN50081-2 & EN50082 or equivalent.
11	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 (for quantity, refer Part-A: Contract quantities of the specification).
		Press Gauge Block	For supply & output pressures, Air Filter Regulator and other accessories shall be provided on as 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 actuators on as required basis

*** Note:**

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:



The following functionalities are achieved through industry standard softwares of the HART management system for electronic transmitters, temperature transmitters and analysers:

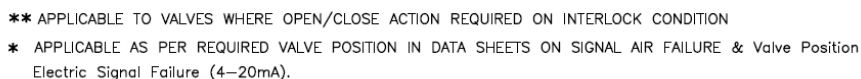
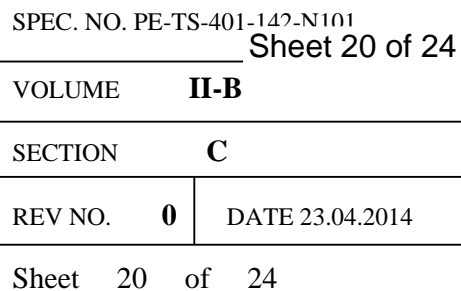
- Constant scanning to monitor faults or changes to instrument configuration.
- Employer-defined and standard calibration and configuration procedures for all transmitters.
- Constant signal data collection facilities to maintain continuously updated records.
- Automatic tracking of configuration changes 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.

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	8.00.00	<p>e) Event and log reports on screen as well as on printer.</p> <p>f) Any addition/deletion of transmitter will be reported on printer and logged in hard disk.</p> <p>Further, the positioners shall be monitored from the above described HART management system .To achieve this, Bidder shall provide the necessary software to achieve the functionalities described above under "Remote Configuration and Diagnostics", and this software shall be loaded in the Employer's HART management system.</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> <p>8.01.00 Non Destructive Test as per ANSI B-16.34.</p> <p>8.02.00 Hydrostatic shell test in accordance with ANSI B 16.34 prior to seat leakage test.</p> <p>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.</p> <p>8.04.00 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>8.05.00 CV Test: Please refer CI No. 1.00.00, Sub-section-IV:19 (Type test requirements), Control Valves.</p> <p>Bidder shall furnish all the control valves under this main plant package as finalized 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>		
		TECHNICAL SPECIFICATION SECTION - VI PART-B	CONTROL VALVES, ACTUATORS & ACCESSORIES	PAGE 7 OF 7





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DATA SHEET- A-1
SIZING DATA FOR AUXILIARY STEAM PRDS

SL. NO	PARAMETERS	CASE-I	CASE-II	CASE-III	CASE-IV	CASE-VIII	MECH. DESIGN
1.0	INLET PARAMETERS TO HC-PRV & DSH (Combined) (AS-22)						
1.1	PRESSURE (Kg/Cm²a)	41	85	65	95	65	189.5
1.2	TEMP. (°C)	340	465	350	488	350	545
2.0	OUTLET PARAMETERS TO HC-PRV & DSH (Combined) (AS-22)						
2.1	PRESSURE (Kg/Cm²a)	18	18	18	18	18	23
2.2	TEMP. (°C)	320*	320	320*	320	320*	350
2.3	FLOW (T/HR)	81.28	90.53	62.31	41.76	101.25	-
3.0	INLET OF COMMON BLOCK SPRAY CONTROL VALVE (FD-43)						
3.1	PRESSURE (Kg/Cm²a)	~80	100-120	100-120	100-120	100-120	321
3.2	TEMP. (°C)	140	140	140	140	140	185
3.3	FLOW (T/HR)	Bidder to calculate					
4.0	SPRAY WATER PRESSURE CONTROL VALVE (FD-30 / 44)						
4.1	PARAMETERS (PRESSURE/ TEMPERATURE / FLOW) SHALL BE CALCULATED BY BIDDER						
5.0	SPRAY WATER TEMPERATURE CONTROL VALVE (FD-28 / 31)						
5.1	PARAMETERS (PRESSURE/ TEMPERATURE / FLOW) SHALL BE CALCULATED BY BIDDER						

NOTE:

1. High capacity PRDS is combined type Pressure Reducing and Desuperheating Valve.
2. Each spray control station shall have two valves: one pressure control valve (FD-30 / FD-44) and one temp. Control valve (FD-28 / FD-31).
3. Pressure downstream of pressure control valve (shall be ~80 kg/cm²(a) & spray control system shall be sized accordingly
4. Case-I is the capability check point for AS-22. Case-II is the capability check point for Spray Water control valves.
5. High capacity steam pressure reducing valve (AS-22) min. flow at 10% valve lift shall correspond to the passing capability of low capacity steam pressure reducing valve (AS-26) at 95% valve list (refer datasheet A-2).

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<p>6. Valve shall be capable to pass min. 110 TPH flow at 123.53kg/cm2(a) pressure and 537 Deg C temperature.</p> <p>7. Pressure D/S of AS-22 may be selected considering pressure drop in DESH-1, such that pressure D/S of DESH-1 is 18 kg/cm2(a).</p> <p>* If Desuperheater outlet temperature is less than 320 Deg C (without spray), same is to be indicated by the bidder.</p>				



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DATA SHEET- A-2
SIZING DATA FOR AUXILIARY STEAM PRDS (PRV (AS-26))

<u>S.NO</u>	<u>PARAMETERS</u>	<u>CASE-V</u> <u>(A)</u>	<u>CASE-V</u> <u>(B)</u>	<u>CASE-V</u> <u>(C)</u>	<u>CASE-VI</u>	<u>CASE-VII</u> <u>(A)</u>	<u>CASE-VII</u> <u>(B)</u>	<u>MECH.</u> <u>DESIGN</u>
1.0	INLET PARAMETERS OF PRV (AS-26)							
1.1	PRESSURE (Kg/Cm ² a)	18	18	44.89	44.89	18	18	55.0
1.2	TEMP. (°C)	305	338	336.3	336.3	305	338	360
2.0	OUTLET PARAMETERS OF PRV (AS-26)							
2.1	PRESSURE (Kg/Cm ² a)	16	16	18	18	16	16	23
2.2	FLOW (T/HR)	1.70	1.66	1.70	29.1	5.80	5.76	-

NOTE:

1. Case-VI is the capability check point for pressure reducing valve.
2. Valve selected shall be suitable for passing 47.6 tph at 45 kg/cm²(a) pressure and 337 Deg C temperature.
3. High capacity steam pressure reducing valve (AS-22) min. flow at 10% valve lift shall correspond to the passing capability of low capacity steam pressure reducing valve (AS-26) at 95% valve list (refer datasheet A-1).
4. Pressure D/S of AS-26 may be selected considering pressure drop in DESH-1, such that pressure D/S of DESH-1 is 18 kg/cm²(a). (except for case-V(A), V(B) and VII(A), VII(B))



TITLE

SPECIFIC TECHNICAL REQUIREMENTS

**AUXILIARY STEAM PRESSURE REDUCING
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DATA SHEET- A-3
SIZING DATA FOR AUXILIARY STEAM PRDS ((DESH-1) & SPRAY CONTROL
VALVES (FD-35 & 46 / FD-38 & 47)

Sl. No.	PARAMETERS	CASE -I	CASE- II	CASE- IV (A)	CASE- IV (B)	CASE- V (A)	CASE- V (B)	CASE- VII(A)	CASE- VII(B)	CASE- VIII	MECH. DESIGN
1.0	PARAMETERS AT DESUPERHEATER INLET (DESH-1)										
1.1	PRESSURE (Kg/Cm²a)	18	18	18	18	16	16	16	16	18	23
1.2	TEMP. (°C)	316.6	320	301.8	320	305	338	305	338	301.8	350
1.3	FLOW (T/HR)	Bidder to calculate									
2.0		PARAMETERS AT DESUPERHEATER OUTLET (DESH-1)									
2.1	PRESSURE (Kg/Cm²a)	18	18	18	18	16	16	16	16	18	18
2.2	TEMP. (°C)	240	240	240	240	240	240	240	240	240	270
2.2	FLOW (T/HR)	67.60	67.60	35.90	35.90	1.50	1.50	5.90	5.90	77.90	-
3.0	COMMON BLOCK SPRAY CONTROL VALVE (FD-43)										
3.1	PRESSURE (Kg/Cm²a)	~80	~80	100-120	100-120	100-120	100-120	100-120	210	100-120	321
3.2	TEMP. (°C)	140	140	140	140	140	140	140	165	140	185
3.3	FLOW (T/HR)	Bidder to calculate									
4.0	SPRAY WATER PRESSURE CONTROL VALVE (FD-35 / 38)										
4.1	PARAMETERS (PRESSURE/ TEMERATURE / FLOW) SHALL BE CALCULATED BY BIDDER										
5.0	SPRAY WATER TEMPERATURE CONTROL VALVE (FD-46 / 47)										
5.1	PARAMETERS (PRESSURE/ TEMERATURE / FLOW) SHALL BE CALCULATED BY BIDDER										

NOTE:

1. Vendor to ensure the D/S pressure of DESH-1 shall be 18 Kg/ Cm² (except for case-V and VII)
2. Each spray control station shall have two valves: one pressure control valve (FD-35 / FD-38) and one temp. Control valve (FD-46 / FD-47).
3. Pressure downstream of pressure control valve (shall be ~80 kg/cm²(a) & spray control system shall be sized accordingly
4. For Case-V & VII, DESH-1 inlet & outlet is based on outlet pressure of AS-26.



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SECTION – D

EQUIPMENT SPECIFICATIONS



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SECTION – D

EQUIPMENT SPECIFICATIONS

FOR

CONTROL VALVE WITH PNEUMATIC ACTUATOR

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1.0

SCOPE

This specification covers the Design, Manufacture, Inspection and Testing at the manufacturer's works, proper packing for transportation and delivery to site of Control valve (with Pneumatic/Electric Actuator) for use in Utility/Captive Power Station/Combined Cycle Station.

2.0

CODES AND STANDARDS

2.1

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

2.2

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

2.3

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

Indian Boiler Regulation (IBR)

Allowable Seat leakage

Pressure & Temperature ratings

Enclosure class

Control Valves

Electric Motor operated Actuators

:

:

:

:

:

:

ANSI-B16.104 / FCI-70.2

ANSI-B16.34

IEC-144 / NEMA / IS-13947

ISA S-75

IS-9334

3.0

TECHNICAL REQUIREMENTS

The Control valve, Actuator and the accessories shall be suitable for continuous operation under an ambient temperature of 0-55°C and Relative Humidity of 0-95% unless specified otherwise in volume IIB Section-B or Section-C.

3.1

Control Valve

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

3.1.1

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

3.1.2


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


3.1.3

The valve bonnet and packing shall be suitable for the service conditions as in Data Sheet-A. Gland sealed type bonnets are not acceptable. Double packing is mandatory for applications involving vacuum service. Bonnets having teflon packing shall have valve stem finished to 2-4 microns. Packing material requiring lubrication will not be acceptable. Justification for proper selection of bonnet & packing shall be furnished in the bid.

3.1.4

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

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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.			
3.1.6	The valve body shall have the direction of flow embossed on all valves.			
3.1.7	The sizing shall conform to the requirements of ANSI/ISA(S75- 01), and the valve capacity shall be selected so as to meet the following:			
	Valve with Linear characteristic.	-	Normal Flow (Design Point) : 70-75% valve lift. Max. Flow : 90% valve lift. Min. Flow : >10% valve lift.	
	Valve with Equipercentage Characteristic	-	Normal Flow (Design Point) : 75-85% valve lift. Max. Flow : 90% valve lift. Min. Flow : >10% valve lift.	
	ON/OFF Quick open Characteristic	-	1.1 times the CV calculated on the basis of maximum flow condition.	
3.1.8	Calculation for valve sizing, velocity and noise shall be subject to purchaser's approval during contract stage. However responsibility of proper selection and design for the duties specified lies with the vendor. Any modifications required to be done on the valves or actuators & accessories to achieve satisfactory performance of the control system shall be done without any commercial implication.			
3.1.9	Suitable justification and evidence shall be furnished regarding proper selection of the valve.			
3.1.10	The valve outlet velocities shall be limited to the following values, unless otherwise specified in the Data sheet-A.			
	i)	Liquid service	<= 7 Metres/Sec.	
	ii)	Steam service	<= 1/3 Sonic velocity in the flow medium.	
3.1.11	For flashing duty, the trim design shall be such that the vapour bubbles are kept away from valve body.			
3.1.12	For cavitation service, the trim design shall be of multistage pressure drop type, so as to avoid cavitation altogether, instead of keeping cavitation away from valve parts.			
3.1.13	In case of predicted noise level above 85 dBA, suitable low noise trim or inbuilt diffusers shall be provided to bring down the noise level below 85dBA.			
3.1.14	The equivalent weighted sound level measured at 1.5M. above floor level in elevation and one metre horizontally from the control valve expressed in decibels to a reference of 0.0002 microbar shall not exceed 85 dBA (without pipe insulation). The offer shall include noise prediction calculations for each valve.			
3.1.15	In case of wrong selection/mal operation of valve and for associated actuator during guarantee period, the vendor shall replace the valve suitably with a modified/new valve of design as approved by purchaser and all the expenses for replacement, rectification/modification including transportation both ways will be at vendor's expenses.			

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3.2

Pneumatic Actuator

The pneumatic actuators shall be employed for modulating or open/close duty, as specified in Data Sheet-A. The bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drops and shut off pressure.

3.2.1

The pneumatic spring opposed diaphragm actuator for modulating duty s hall 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 s hall be suitable for fa st 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.


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,


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<p>5 micron size filter. The design pressure for regulator shall be 7 Kg/cm2g. The Air filter regulator shall be selected to meet the requirements of positioner/actuator, E/P convertor and air-lock. The flow capacity of the Air filter regulator shall be variable with a knob. Output gauge shall be provided wherever pneumatic positioner is not specified for the valve.</p>				
3.3.5	<p>Air Lock Relay</p> <p>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.</p>			
3.3.6	<p>Solenoid Valves</p> <p>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.</p>			
3.3.7	<p>Limit Switches</p> <p>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.</p>			
3.3.8	<p>I/P Converter</p> <p>I/P Converters shall preferably be of force balance type and shall produce pneumatic output signal corresponding to input current signal, also specified in Data Sheet. Converter electronics shall be protected against reverse connection of signal polarities and a separate external connection shall be provided to facilitate grounding of instrument casing. Cable glands with neoprene gromets suitable for PVC cables shall be provided. I/P convertor shall have span adjustment facility. I/P convertor enclosure shall conform to IP-55 enclosure class.</p>			
3.3.9	<p>Positioner</p> <p>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</p>			
3.3.10	<p>Electro pneumatic Positioner</p> <p>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.</p>			
3.3.11	<p>Junction Box</p>			


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Wherever specified, an integral junction box with all electrical accessories conduited up to JB shall be supplied. The junction box shall have two (2) cable glands for outgoing cables. Junction box shall have enclosure class of IP-55.				
3.4	Guarantee & Performance			
3.4.1	The overall performance of the control valve with pneumatic actuator assembly shall be as follows:-			
	i) Hysteresis	:	± 1% of span	
	ii) Linearity	:	± 2% of span	
	iii) Sensitivity	:	± 0.5% of span.	
	iv) Repeatability	:	± 1% of span	
	v) Accuracy (Overall)	:	± 2% of span	
3.4.2	The guarantee for the control valve, pneumatic actuator & accessories shall be for 12 months continuous operation from the date of commissioning, unless specified otherwise in VOL-II B Section-B or Section-C.			
3.5	Electric Actuator			
	The electric actuator shall be employed for modulating duty.			
3.5.1	The actuator assembly shall be complete with drive motors, gears, hand wheel, signaling & switching units, associated control, integral starter, (when specified) and other accessories as required.			
3.5.2	The Electric Actuator shall be capable of positioning the associated valve at the desired opening for all the operating conditions.			
3.5.3	The motor shall meet the requirements of Current, torque, Axial thrust, Accelerating & stall time as imposed by the driven equipment.			
3.5.4	The motor shall be suitable for direct on line starting.			
3.5.5	Motors shall be suitable for inching & plugging duty operations.			
3.5.6	The motors shall be capable of starting and accelerating to rated speed at 85% of rated voltage.			
3.5.7	The motors shall be rated for continuous operations for modulating duty.			
3.5.8	The motor shall operate satisfactorily under the following conditions:			
	i)	±10% supply voltage variation at rated frequency.		
	ii)	-5% to + 3% variation in frequency at rated supply voltage.		
	iii)	Simultaneous variation in voltage and frequency, the sum of absolute percentage not exceeding 10%.		
3.5.9	The Actuator shall be suitable for mounting directly on the valve and shall be suitable for mounting in any position. Supports required for inclined mounting shall form part of supply of valve assembly.			

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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.		
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.		

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

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change of 0- 100%. The position transmitters of both type s 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 mm ² 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 a nd torque switches, space heater, position transmitters, thermostat/thermister shall be brought to a common terminal box. The enclosure shall be to degree of protection IP-65.		
	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.		
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.		

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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 <ul style="list-style-type: none">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 <ul style="list-style-type: none">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 <ul style="list-style-type: none">i) Functional tests of control valve operation along with actuator & accessories.ii) Dimension checks.			
4.3.5	Type tests or Test Reports <ul style="list-style-type: none">i) Valve lift vs. Flow test (Cv Test)ii) Degree of protection tests for the enclosuresii) Temperature rise test (applicable for Electrical Actuator only).iii) Type test for motor as per IS: 325.			
4.4	Inspection will be conducted by BHEL and/or their authorised representatives as per the agreed inspection schedule. The inspection schedule will be submitted by the bidder, for BHEL's approval at contract stage. The cost of all tests and inspections will be deemed to have been included in the bid. For all the type tests covered under 4.3.5 above, "Type Test Certificates" as per agreed Quality Plan shall be furnished. In the absence of the same, such Type Tests shall be arranged at the Vendor's works in the presence of BHEL and/or their authorised representatives or in independent Test House/Laboratory approved by BHEL.			
4.5	The Standard QP is included in this specification to enable bidder to understand the extent of inspection and testing requirements to execute this job. The successful bidder has to follow the agreed QP, taking care of customer requirements mentioned in Sec-C and submit QP for final approval by BHEL / Customer.			

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5.0

SPARES AND CONSUMABLES

5.1

Commissioning Spares and consumables

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

5.2

Mandatory Spares

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

5.3

Recommended Spares

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

5.4

Special Tools & Tackles

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

6.0

DRAWINGS AND DOCUMENTS

6.1

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

6.1.1

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

6.1.2

Wiring diagrams for Electrical Actuators.

6.1.3

Hook up diagrams of Control Valve with Actuator & accessories.

6.1.4

Valve & actuator assembly dimensional drawings with weights.

6.1.5

Quality Plan

6.1.6

All relevant Catalogs with detailed technical information.

6.1.7

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

6.2

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

6.2.1


For approval

i)

Dimensional drawings.

ii)

Installation drawings with overall dimensions of the completed equipment and clearances for operation and maintenance.

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<p>iii) Data sheet-C, completely filled-up along with all the enclosures including the sizing calculations & noise calculations.</p> <p>iv) Quality Plan.</p> <p>v) Test Certificates.</p> <p>6.2.2 Final / As-built Drawings</p> <p>Final / As-built drawings / CDs in required number of copies shall be submitted.</p> <p>6.3 Operation & Maintenance Manuals</p> <p>O&M Manuals in required number of copies shall be submitted. O&M manuals shall also contain storage and commissioning instructions.</p> <p>7.0 MARKING AND PACKING</p> <p>7.1 Marking</p> <p>A stainless steel metal nameplate should be permanently fixed on each equipment giving its tag number and technical specifications.</p> <p>7.2 Packing</p> <p>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.</p> <p>8.0 APPLICABLE DATA SHEET FORMS</p> <p>This document shall be read with one or more of the following data sheet forms :</p> <table><tr><td>- Data sheet A&B for Control Valve with Pneumatic Actuator :</td><td>Data sheet no. PES-145-06-DS1-1</td></tr><tr><td>- Data sheet C for Control Valve with Pneumatic Actuator :</td><td>Data sheet no. PES-145-06-DS2-1</td></tr><tr><td>- Data sheet A&B for Control Valve with Electric Actuator :</td><td>Data sheet no. PES-145-06-DS3-1</td></tr><tr><td>- Data sheet C for Control Valve with Electric Actuator :</td><td>Data sheet no. PES-145-06-DS4-1</td></tr></table>				- 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
- 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										



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SPECIFIC TECHNICAL REQUIREMENTS**AUXILIARY STEAM PRESSURE REDUCING
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SPECIFICATION FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER (SMART)**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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5.0 Hardware :

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

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

6.0 Valve Action :

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

7.0 Flow Characterization :

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

8.0 Performance:

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

9.0 Test Certificates:

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

10.0 EMC & CE compliance

International Standard Like EN/IEC.

To EN 50081-2 & EN 50082 or equivalent



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11.0 Accessories

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



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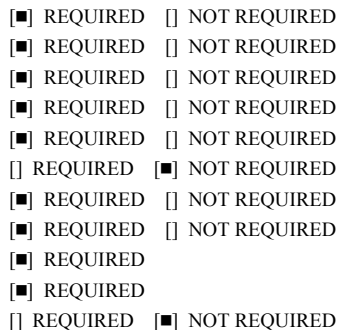
VOLUME **II-B**

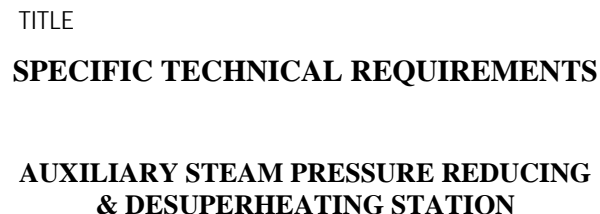
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**DATA SHEETS- A&B
FOR CONTROL VALVES**



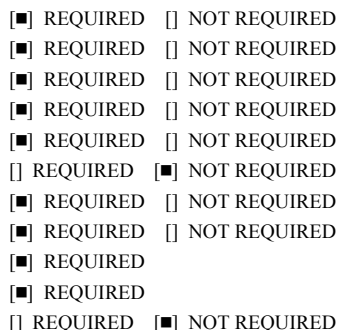


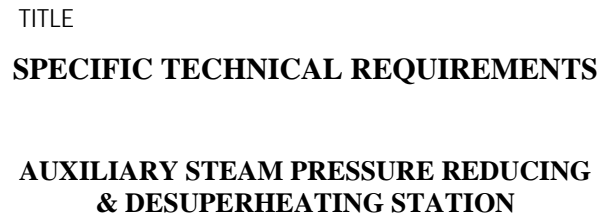
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Date Sheet No. PES-145-06-DS1-0

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
	Refer Sizing Data Sheet A-1 for Aux. Steam PRDS								
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 188.5 * BODY DESIGN : PRESS (KG/CM2g) TEMP (DEG C) 188.5 545 * IBR FORM III-C <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED							
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								





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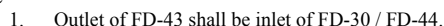
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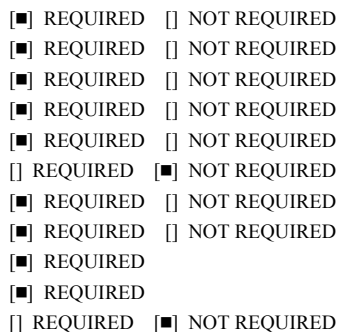
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Date Sheet No. PES-145-06-DS1-0

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)	1x500 MW FGUTPP-IV STPP PRESS. CONTROL SPRAY VALVES - HCPRDS <input type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 60.3 x 11.07 | 60.3 x 11.07 SA 106 GrC | SA 106 GrC	
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	<input checked="" type="checkbox"/> GLOBE <input type="checkbox"/> ANGLE <input type="checkbox"/> TOP <input checked="" type="checkbox"/> CAGE | ONE <input checked="" type="checkbox"/> BWE <input type="checkbox"/> SWE <input type="checkbox"/> FLANGED <input type="checkbox"/> A216 WCB <input checked="" type="checkbox"/> A217 WC6 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS <input type="checkbox"/> A351 CF8M <input type="checkbox"/> PTFE <input checked="" type="checkbox"/> GRAFOIL <input type="checkbox"/> DOUBLE <input checked="" type="checkbox"/> SINGLE <input type="checkbox"/> STD <input type="checkbox"/> EXTENDED <input type="checkbox"/> FINNED <input 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 checked="" type="checkbox"/> MAC NO. < 1/3(STM) <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input checked="" type="checkbox"/> V <input type="checkbox"/> VI LESS THAN 85 dBA <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN *VALVE POSN. ON SIGNAL AIR FAILURE *VALVE POSN. ON SUPPLY AIR FAILURE	 <input type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input checked="" type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT	
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR 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 type="checkbox"/> REQUIRED <input checked="" 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 checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED	







TITLE
SPECIFIC TECHNICAL REQUIREMENTS

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Tag No.FD-28/31...

Qty.: ...2 per Unit ...

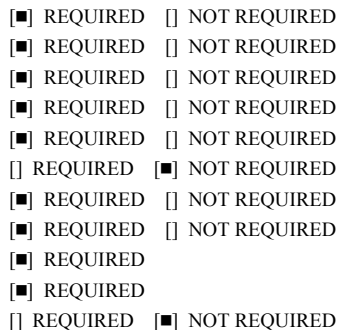
Date Sheet No. PES-145-06-DS1-0

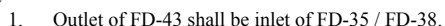
DATA SHEET – A & B

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			± 1%			.....	
	HYSTERESIS			± 1%			.....	
	SENSITIVITY			± 0.5%			.....	
	ACCURACY (OVERALL)			± 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
	Refer Sizing Data Sheet A-1 for Aux. Steam PRDS								
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP		
	* MAX SHUT OFF PRESS (KG/CM2g) 320.0						.....	
	* BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 320 | 185						.....|.....	
* IBR FORM III-C <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED						.....		
TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								.....


Note -

1. Outlet of FD-30 / FD-44 shall be inlet of FD-28 / FD-31.







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)	1x500 MW FGUTPP-IV STPP TEMP. CONTROL SPRAY VALVES - LCPRDS <input type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input type="checkbox"/> ON/OFF <input checked="" type="checkbox"/> MODULATING 60.3 x 11.07 | 60.3 x 11.07 SA 106 GrC SA 106 GrC	
BODY*	MODEL NO. TYPE OF BODY: GUIDING : NO. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING: MATERIAL SINGLE / DOUBLE BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT | PLUG : CAGE | GUIDE BUSH FLOW OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) (spec. 3.1.14) VACUUM SERVICE ANTI CAVITATION TRIM	<input type="checkbox"/> GLOBE <input type="checkbox"/> ANGLE <input type="checkbox"/> TOP <input checked="" type="checkbox"/> CAGE | ONE <input checked="" type="checkbox"/> BWE <input type="checkbox"/> SWE <input type="checkbox"/> FLANGED <input type="checkbox"/> A216 WCB <input checked="" type="checkbox"/> A217 WC6 <input type="checkbox"/> SS <input type="checkbox"/> A217 CS <input type="checkbox"/> A351 CF8M <input type="checkbox"/> PTFE <input checked="" type="checkbox"/> GRAFOIL <input type="checkbox"/> DOUBLE <input checked="" type="checkbox"/> SINGLE <input type="checkbox"/> STD <input type="checkbox"/> EXTENDED <input type="checkbox"/> FINNED <input 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 checked="" type="checkbox"/> MAC NO. < 1/3(STM) <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input checked="" type="checkbox"/> V <input type="checkbox"/> VI LESS THAN 85 dBA <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE CLOSE AT : OPEN AT (KG/CM2g) *TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN *VALVE POSN. ON SIGNAL AIR FAILURE *VALVE POSN. ON SUPPLY AIR FAILURE	 <input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT	
ACCESSORIES	POSITIONER (SMART) AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR 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 <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 checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED	

	TITLE SPECIFIC TECHNICAL REQUIREMENTS AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION					SPEC. NO. PE-TS-401-142-N101				
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						SECTION D				
						REV NO. 0		DATE 23.04.2014		
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Tag No.FD-46/47... Qty.: ...2 per Unit ... Date Sheet No. PES-145-06-DS1-0										
<u>DATA SHEET – A & B</u>										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY				± 1%		.....		
	HYSTERESIS				± 1%		.....		
	SENSITIVITY				± 0.5%		.....		
	ACCURACY (OVERALL)				± 2%		.....		
SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY	
	Refer Sizing Data Sheet A-3 for Aux. Steam PRDS									
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP			
	* MAX SHUT OFF PRESS (KG/CM2g) 320.0 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 320 | 185 * IBR FORM III-C <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED						..... .....|..... .....		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg								
Note - 1. Outlet of FD-35 / FD-38 shall be inlet of FD-46 / FD-47.										

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Tag No.FD-43.... 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	1x500 MW FGUTPP-IV STPP		.....
	SERVICE	BLOCK VALVES FOR APRDS SPRAY LINE		.....
	LOCATION	<input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR		.....
	DUTY	<input checked="" type="checkbox"/> ON/OFF <input type="checkbox"/> MODULATING		.....
	PIPE SIZE (inlet / outlet)	60.3 x 11.07 | 60.3 x 11.07		.....
	PIPE MATERIAL (inlet / outlet)	SA 106 GrC | SA 106 GrC		.....
BODY*	MODEL NO.	<input checked="" type="checkbox"/> GLOBE <input type="checkbox"/> ANGLE <input type="checkbox"/> TOP <input checked="" type="checkbox"/> CAGE | ONE		.....
	TYPE OF BODY: GUIDING : NO. OF PORTS			.....
	BODY SIZE: PORT SIZE: DESIGN CV			.....
	END CONNECTION & RATING (ANSI)	<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		.....
	BODY MATERIAL	<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 type="checkbox"/> LINEAR <input type="checkbox"/> EQ. PERCENTAGE <input checked="" type="checkbox"/> QUICK OPEN (ON/OFF)		.....
	PACKING: MATERIAL SINGLE / DOUBLE	SS 316 STELLITED | SS 316 STELLITED		.....
	BONNET TYPE	SS 316 STELLITED | SS 316 STELLITED		.....
	TRIM FORM			.....
	TRIM MATERIAL: SEAT | PLUG			.....
	: CAGE | GUIDE BUSH			.....
	FLOW	<input type="checkbox"/> BELOW SEAT <input type="checkbox"/> ABOVE SEAT <input type="checkbox"/> < 7 M/SEC(WATER) <input checked="" type="checkbox"/> MAC NO. < 1/3(STM) <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input checked="" type="checkbox"/> V <input type="checkbox"/> VI LESS THAN 85 dBA <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		.....
	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/CM2g)	|		.....
	*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN	<input checked="" type="checkbox"/> TO OPEN <input type="checkbox"/> STAYPUT <input type="checkbox"/> TO CLOSE <input checked="" type="checkbox"/> STAYPUT		.....
	*VALVE POSN. ON SIGNAL AIR FAILURE *VALVE POSN. ON SUPPLY AIR FAILURE			.....
ACCESSORIES	POSITIONER (SMART)	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	AIR FILTER REGULATOR	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	AIR LOCK RELAY	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	POSITION LIMIT SWITCH	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	POSITION TRANSMITTER	<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	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		.....
	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		.....

	TITLE SPECIFIC TECHNICAL REQUIREMENTS AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION						SPEC. NO. PE-TS-401-142-N101			
							VOLUME II-B			
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							Sheet 31 of 50			
Tag No.FD-43... Qty.: ...1 per Unit ... Date Sheet No. PES-145-06-DS1-0										
<u>DATA SHEET – A & B</u>										
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)								DATA SHEET – B (TO BE FILLED UP BY BIDDER)		
PERFORMANCE OF VALVE	LINEARITY				± 1%		.....		
	HYSTERESIS				± 1%		.....		
	SENSITIVITY				± 0.5%		.....		
	ACCURACY (OVERALL)				± 2%		.....		
SERVICE CONDITION*	SL. No. +	LOAD	FLOW (T/HR)	INLET PR. KG/CM2(A)	OUTLET PR. KG/CM2(A)	TEMP DEG (C)	CALC ULATED CV	% VLV LIFT	VLV O/L VELOCITY	
	Refer Sizing Data Sheet A-1 and A-3 for Aux. Steam PRDS									
	VALVE TYPE						<input type="checkbox"/> CAVITATION <input type="checkbox"/> FLASHING <input checked="" type="checkbox"/> HIGH DP			
	* MAX SHUT OFF PRESS (KG/CM2g) 320.0 * BODY DESIGN : PRESS (KG/CM2g) | TEMP (DEG C) 320 | 185 * IBR FORM III-C <input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED						..... .....|..... .....		
	TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) Kg						.....		
Note - 1. Flow FD-43 shall be based on total flow requirement for HCPRDS and LCPRDS together. 2. Outlet of FD-43 shall be inlet of FD-30 / FD-44 (for HCPRDS) and FD-35 / FD-38 (for LCPRDS).										

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Tag No..... Quantity.....				Data Sheet No. PES-145-06-DS1-1			
APPLICABLE FOR TAG Nos.WHEREVER STATEMENT “REQUIRED” INDICATED IN THE INDIVIDUAL CV DATA SHEETS							
DATA SHEET – A & B for ACCESSORIES							
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY PURCHASER)						DATA SHEET – B (TO BE FILLED-UP BY BIDDER)	
POSITIONER (SMART) WITH HART PROTOCOL	MFR. & MODEL NUMBER			Bidder To Specify			
	BYPASS	GAUGES	ENCL. CLASS	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<input type="checkbox"/> THREE <input checked="" type="checkbox"/> TWO	<input checked="" type="checkbox"/> IP-65	
	INPUT SIGNAL (Kg / Cm ²)			<input checked="" type="checkbox"/> 0.2 – 1.0 <input type="checkbox"/> 0.2 – 0.6 <input type="checkbox"/> 0.6 – 1.0			
	OUTPUT SIGNAL (Kg / Cm ²)			TO SUIT ACTUATOR			
AIR FILTER REGULATOR TWO (2) Nos. PER CV	MFR. & MODEL NUMBER			Bidder To Specify			
	AIR SUPPLY PRESS (Kg / Cm ² g)			<input checked="" type="checkbox"/> 7.0			
	OUTPUT PRESS (Kg / Cm ² g)			TO SUIT ACTUATOR			
	FILTER SIZE			5 MICRON			
OUTPUT GAUGE			<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED				
AIR LOCK	MFR. & MODEL NUMBER			Bidder To Specify			
	SET PRESS (Kg / Cm ²)			Bidder To Specify			
	SUPPLY PRESS (Kg / Cm ²)			<input checked="" type="checkbox"/> 7.0			
	RESET TYPE			AUTO			
	VENT PLUG			REQUIRED			
	ENCLOSURE CLASS			<input checked="" type="checkbox"/> IP 65			
LIMIT SWITCH	MFR. & MODEL NUMBER			Bidder To Specify			
	OPEN posn	INT posn	CLOSE posn	1 NO.	---	1 NO.	
	CONTACT TYPE			SPDT 2 NO + 2 NC			
	RATING (AC / DC)			5A 240V AC AND 0.2A 220V DC			
	ENCLOSURE CLASS			<input checked="" type="checkbox"/> IP 55 <input type="checkbox"/>			
POSITION TRANSMITTER (PART OF POSITIONER)	MFR. & MODEL NUMBER			PART OF POSITIONER			
	TYPE						
	SUPPLY						
	OUTPUT RATING						
	ACCURACY						
	ENCLOSURE CLASS						
SOLENOID VALVE	MFR. & MODEL NUMBER			Bidder To Specify			
	RATING			<input checked="" type="checkbox"/> 24V DC <input type="checkbox"/> 220V DC <input type="checkbox"/> 240V AC <input type="checkbox"/>			
	TYPE			3-WAY (UNIVERSAL OPERATION TYPE)			
	OPERATION	QUANTITY		<input type="checkbox"/> Stayput <input checked="" type="checkbox"/> Interlock		<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	
	COIL INSULATION CLASS			CLASS - H			
	ENCLOSURE CLASS			<input checked="" type="checkbox"/> IP 65			
HANDWHEEL	ORIENTATION			<input type="checkbox"/> TOP MOUNTED <input checked="" type="checkbox"/> SIDE MOUNTED			
JUNCTION BOX	NO. OF WAYS			<input type="checkbox"/> 24-WAYS <input type="checkbox"/> AS REQUIRED <input checked="" type="checkbox"/> 36-Ways			
	SIZE			AS REQUIRED			
	CABLE GLANDS (Size / Quantity)			AS REQUIRED (Double Compression Type).			
	ENCLOSURE CLASS			<input checked="" type="checkbox"/> IP 65			
I/P CONVERTER (PART OF POSITIONER)	INPUT SIGNAL		POWER SUPPLY		PART OF POSITIONER		
	SPLIT RANGE						
	ENCLOSURE CLASS						
	LINEARITY						
	HYSTERESIS						
Cu. Tubing & Fittings / per CV	This is in addition to cu. Tubing and fittings which are integral part of CV			15 Meters of ¼" 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	SIGNATURE
						NAME	DATE



TITLE

SPECIFIC TECHNICAL REQUIREMENTS

**AUXILIARY STEAM PRESSURE REDUCING
& DESUPERHEATING STATION**

SPEC. NO. PE-TS-401-142-N101

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SECTION – D

**EQUIPMENT SPECIFICATIONS
FOR
STEAM DESUPERHEATER**

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1.0.0 GENERAL

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

2.0.0 CODES AND STANDARDS

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

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

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


3.0.0 DESIGN AND CONSTRUCTIONAL FEATURES

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

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


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

3.4.0 The material of construction shall be as indicated in Data Sheet – A-4.

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4.0.0 SHOP INSPECTION AND TEST

- 4.1.0 The bidder shall submit along with the offer the Quality Plans in the enclosed format together with all reference documents/standards etc. as applicable.
- 4.2.0 Indicative Quality Plans, specifying minimum checks and tests as considered necessary are enclosed along with this specification for compliance. These however are not intended to exhibit the total comprehensive testing programmes, which are the responsibility of the bidder.
- 4.3.0 Detailed Quality Plans to be submitted by the bidders should also include all the checks/tests carried out by the suppliers as part of their normal practice. The Quality Plans submitted by the bidders shall be subject to approval of BHEL/their Customer who reserves the right to ask for further checks during finalization of Quality Plans. BHEL/their Customer shall indicate customer hold points in the approved Quality Plans beyond which the work shall not proceed without their approval.
- 4.4.0 The supplier shall furnish their production program along with scheduled dates of testing at least three months in advance to enable BHEL/their customer to plan for witnessing the tests identified as hold points.
- 4.5.0 Material identification and co-relation with test certificates for all major components shall be essentially required. In absence of these, the material of each component shall be tested as per relevant specification for Chemical Composition and Mechanical properties i.e. Yield Stress, Ultimate Tensile Stress, Impact test, % Elongation, % Reduction in Area, Hardness etc. In addition, to ensure freedom from surface and sub-surface defects, suitable Non Destructive Testing shall also be carried out.
- 4.6.0 Following tests shall be done at Manufacturers' works during various stages as minimum requirement :
- 4.6.1 Visual examination of all components.
- 4.6.2 Check for weld joints for proper fit up, Dye Penetration Test after root run and final welding. 100% Radiographic test as per ASTM E 165 for all butt welds.
- 4.6.3 Verification of stress relieving chart if post-weld heat treatment is called for.
- 4.6.4 Check / test for pressure retaining bolts and nuts as per relevant Codes/Standards.
- 4.6.5 Dimension check for all components including surface finish.

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4.6.6	Hydraulic Test to two times the rated design pressure for desuperheater body and other pressure retaining parts.		
4.6.7	Check for final completeness, cleaning, surface finish, appearance, identification, surface preparation, painting, marking and packing including spares.		
4.6.8	The equipment comes under the purview of IBR (Indian Boiler Regulations). All tests certificates duly signed by Chief Inspector (IBR) / authorized representative shall be furnished in IBR from III-C.		
4.6.9	The particulars of proposed shop tests and process of test shall be submitted to BHEL/their Customer along with Quality Plan for approval.		
5.0.0	<u>PERFORMANCE REQUIREMENTS</u>		
	Bidder shall guarantee that equipment offered shall meet the rating and performance requirements as stipulated in this specification. In case it is not as per guarantee furnished by the bidder, the deficiency shall be made good by the bidder by rectification / replacement of defective parts within reasonable time at their own cost inclusive of cost of transportation both ways if required. The Purchaser is entitled to reject the equipment in case of repeated failures to meet the guaranteed performance.		
6.0.0	<u>PAINTING</u>		
6.1.0	All foundry sand and loose material shall be removed and surface should be made thoroughly clean for further protection as required.		
6.2.0	A shop coat of paint, removable after installation at site, shall be applied to all steel surfaces and other exposed surfaces requiring corrosion protection during transit and storage at site.		
7.0..0	<u>PRESERVATION, MARKING AND PACKING</u>		
7.1.0	A Stainless Steel metal nameplate should be permanently fixed on each equipment giving its Tag. No. and technical specifications i.e. Service, Size, Pressure Rating etc.		
7.2.0	All equipments / materials shall be packed suitably and protected from impact, abrasion, corrosion, incidental damage due to vermin, Sun-light, high temperature, rain, moisture, humidity, dust, sea water (where applicable) as well as rough handling during entire period of dispatch, storage and erection including delays in transit and storage in open.		
7.3.0	Spares shall be packed separately and marked clearly for identification. These shall be specially packed for long storage without damage.		



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DESUPERHEATER DATA SHEET A-4

DATA SHEET FOR LOW TEMP. DESUPERHEATER DESH-1

S.NO	DESCRIPTION	UNITS	DATA FOR LOW TEMPERATURE PRDS DESUPERHEATER
1.0	TAG NO.		DESH-1
2.0	TYPE		VARIABLE ORIFICE / VENTURI TYPE
3.0	STEAM PARAMETERS		(INLET OF DESUPERHEATER)
3.1	FLOW	T/HR	REFER SIZING DATA SHEET A-3
3.2	PRESSURE	Kg/cm ² (a)	BIDDER TO DECIDE BASED ON SIZING DATA
3.3	TEMPERATURE	°C	BIDDER TO DECIDE BASED ON SIZING DATA
4.0	STEAM PARAMETERS (OUTLET OF DESUPERHEATER)		REFER SIZING DATA SHEET A-3
5.0	SPRAY WATER PARAMETERS		(INLET OF DESUPERHEATER)
5.1	FLOW	T/HR	REFER SIZING DATA SHEET A-3
5.2	PRESSURE	Kg/cm ² (a)	BIDDER TO DECIDE BASED ON SIZING DATA
5.3	TEMPERATURE	°C	REFER SIZING DATA SHEET A-3
6.0	END DETAILS		(STEAM INLET / OUTLET)
6.1	TYPE / MATCHING PIPE	mm x mm	BW / 323.9 x 9.53
7.0	END DETAILS		(SPRAY WATER INLET)
7.1	TYPE / MATCHING PIPE		SW/ 60.3 x 11.07
8.0	MATERIALS OF CONSTRUCTION		
8.1	BODY		A217 WCB
8.2	PIPE		SA 106GRB
8.3	SPRAY NOZZLE WITH ASSEMBLY		SS 316 (Spray Nozzle design pressure shall be equal to Design Spray Water Pressure)
9.0	DESIGN PARAMETERS		
9.1	DESIGN PRESSURE	Kg/cm ² (g)	22
9.2	DESIGN TEMPERATURE	°C	350
10.0	HYDRO TEST PRESSURE	Kg/cm ² (g)	1.5 TIMES DESIGN PRESSURE

<div><div>बी एच ई एल</div><div></div></div>	TITLE	SPEC. NO. PE-TS-401-142-N101		
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DATA SHEET-C

LIST OF DOCUMENTS AND DATA TO BE SUBMITTED AFTER AWARD OF CONTRACT

The list of documents and data to be submitted by the successful bidder after the award of the contract are specified in Data Sheet - C.

The supplier shall after award of contract submit Four (04) sets of the following documents for purchaser's approval / vetting.

- i) Certified final drawings & data sheets as indicated in section-C.
- ii) Quality Plans, Inspection/Test Reports as agreed with the Purchaser.
- iii) Material and Hydraulic Test Certificates along with IBR form III C.
- iv) Performance Test Procedures and Reports.
- v) Field Quality Plan as agreed.
- vi) Storage Instructions.
- vii) List of Commissioning, Mandatory and Recommended Spares.
- viii) List of Tools and Tackles required.
- ix) List of lubricants.
- x) Operation and Maintenance Instruction Manual.

NOTE: Above list is only tentative. Successful bidder shall prepare detailed schedule of Drawings/ Documents, which shall be mutually agreed and included in the contract document/ordering Specification.



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**AUXILIARY STEAM PRESSURE REDUCING
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QUALITY PLAN

		STANDARD QUALITY PLAN FOR AUXILIARY STEAM PRDS			CUSTOMER : NTPC		PROJECT: 1x500 MW FGUTPP-IV		SPECIFICATION NUMBR PE-TS-401-142-N101			
					BIDDER/ : AS PER APPROVED VENDOR LIST		SPECIFICATION TITLE : AUXILIARY STEAM P.R.D.S					
		SHEET 1 of 2			SYSTEM ITEM : STEAM DESUPERHEATER		QUALITY PLAN NUMBR			SECTION VOLUME		
SL. NO.	COMPONENT/ OPERATION	CHARACT-ERISTIC CHECK	CAT.	TYPE METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11

1.0	Raw Materials											
1.1	Pipes	Mechanical & Chemical Prop.		Mechanical & Chemical	100%	Appd Specn./ Data Sheet/Drg.	Appd Specn./ Data Sheet/Drg.	TC	3/2	-	1	Correlation required
		Leakproofness		Hydraulic test	100%	-do-	-do-	TC	3/2	-	1	
		Dimensions		Measurement	100%	-do-	-do-	IR	3/2	-	1	
1.2	Forging	Physical & Chemical Prop.		Physical & Chemical Prop.	1/heat	Appd Specn./ Data Sheet/Drg.	Appd Specn./ Data Sheet/Drg.	TC	3/2	-	1	Correlation required
		Dimensions		Measurement	100%	-do-	-do-	IR	3/2	-	1	
		Heat Treatment		Scrutiny	100%	-do-	-do-	HT/SR Chart	3/2	-	1	Correlation required
2.0	In Process											
2.1	Forgings	Internal defects		U.T	100%	ASTMA 435	ASTMA 435	IR	3/2	-	1	
2.2	Machining Body Internals	Dimensions		Measurement	100%	Appd.Drg.	Appd.Drg.	IR	3/2	-	1	Correlation required
2.3	Body	Surface Defects		D.P. Check	100%	ASTME165	ASTM-D-12964	TC	3/2	-	1	

PARTICULARS	CUSTOMER / EPC CONTRACTOR	BHEL	BIDDER / VENDOR	
NAME				
SIGNATURE				
DATE				
				BIDDER'S/ VENDOR'S COMPANY SEALS



CUSTOMER : NTPC

PROJECT: 1x500 MW FGUTPP-IV

SPECIFICATION
NUMBR **PE-TS-401-142-N101**

BIDDER/ : AS PER APPROVED
VENDOR LIST

SPECIFICATION TITLE:

AUXILIARY STEAM P.R.D.S

SHEET 2 of 2

SYSTEM ITEM :
STEAM DESUPERHEATER

QUALITY PLAN
NUMBR

SECTION	VOLUME
---------	--------

SL. NO.	COMPONENT/ OPERATION	CHARACT-ERISTIC CHECK	CAT.	TYPE METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11

2.4	WPS,PQR,WPQ	WPS,PQR,WPQ		Physical	100%	ASME Sec-IX/IBR	ASME Sec-IX/IBR	Format	3/2	-	1	Records to be shown
3.0	Final Inspection											
3.1	Assembly	Completeness and Marking		Visual	100%	Appd Specn./Data Sheet/Drg.	Appd Specn./Data Sheet/Drg.	IR	3/2	1	-	
		Dimensional		Measurement	100%	Appd Specn./Data Sheet/Drg.	Appd Specn./Data Sheet/Drg.	IR	3/2	1	-	
3.2	Pressure Test	Leak Proofness		Hydraulic Test	100%	-do-	-do-	IR	3/2	1	-	
4.0	Painting	Surface Prepn., Uniformity, Shade & Thick.		Visual, Measurement	100%	-do-	-do-	IR	3/2	-	1	
5.0	Packing	Soundness of Packing, Marking		Visual	100%	Appd Specn./Mfr. Standard	Appd Specn./Mfr. Standard	IR	3/2	-	1	
Note:: IBR –Certificate in Form III C shall be submitted.												

LEGEND P – PERFORM

W – WITNESS

V – VERIFICATION

1 – BHEL, CUSTOMER/CONSULTANT 2 – VENDOR

3 – SUB VENDOR

PARTICULARS	CUSTOMER / EPC CONTRACTOR	BHEL	BIDDER / VENDOR	
NAME				
SIGNATURE				
DATE				
				BIDDER'S/ VENDOR'S COMPANY SEALS



PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

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

VOLUME IIB

SECTION D

REV. NO. 06 DATE: 05.09.2013

SHEET 1 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
1.0	MATERIAL											
1.1	Body & Bonnet casting / forgings, plug, valve stem, seat ring/cage.	1. Physical, Chemical properties	MA	Physical, Chemical tests	One/ Heat(HT Batch)	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	3	---	2,1	
		2. Heat Treatment	MA	Review of H.T. Chart	Each H.T.	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	3/2	2	1	IBR Certification (if applicable) to be verified by BHEL
		3. Internal quality of castings	MA	RT for Body & UT for Bonnet(NDT)	100%	ASME B 16.34	ASME B 16.34	Test Report / FILM	3/2	2	1	Only for rating ANSI 900 and above. Applicable for Body and Bonnet only. For Lower rating only if called for in specification.
		4. Surface Quality	MA	1. Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2,1	
				2. MT/PT	100%	ASME B 16.34	ASME B 16.34	Test Certificate	3	2	1	After Machining on machined surface only

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

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

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

1 - BHEL
2 - Vendor
3 - Sub-vendor



PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

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

VOLUME IIB

SECTION D

REV. NO. 06 DATE: 05.09.2013

SHEET 2 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
		5. Pressure test for shell	MA	Hyd. Test	100%	ISA-S-75.19/ ASME B 16.34	ISA-S-75.19/ ASME B 16.34	Test Certificate	2	2	1	For Body & Bonnet after machining
1.2	Diaphragm	1. Surface Quality	MA	Visual	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2,1	
		2. Hardness	MA	Measurement	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2,1	
		3. Endurance / Life cycle	MA	Cyclic test 10,000 cycles	One / Type	10,000 cycles/ Mfr. standard.	No damage	Test Certificate	3/2		2,1	
1.3	Spring	1. Composition	MA	Chemical- Analysis	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
		2. Mech. Properties	MA	Mech. Test	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
		3. Performance	MA	1. Stiffness ratio	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
				2. Scragging	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
				3. Cyclic test (Endurance)	One / type	10,000 cycles	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
				4. Dimension (Measurement)	One sample/ Lot	Mfr. standard	Appd Drg	Record	3	---	2,1	

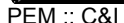
LEGEND: * CR - Critical characteristics
MA - Major characteristics
MI - Minor characteristics

RT- Radiographic Test
UT – Ultrasonic Test

PT – Dye penetrant Test
MT- Magnetic Test

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

1 - BHEL
2 - Vendor
3 - Sub-vendor



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

IIB

D

06

DATE: 05.09.2013


3

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[illegible]

 PEM :: C&I		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)						QUALITY PLAN NO.: PE-QP-999-145-I 006				
								VOLUME IIB				
								SECTION D				
								REV. NO. 06 DATE: 05.09.2013				
								SHEET 4 OF 7				
Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
3.1	Actuator Chamber	Leakage & Strength	MA	Pneumatic test	100%	Mfr. Standard	No Leakage	Test Certificate	2	1	1	Refer Note-4
3.2	Body	Leakage and Pressure test (Body Mount Leakage)	MA	Hydro test	100%	ISA - S-75.19	No Leakage	Test Certificate	2	1	1	Refer Note-4
3.3	Seat leakage test for completed valve	Seat Leakage	MA	Pneumatic Test	100%	FCI-70.2	FCI-70.2	Test Certificate	2	1	1	Refer Note-4
4.0	OPERATION TEST ON COMPLETED VALVE (Final inspection)	1. Valve Travel	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		2. Opening/Closing time	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		3. Linearity/cam characteristic	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		4. Repeatability	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		5. Hysteresis	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		6. Sensitivity	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		7. Accuracy (Overall)	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1	1	Refer Note-4
		8. Control Valve characteristics / CV Test	MA	♦ Measurement (Press. vs. discharge and discharge vs. opening 0-100% in steps of 10%)	One per type	As per specs/ Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Certificate	2	--	1	♦ Size = Body & port size Or Body size & CV for non std port. Refer Note 1.

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

 PEM :: C&I		STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)						QUALITY PLAN NO.: PE-QP-999-145-I 006				
								VOLUME IIB				
								SECTION D				
								REV. NO. 06 DATE: 05.09.2013				
								SHEET 5 OF 7				
Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
		9. Operation of limit switch & solenoids and other accessories	MA	Function	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Report	2	1	1	On assembled valve Refer Note-4
		10. Overall dimensions	MI	Visual and dimensional	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Records	2	1	1	Refer Note-4
		11. Pre defined valve position in case of air failure	MA	Visual	100%	As per spec & Appd drg	As per spec & Appd drg	Test Certificate	2	1	1	
		12. Cleanliness, painting, stamping (for direction of flow), Tag No.	MA	Visual and dimensional	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Certificate	2	1	1	
5.0	AUXILIARY ITEMS (Performance test of auxiliary items shall be performed on the completely assembled valve)											
5.1	Positioner	Overall leakage after assembly including Nozzles leakage	MA	Leak Test (in the steady state input signal)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	Overall leakage including tubing
5.2	Air filter regulator	1. Normal air consumption	MA	Measurement	Each type	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	
		2. Overall leakage	MA	Visual (soap solution)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	
5.3	Air lock relay	Performance Test	MA	Leakage test	100%	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	
5.4	Electronic position transmitter(not applicable if provided integral to smart positioner)	1. Accuracy	MA	Operation	100%	Approved data sheet /	Approved data sheet /	Test Certificate	2	1	1	

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

RT- Radiographic Test
 UT – Ultrasonic Test

PT – Dye penetrant Test
 MT- Magnetic Test

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

1 - BHEL
 2 - Vendor
 3 - Sub-vendor



STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.: PE-QP-999-145-I 006			
VOLUME	IIB		
SECTION	D		
REV. NO.	06	DATE: 05.09.2013	
SHEET	6	OF	7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
5.5	Current to Pneumatic converter(not applicable for smart positioner)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	2,1	
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	2,1	
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
		4. Hysterisis	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
5.6	Smart Positioner (As Applicable)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	2,1	
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	2,1	
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
		4. Hysterisis	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
		5. Calibration with Hand Held Communicator	MA	Measurement	Each type	Approved data sheet / Mfr. Standard	Approved data sheet / Mfr. Standard	Test Certificate	2	1	1	
6.0	PAINTING	Soundness of Painting	MA	Visual and Measurement	100%	BHEL specn. / Mfr. Standard	BHEL specn. / Mfr. Standard	Inspection Report	2	---	---	Refer Note-2
7.0	PACKING	Soundness of Packing against transit damage	MA	Visual	100%	Mfr. Standard	Mfr. Standard	Inspection Report	2	---	---	Refer Note-3


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

RT- Radiographic Test
UT – Ultrasonic Test

PT – Dye penetrant Test
MT- Magnetic Test

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

1 - BHEL
2 - Vendor
3 - Sub-vendor

 PEM :: C&I	STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)							QUALITY PLAN NO.: PE-QP-999-145-I 006				
								VOLUME IIB				
								SECTION D				
								REV. NO. 06		DATE: 05.09.2013		
								SHEET 7		OF 7		
Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	

NOTES:

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

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



TITLE

SPECIFIC TECHNICAL REQUIREMENTS

**AUXILIARY STEAM PRESSURE REDUCING
& DESUPERHEATING STATION**

SPEC. NO. PE-TS-401-142-N101

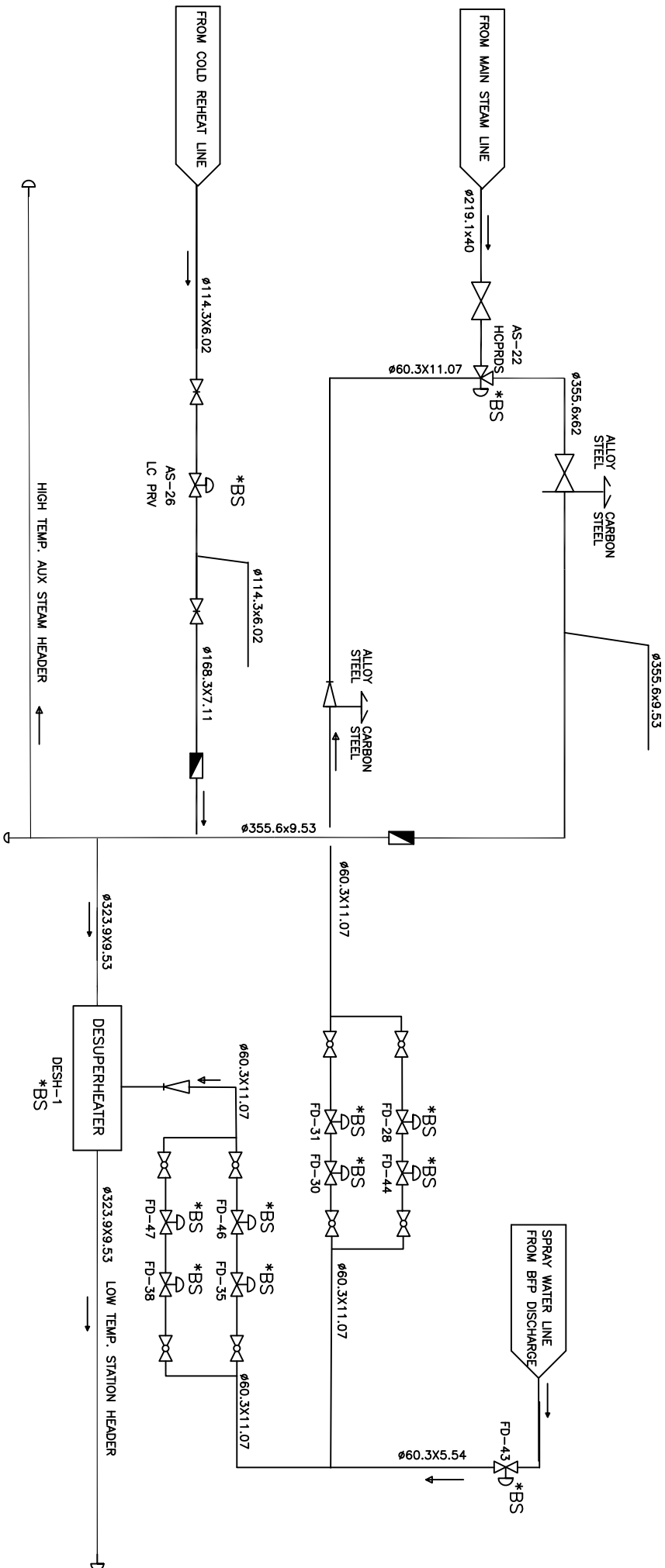
VOLUME **II-B**

SECTION **D**

REV NO. **0** DATE 23.04.2014

Sheet 49 of 50

TENDER DRAWINGS



NOTE

1. EQUIPMENTS IN BIDDER'S SCOPE HAVE BEEN MARKED AS *BS

JOB NO. STANDARD

NTPC-1X500 MW FGUTPP-IV, UNCHAHAR

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED & MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

TECHNICAL SPEC. for STANDARD AUXILIARY PRDS

CHK	DATE	DESIGN	SCALE	REVISION	DRAWING NO.
					PE-TS-999-142-N101
					SHEET 01 OF 01 REV. 00

NTPC LTD.

**1 x 500 MW FGUTPP-IV
at
UNCHAHAR (UP)**

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

VOLUME - III

SPECIFICATION No: PE-TS –401-142–N101 (REV 00)



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



TITLE


PREAMBLESPECIFICATION NO **PE-SS-999-100-Q-001**VOLUME **III**SECTION **PREAMBLE**REV NO. **0** DATE 23.04.2014

SHEET 1 OF 1

VOLUME – III TECHNICAL SCHEDULES

1.0 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. PES-100-901 in Volume-III.

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

	TITLE AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-401-142-N101	
		VOLUME III	
		SECTION	CONTENTS
		REV NO. 0	DATE 23.04.2014
		SHEET 1 OF 3	
1.0	Volume III comprises of following: -		
1.1	Data Sheet : Data Sheet(s) 'B' Section 'D'.		
1.2	Schedules :		
	PART – A : Technical Schedules		
	PART – B : Price Schedules		
	(See clause 2 (b) below for unpriced schedules)		
	The Schedule and Data Sheets enclosed/indexed shall be completely filled up by the bidder and furnished with the bid duly signed and stamped by the bidder. Purchaser reserves the right to ask the bidder to fill additional schedules, which are not listed in the contents.		
2.0	Form No. PEM-6020 is a 'Checklist', which is enclosed to facilitate the bidder to make sure that the necessary data/information is furnished by him in his bid. The remarks column of this schedule shall be filled up by the bidder as per the instructions given below:-		
	a) The bidder shall write 'Not Applicable' against those schedules / documents which are not listed in the contents.		
	b) The bidder shall write 'Enclosed' for the listed schedules / documents which are filled and furnished by the bidder with the bid. Otherwise 'Not Enclosed' shall be written.		
	c) Duly filled Part-A schedules as well as Data Sheet-B shall be furnished with the technical offer while Part-B (Price Schedules) shall be submitted with price offer in separate covers.		
	d) Wherever unpriced schedules are to be furnished with Part-A schedules in tech. bids. the same is indicated in the filling space of price schedule formats.		
	e) Other documents / information as required in the checklist shall also be furnished by the bidder.		
3.0	The Data Sheet(s)-B shall be filled-up completely and typed written and shall be duly signed with Rev. No. and date. One copy of the same shall be furnished with the bid. The items, which deviate from the specification, shall be marked with an asterisk (*) in the data sheets and details shall also be given in the 'Schedule of deviations' from technical specification (Form No. PEM-6036).		
4.0	Bidder shall fill specification No. in all schedules .		
5.0	Schedules PEM – 6020 & PEM 6040 duly filled in shall be enclosed by bidder both in Technical and price offers.		



TITLE

**AUXILIARY STEAM PRESSURE REDUCING
& DESUPERHEATING STATION**

SPEC. NO.: PE-TS-401-142-N101

VOLUME **III**SECTION **CONTENTS**REV NO. **0** DATE 23.04.2014

SHEET 2 OF 3

CONTENTS**PART-A**

<u>SL.NO.</u>	<u>FORM NO.</u>	<u>FORM DESCRIPTION</u>	<u>NO. OF SHEETS</u>
1.		Data Sheet-C for Control Valves	3
2.		Data Sheet-C for Steam Desuperheater	2
3.	PE-6020	Check List - List of Schedules	1
4.	PE-6024	Schedule of Drawings / Catalogues submitted with bid	1
5.	PE-6026*	Schedule of Equipment, Manufacture, Dispatch & Shipment to Site	1
6.	PE-6027*	Schedule of Weights & Dimensions	1
7.	PE-6030*	Inspection Schedule	1
8.	PE-6036	Schedule of Deviations	1
9.	PE-6040	Schedule of Declaration	1
10.	PE-6041*	Quality Plan	1
11.	PE-6042-00	Instructions for filling up the Quality Plan	1
12.	PE-6042*	Vendor's Drawings / Document Schedule	1
13.	PE-6046*	Inspection Request	1

* To be filled up by successful bidder after LOI.



TITLE

**AUXILIARY STEAM PRESSURE REDUCING
& DESUPERHEATING STATION**

SPEC. NO.: PE-TS-401-142-N101

VOLUME **III**SECTION **CONTENTS**REV NO. **0** DATE 23.04.2014

SHEET 3 OF 3

CONTENTS**PART-B**

<u>SL.NO.</u>	<u>FORM NO.</u>	<u>FORM DESCRIPTION</u>	<u>NO. OF SHEETS</u>
1.	PE-6051	Schedule of Prices	1
2.	PE-6052	Schedule of Unit Prices	1
3.	PE-6053	Schedules of Prices for Commissioning & Mandatory Spares	1
4.	PE-6054	Schedule of Prices for Recommended Spares	1
5.	PE-6055	Schedule of Prices for Erection & Maintenance Tools & Tackles	1
6.	PE-6056*	Schedule of Bidder's Man-power for Supervision of E & C and their Charges	1

* to be filled up by successful bidder after LOI.



TITLE

**AUXILIARY STEAM PRESSURE REDUCING
& DESUPERHEATING STATION**

SPEC. NO.: PE-TS-364-142-N101

VOLUME **III**

SECTION **PART-A**

REV NO. **0** DATE 25.06.2011

SHEET **1** OF **1**

**VOLUME-III
PART-A**

SCHEDULES AND DATA SHEETS



TITLE

EQUIPMENT SPECIFICATIONS

**AUXILIARY STEAM PRESSURE REDUCING
& DESUPERHEATING STATION**

SPEC. NO.: PE-TS-401-142-N101

VOLUME **III**

SECTION **Part-A**


REV NO. **0** DATE 23.04.2014


SHEET 1 OF 1

DATA SHEETS - C
**AUXILIARY STEAM PRESSURE REDUCING
& DESUPERHEATING STATION**

(TO BE FILLED BY SUCCESSFUL VENDOR AFTER THE AWARD OF CONTRACT)

	TITLE DATASHEET - C STEAM DESUPERHEATER				SPEC. NO.: 1PE-TS-401-142-N101	
					VOLUME III PART -A	
	SHEET 1 OF 2					
INSTRUCTIONS TO BIDDER 1. This data sheet shall be read in conjunction with specification No. PES - 148 - 01 Section - D, Volume - II B. 2. Items which deviate from specification shall be marked with an asterisk (*) 3. This data sheet shall be submitted alongwith bid.						
SL.NO.	ITEM	UNIT	PARTICULARS			
1.0	TYPE OF DESUPERHEATER	-				
2.0	MODEL NO.	-				
3.0	NUMBER OFFERED NOS.					
4.0	FLOW CAPACITY (OUTLET OF DESUPERHEATER)	T/HR				
5.0	STEAM PARAMETERS AT INLET					
5.1	PRESSURE	KG/CM ² A				
5.2	TEMPERATURE	°C				
5.3	FLOW T/HR					
6.0	STEAM PARAMETERS AT OUTLET					
6.1	PRESSURE	KG/CM ² A				
6.2	TEMPERATURE	°C				
7.0	SPRAY WATER PARAMETERS					
7.1	PRESSURE	KG/CM ² A				
7.2	QUANTITY	T/HR				
8.0	DESIGN PARAMETERS OF DESUPERHEATER BODY					
8.1	PRESSURE	KG/CM ² G				
8.2	TEMPERATURE	°C				
9.0	DESIGN PRESSURE OF SPRAY NOZZLE	KG/CM ² G				
10.0	TYPE OF SPRAY NOZZLE					
10.1	FIXED / VARIABLE AREA ORIFICE					
10.2	SINGLE HOLE / MULTI HOLE					
Name of Bidder / Vendor					Project	
Revision Number		0	1	2	3	BIDDER'S SEAL
Signature of Bidder / Vendor / Authorised Representative						
Date						

	TITLE DATASHEET - C STEAM DESUPERHEATER				SPECIFICATION NO. PE-TS-401-142-N101	
					VOLUME III PART -A	
	SHEET 2 OF 2					
INSTRUCTIONS TO BIDDER						
1. This data sheet shall be read in conjunction with specification No. PES - 148 - 01 Section - D, Volume - II B. 2. Items which deviate from specification shall be marked with an asterisk (*) 3. This data sheet shall be submitted alongwith bid.						
SL.NO.	ITEM	UNIT	PARTICULARS			
11.0	NUMBER OF SPRAY NOZZLE / TURNDOWN RATIO					
12.0	SPRAY WATER NOZZLE CHARACTERISTICS					
13.0	SIZE OF ORIFICE	MM				
14.0	MIN. VELOCITY ACCEPTABLE IN THE DESUPERHEATER PIPE	M/SEC				
15.0	END CONNECTIONS TYPE & SIZE					
15.1	DESUPERHEATER INLET / OUTLET					
15.2	SPRAY WATER INLET					
16.0	MATERIAL OF CONSTRUCTION					
16.1	BODY					
16.2	SPRAY NOZZLE					
17.0	OVERALL DIMENSIONS	MM				
18.0	WEIGHT OF DESUPERHEATER	KG				
19.0	MOUNTING RECOMMENDATIONS (IF ANY)					
20.0	DESIGN CODE					
21.0	HYDRAULIC TEST PRESSURE	KG/CM ² G				
Name of Bidder / Vendor					Project	
Revision Number		0	1	2	3	BIDDER'S SEAL
Signature of Bidder / Vendor / Authorised Representative						
Date						

	Technical specification for APRDS CONTROL VALVES (Pneumatically Operated)	SPECIFICATION NO. PE-TS-999-145-N101	
		VOLUME II-B	
		SECTION D	
		REV. NO. 00	DATE: 25.04.2010
		SHEET 1 of 3	

		NAME
		SIGNATURE
		DATE
Tag No..... Quantity.....		Data Sheet No. PES-145-06-DS2-0
DATA SHEET C		
DATA SHEET – C FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED BY THE BIDDER AFTER THE AWARD OF CONTRACT)		
GENERAL*	PROJECT	
	SERVICE	
	LOCATION	
	DUTY	
	PIPE SIZE (inlet / outlet)	
	PIPE MATERIAL (inlet / outlet)	
BODY	MODEL NUMBER	
	TYPE OF BODY : GUIDING : NO. OF PORTS	
	BODY SIZE : PORT SIZE : DESIGN DV	
	END CONNECTION & RATING (ANSI)	
	BODY MATERIAL	
	PACKING MATERIAL SINGLE / DOUBLE	
	BONNET TYPE	
	TRIM FORM	
	TRIM MATERIAL : SEAT | PLUG	
	TRIM MATERIAL : CAGE | GUIDE	
	FLOW	
	OUTLET VELOCITY	
	REQUIRED LEAKAGE CLASS	
	NOISE LEVEL (dBA) (Spec. 3.1.14)	
	VACUUM SERVICE	
	ANTI CAVITATION TRIM	
PNEUMATIC ACTUATOR	MODEL NO. & SIZE	
	CLOSE AT : OPEN AT (Kg / Cm ² g)	
	*TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN	
	*VALVE POSN. ON SIGNAL AIR FAILURE	
	*VALVE POSN. ON SUPPLY AIR FAILURE	
ACCESSORIES	POSITIONER	
	AIR FILTER REGULATOR	
	AIR LOCK RELAY	
	POSITION LIMIT SWITCH	
	POSITION TRANSMITTER	
	SOLENOID VALVE	
	E / P CONVERTER	
	JUNCTION BOX	
	HAND WHEEL (SIDE MOUNTED)	
	LOCAL POSITION INDICATOR	
	ELECTRO PNEUMATIC POSITIONER	



Technical specification for **APRDS CONTROL VALVES** (Pneumatically Operated)

SPECIFICATION NO. **PE-TS-999-145-N101**VOLUME **II-B**SECTION **D**

REV. NO. 00

DATE: 25.04.2010

SHEET 2 of 3

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. CCALCULA
TED CV%
VALVE
LIFTVALVE O/L
VELOCITY

VALVE TYPE

* MAX SHUT OFF PRESS ((KG/CM²g)* BODY DESIGN : PRESS ((KG/CM²g) | TEMP (DEG. C)

* IBR FORM III-C

TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) KG.



Technical specification for Control Valves with Accessories (Pneumatically Operated)

SPECIFICATION NO. **PE-TS-350-142-N101**VOLUME **II-B**SECTION **D**

REV. NO. 00

DATE: 08.01.2010

SHEET 1 of 1


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)				(TO BE FILLED UP BY BIDDER)	
SMART POSITIONER	MFR. & MODEL NUMBER				
	BYPASS	GAUGES	ENCL. CLASS		
	INPUT SIGNAL				
	OUTPUT SIGNAL (Kg / Cm ²)				
AIR FILTER REGULATOR TWO (2) Nos./CV <=5MICRON (SINTERED BRONZE)	MFR. & MODEL NUMBER				
	AIR SUPPLY PRESS (MAX.) (Kg / Cm ² g)				
	OUTPUT PRESS (Kg / Cm ² g)				
	OUTPUT GAUGE				
AIR LOCK	MFR. & MODEL NUMBER				
	SET PRESS (Kg / Cm ²)				
	SUPPLY PRESS (MAX.) (Kg / Cm ²)				
	RESET TYPE				
	VENT PLUG				
LIMIT SWITCH	MFR. & MODEL NUMBER				
	OPEN posn	INT posn	CLOSE posn		
	CONTACT TYPE				
	RATING (AC / DC)				
	ENCLOSURE CLASS				
POSITION TRANSMITTER	MFR. & MODEL NUMBER				
	TYPE				
	SUPPLY				
	OUTPUT RATING				
	ACCURACY				
	ENCLOSURE CLASS				
SOLENOID VALVE	MFR. & MODEL NUMBER				
	RATING				
	OPERATION	QUANTITY			
	COIL INSULATION CLASS				
	ENCLOSURE CLASS				
JUNCTION BOX	NO. OF WAYS				
	SIZE				
	CABLE GLANDS (Size / Quantity)				
	ENCLOSURE CLASS				
I/P CONVERTER (Part of SMART Positioner)	INPUT SIGNAL	POWER SUPPLY			
	SPLIT RANGE				
	ENCLOSURE CLASS				
	Accuracy	Repeatability			
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 ¼ " 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.		

	TITLE SCHEDULE OF DRAWINGS / CATALOGUES SUBMITTED WITH BID		SPECIFICATION NUMBER PE-TS-401-142-N101	
			VOLUME III PART - A	
			SHEET OF	
Section C/D enclosed with the specification indicate the drawings / catalogues to be furnished with the bid. The bidder in addition to furnishing the same, can also include any other drawings / catalogues which he may desire to submit with the bid. This schedule duly lists out such drawings as enclosed by the bidder with the bid.				
DRAWING./ CATALOGUE NUMBER	DESCRIPTION			NUMBER OF SHEETS
PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				COMPANY SEAL
NAME	DESIGNATION	SIGNATURE	DATE	

	TITLE SCHEDULE OF EQUIPMENT, MANUFACTURE, DESPATCH AND SHIPMENT TO SITE			SPECIFICATION NUMBER PE-TS-401-142-N101	
				VOLUME III PART - A	
				SHEET OF	
Equipment / Major Bought-out Items	Time for Manufacture/ Procurement from Date of Issue of Letter of Intent (Weeks)	Time for Test, Dismantling Packing & Ready for Despatch (Weeks)	Time required for Shipment to Site (Weeks)	Total Time from Date of Issue of Letter of Intent to Shipment to Site (Weeks)	
We, the undersigned hereby undertake to meet the above time schedule in weeks for manufacture, despatch and shipment of each equipment and procurement of major boughtout items as listed above.					
PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE					COMPANY SEAL
NAME	DESIGNATION	SIGNATURE	DATE		

	TITLE <h2 style="text-align: center;">SCHEDULE OF WEIGHTS & DIMENSIONS</h2>		SPECIFICATION NUMBER PE-TS-401-142-N101			
			VOLUME III PART - A			
			SHEET OF			
The bidder shall state below the weights and dimensions of various packages for shipment covering the complete scope.						
Description of Package(s)		Dimensions (in meters)		Weight (in tonnes)		
PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE						
NAME	DESIGNATION				SIGNATURE	DATE
COMPANY SEAL						



INSPECTION SCHEDULE

SPECIFICATION PE-TS-401-142-N101
NUMBERP.O.
NUMBER


VOLUME - III PART-A

SHEET OF

S. No.	ITEM/ COMPONENT	PLACE & ADDRESS OF TEST / INSPECTION	Scheduled Date of Inspection	Duration of Test / Inspection (in days)

This schedule shall be in line with specification and quality plan requirements. The information in this form shall be furnished after receipt of LOI / PO.

PARTICULARS OF VENDOR's / AUTHORISED REPRESENTATIVE			
NAME	SIGNATURE	DATE	COMPANY SEAL

	TITLE				SPECIFICATION NUMBER	
	* SCHEDULE OF DEVIATIONS () From Conditions of Contract (Volume - I) () From General Technical Conditions (Volume - II A) () From Technical Specifications (Volume - II B)				PE-TS-401-142-N101	
					VOLUME III PART - A	
				SHEET OF		
We the undersigned hereby certify that the above mentioned are the only deviations.						
PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE						COMPANY SEAL
NAME	DESIGNATION	SIGNATURE	DATE			



TITLE

SPECIFICATION NUMBER PE-TS-401-142-N101

* SCHEDULE OF DECLARATION

VOLUME III PART - A

SHEET OF

DECLARATION

I,.....certify that all the technical data and information pertaining to this specification are correct and are true representation of the equipment/system covered by our formal proposal number Dated..... and there is no deviation to the specification.

I hereby certify that I am duly authorised representative of the Bidder's company whose name appears above my signature.

Bidders Company Name

Authorised representative's Signature

Name


Bidder's Intent The bidder hereby agrees to fully comply with the requirements and intent of this specifications for the price indicated.

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

CHECKLIST — LIST OF SCHEDULES

Sl. No.	Form No.	Description	Tick Applicable Forms
1.	PEM-6024	Schedule of Drawings / Catalogues submitted with Bid	✓
2.	PEM-6025@	Schedule of Occurance of Key Events of Delivery,Erection& Commissioning	
3.	PEM-6026	Schedule of Equipment Manufacture, Despatch and Shipment to Site.	✓
4.	PEM-6027	Schedule of Weights & Dimensions	✓
5.	PEM-6028@	Schedule of Performance Guarantee	
6.	PEM-6030	Inspection Schedule	✓
7.	PEM-6031	Schedule of Cement and Steel and Quarterly Cement Requirement	
8.	PEM-6032	Schedule of Quarterly Requirement of Reinforcing Bars and Structural Steel	
9.	PEM-6033@	Bill of Quantities (Civil Works)	
10.	PEM-6035	Schedule of Bidder's Proposed Construction / Site Fabrication Facilities.	
11.	PEM-6036	Schedule of Deviations	✓
12.	PEM-6040	Schedule of Declaration	✓
13.	PEM-6041	Quality Plan	✓
14.	PEM-6042	Vendor's Drawings / Documents Schedule	✓
15.	PEM-6043@	Schedule of Occurance of Key Events for Civil / Structural Works	
16.	PEM-6046	Inspection Request	✓
17.	PEM-6051	Schedule of Prices	✓
18.	PEM-6052@	Schedule of Unit Prices	✓
19.	PEM-6053	Schedule of Prices for Commissioning & Mandatory Spares	✓
20.	PEM-6054	Schedule of Prices for Recommended Spares	✓
21.	PEM-6055	Schedule Prices for Erection and Maintenance Tools & Tackles	✓
22.	PEM-6056	Schedule of Bidder's Man-power for Supervision of E & C and their Charges.	✓
23.	PEM-6057	Schedule of Daily & Overtime Rates	
24.	PEM-6058	Schedule of Hire-charges for Construction / Site Fabrication Facilities	
For Forms marked with @ certain information to be filled by DEs - before issuing to bidder.			

	QUALITY PLAN			CUSTOMER: NTPC			PROJECT: 1X500 MW FGUTPP-IV, UNCHAHAR		SPECIFICATION: PE-TS-401-142-N101 NUMBR			
				BIDDER/: VENDOR			QUALITY PLAN NUMBER		SPECIFICATION TITLE: AUXILIARY STEAM P.R.D.S			
	SHEET OF			SYSTEM:			ITEM:		SECTION VOLUME III			
SL. NO.	COMPONENT/ OPERATION	CHARACT-ERISTIC CHECK	CAT.	TYPE METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11

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PARTICULARS	BHEL	BIDDER / VENDOR	
NAME			
SIGNATURE			
DATE			
			BIDDER'S/ VENDOR'S COMPANY SEALS

INSTRUCTIONS FOR FILLING QUALITY PLAN

(Form No. PEM-6042-0)

The Quality Plan shall include all the Quality Control Measures and Checks adopted by the Vendor to ensure that the material/component/assembly/services supplied by him meet/will meet the requirements as per specifications and good practices. They shall include all stages of operation such as materials, processes, manufacture, assembly, packing and despatch. The following guide lines may be noted:

- Column 1- Serial Number
- Column 2- Component/Operation- The component and/or operation being checked shall be given here.
- Column 3- Characteristics check- The characteristics being checked shall be given here, e.g., chemical composition, mechanical properties, leak tightness, surface defects etc..
- Column 4- Category - 'CR' stands for critical characteristic - affecting safety of equipment and personnel
'MA' stands for major Characteristic - affecting safety of equipment and personnel
'MI' stands for minor characteristic - affecting appearance etc.
- Column 5- Type/Method of check e.g. chemical analysis tensile testing, hydraulic test, visual examination radiography etc.
- Column 6- Extent of check, such as, 100, 10, 1 per heat etc.
- Column 7- Reference Documents - Documents, such as technical specification, drawings, standard specifications (IS, BS ETC.) procedure, etc. according to which check is done.
- Column 8- Acceptance Norms - Standards etc. according to which acceptability or otherwise of the characteristics being checked is decided.
- Column 9- Format of Record - Formats, log sheets, reports, etc. in which the observations are recorded. Standard log sheets, reports, formats etc. of the Vendors shall be numbered and such reference numbers shall be included here.
- Column 10- Agency - The agency which performs the test/instruction shall be written in sub-column 'W'
The agency which verifies test certificates/inspection records and carries out audit check of the components/operation shall be written in sub-column 'V'
The agencies are codified '1' stands for (BHEL)
as 1,2 & 3 '1' * means the operation shall be cleared by BHEL before the start of the next operation.
'2' Stands for Vendor
'3' stands for sub-Vendor of the Vendor and so on.

Example :

- Entry '3' in column 'P' means test/inspection to be performed by sub-Vendor's QC
- Entry '2' in column 'W' means test/inspection to be witnessed by Vendor's QC
- Entry '1' in column 'V' means verification shall be done by BHEL and next stage to be started only after the hold point is cleared by BHEL
- Column II- Remarks - Any special remarks shall be given here.

NOTES :

1. In absence of correlation with the test certificate(s) (e.g. material identification) samples shall be drawn by BHEL and all tests as per relevant specifications shall be carried out in their presence or in recognized Government Laboratory.
2. When materials and components are initially identified and stamped by BHEL QS engineer, the identification marks shall be preserved till despatch. Wherever this is not possible, the identification mark shall be transferred to the components in the presence of BHEL QS Engineer unless otherwise agreed.
3. For castings and forgings integral test specimens shall be provided, When this is not possible for casting, they shall be poured in the presence of BHEL QS Engineer unless otherwise, if witnessing of test by BHEL is called for.
4. When welders qualified by reputed inspection agencies or statutory bodies are not available, qualification tests shall be conducted in the presence of BHEL QS Engineer.
5. This Quality Plan is liable to be modified as per the requirements of approved drawings and changes in technical specifications/drawings. If there are contradictions in respect of column 7 & 8 between this Quality Plan and the approved drawings specifications, the latter shall prevail.
6. Wherever inspection by BHELs Purchaser/Third Party/Statutory authorities are mandatory, this shall be complied with.
7. Inspection reports, log sheets, test reports/certificate. etc. shall be furnished to BHEL at the appropriate stages or at the time of final inspection, as required.
8. This Quality Plan is also applicable to spares, if any, under scope of supply of Vendor.
9. The quality plan shall be submitted in septuplicate (7 Copies).

INSPECTION REQUEST

(From Vendor to BHEL Inspection Agency)

1 PROJECT TITLE:**2 NAME OF VENDOR:****3 BHEL'S LOI / PO NO:****DATE :****4 SYSTEM / ITEM DESCRIPTION****5 ITEMS BEING OFFERED FOR INSPECTION WITH SL. NO. AS PER LOI / PO / BILLING SCHEDULE****6 DESCRIPTION AND SL. NO. OF INSPECTION AS PER QUALITY PLAN****7 QUANTITY OFFERED FOR INSPECTION****8 PLACE OF INSPECTION (FULL ADDRESS AND NAME OF SUB-VENDOR, IF ANY)**

PLACE

ADDRESS

.....
.....**9 CONTACT PERSON (FOR SL. NO. 8 ABOVE).**

NAME DESIGNATION

TELEPHONE

FAX TELEGRAM

TELEX

10 THE FOLLOWING DOCUMENTS ARE APPROVED BY BHEL AND AVAILABLE AT PLACE OF INSPECTION

(A) QUALITY PLAN (B) DRAWINGS (C) DATA SHEETS, CHARACTERISTIC CURVES ETC. (D) PLANT STANDARDS

11 REQUIRED DATE OF INSPECTION LIKELY DURATION (No of Working days).....

WEEKLY OFF DAY WORKING HOURS

(At least 15 days prior notice shall be given by the Vendor to Inspection Agency)

We hereby certify that the above items are complete in all respects and have been fully inspected/tested by us and are found to be as per technical specification/approved drawings/data sheets/characteristic curves and are acceptable to our QC department. The detailed inspection and test reports of our QC department are enclosed.

VENDOR'S PARTICULARS

NAME	DESIGNATION	SIGNATURE	PLACE	DATE	COMPANY SEAL
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TITLE

**AUXILIARY STEAM PRESSURE REDUCING
& DESUPERHEATING STATION**

SPEC. NO.: PE-TS-401-142-N101


VOLUME **III**

SECTION **PART-B**

REV NO. **0** DATE 23.04.2014

SHEET **1** OF **1**

**VOLUME-III
PART-B
PRICE SCHEDULES**

	TITLE SCHEDULE OF PRICES AUXILIARY STEAM PRESSURE REDUCING & DESUPERHEATING STATION	SPEC. NO.: PE-TS-401-142-N101	
		VOLUME III	
		SECTION PART-B	
		REV NO. 0	DATE 23.04.2014
		SHEET 1 OF 1	

S.No.	Description of Works or Equipment/System	Price (in Lakhs of Rs.)
1.0	Total price for design, manufacture, assembly, inspection, testing, packing and dispatch to site of auxiliary steam pressure reducing and desuperheating stations complete with desuperheaters, controls valves and all accessories including commissioning spares and special tools & tackles as specified and necessary as per technical specification PE-TS-401-142-N101	
2.0	Recommended spares, item-wise break up with item-wise price to be given as per “Schedule of Recommended Spares” enclosed under Vol. III of technical specification- price not to be included in clause 1.0 above, Bidder to indicate the break up.	
3.0	Optional price of supervision of erection and commissioning of equipments – prices not to be included in clause 1.0 above.	
	Indicate all duties, taxes etc. Stating whether included/excluded in above price.	

-Bidder shall furnish this price schedule in his price offer only.

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PARTICULARS OF VENDOR's/AUTHORISED REPRESENTATIVE			
NAME	SIGNATURE	DATE	COMPANY SEAL



TITLE

SCHEDULE OF UNIT PRICES


SPEC. NO.: PE-TS-401-142-N101


VOLUME **III**SECTION **PART-B**


REV NO.	0	DATE 23.04.2014
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SHEET OF

[illegible]

		TITLE * SCHEDULE OF PRICES FOR COMMISSIONING AND MANDATORY SPARES				SPECIFICATION NUMBER PE-TS-401-142-N101			
						VOLUME III			
						SHEET OF			
The bidder shall indicate here the quantity required for erection / commissioning and mandatory spares for equipment as listed in Section-C / Section - D. If the listed spares are not adequate, then the bidder shall indicate those and additional spares considered necessary by him.									
Type	Manufacturer's Drawing No. / Part of spare	Description	Material	Quantity per Unit / Equipment	Quantity Required	If set, Nos. Per set	Delivery period (Weeks)	Unit Price (Rs.)	Total Price (Rs.)
Erection and Commissioning	Bidder to list each item required as per specification / considered by bidder and its unit price								
Mandatory Spares	Bidder to list each item required as per specification / considered by bidder and its unit price								
Additional Spares Mandatory Erection / Commissioning	Bidder to list each item required as per specification / considered by bidder and its unit price								
PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE									
NAME	DESIGNATION	SIGNATURE	DATE						

		TITLE * SCHEDULE OF PRICES FOR RECOMMENDED SPARES				SPECIFICATION NUMBER PE-TS-401-142-N101			
						VOLUME III			
						SHEET OF			
The bidder shall give below a list of spares recommended for three years (or as otherwise specified in section - C) for trouble free performance of the equipment / system offered.									
S. No.	Manufacturer's Drawing No. / Part of spare	Description	Material	Quantity per Unit / Equipment	Quantity recommended	If set, Nos. Per set	Delivery period (Weeks)	Unit Price (Rs.)	Total Price (Rs.)
PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE									
NAME	DESIGNATION	SIGNATURE	DATE						
							COMPANY SEAL		

	TITLE SCHEDULE OF PRICE FOR ERECTION AND MAINTENANCE TOOLS & TACKLES		SPECIFICATION NUMBER PE-TS-401-142-N101	
			VOLUME III	
			SHEET OF	
The bidder shall be give below the list of erection and maintenance tools and tackles as offered by him. This shall also include the customer's list of maintenance tools, if specified in Section - C / Section - D.				
S. No.	Description of Tools & Tackles	Quantity offered	Unit Price (Rs.)	Total Price (Rs.)
NOTE : The hire charges for vendor's equipment called for in this schedule shall include the cost of consumables, operation services, depreciation, wear and tear as well as vendor's over head and profit. (These rates will be payable by customer to the vendor, only if the customer's requires the use of this equipment for carrying out his own work out side the scope of this contract.)				
PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				COMPANY SEAL
NAME	DESIGNATION	SIGNATURE	DATE	

	TITLE			SPECIFICATION NUMBER PE-TS-401-142-N101	
	SCHEDULE OF BIDDER'S MAN POWER FOR SUPERVISION OF E & C AND THEIR CHARGES			VOLUME III	
				SHEET OF	
The bidder shall indicate below, designation-wise, the personnel required for supervision of erection and commissioning and their charges.					
SUPERVISION OF ERECTION					
S. No.	Designation	Normal rate per day of 8 hours		Overtime rate per hour	
SUPERVISION OF COMMISSIONING					
Sl. No.	Designation	Normal rate per day of 8 hours		Overtime rate per hour	
PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE					COMPANY SEAL
NAME	DESIGNATION	SIGNATURE	DATE		