



**Bharat Heavy Electricals Limited
Piping Centre Chennai-17**

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TECHNICAL SPECIFICATION FOR AUX.PRDS CONTROL VALVES

**BHARATEEYA RAIL BIJLEE COMPANY LTD
NATIONAL THERMAL POWER CORPORATION
NABINAGAR 4x250MW
THERMAL POWER PROJECT**

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| Rev | Date | Alteration | Prepared | Approved(C&I) | Approved (Mech.) |
|-----|----------|-------------|----------|---------------|------------------|
| 00 | 21.03.12 | Fresh Issue | SUKUMAR | R PRABHA | C VAITHIANATHAN |



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Important note to the Bidder

Bidder is to take Photostat copy of Table V-A & Table V-B, control valve data sheets, Section VII and section VIII of this specification, fill it by neatly typing and submit the same along with the offer. Non-compliance of the above shall lead to rejection of the offer. Information called for in the above tables, sections of the Technical specification furnished in any other format shall be considered only for information.



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SECTION - I

INTENT OF SPECIFICATION

- 1.0 This specification is intended to cover the design, engineering, manufacture, shop Fabrication, assembly, tests and inspection at manufacturer's works, packing and despatch of control valves for the mentioned project.
- 2.0 The equipment to be supplied as per this Technical specification shall be suitable for the site conditions specified in Equipment specification (Section III)
- 3.0 It is not the intent to completely specify herein all aspects of design and construction of equipment. Nevertheless the equipment shall conform to all aspects of high standards of engineering , design and workmanship and shall be capable of performing in continuous commercial operation in a manner acceptable to the purchaser who will interpret the meaning of the specification, drawings and shall have right to accept or reject any work or material which in his assessment is not complete to meet the requirements of this specification and/or applicable national and/or international standards mentioned elsewhere in the specification.
- 4.0 If any provision of this specification departs from the bidder's usual construction sufficiently to materially increase cost of equipment without (in bidders opinion) providing a corresponding increase in quality or if the bidder considers that his usual construction would provide better quality, the Bidder shall call this to the attention of the Purchaser by submitting an alternate bid. However in any case, a base bid shall be submitted based on the equipment and services as specified.



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5.0 In case of any conflict between this technical specification and NTPC contract technical specification for NNTPP (ANNEXURE-E), the latter shall prevail. In case of any further conflict in this matter, the interpretation of the specification by the engineer shall be final and binding.

SECTION - II

SCOPE OF WORK AND SUPPLY

1.0 SCOPE OF WORK

The scope of work of this specification shall include design, manufacture and delivery of control valves as detailed in various sections of this specification.

2.0 SCOPE OF SUPPLY

- | | |
|--|---------------------|
| 1. High capacity Pressure Reducing valve | TAG No. AS 10 |
| 2. Low capacity Pressure Reducing valve | TAG No. AS 19 |
| 3. Common spray block valve | TAG No. CD-15 |
| 4. High capacity spray CV | TAG No.CD-02, CD-04 |
| 5. High capacity Desuperheater | TAG No.DESH-01 |
| 6. Low capacity spray PCV | TAG No.CD-08, CD-11 |
| 7 Low Capacity Desuperheater | TAG No.DESH-02 |

Complete accessories such as pneumatic diaphragm actuators, smart positioners, I/P converters, position transmitter, air lock valve, limit switches, air-set (air filter with regulators and gauges), solenoid valves, junction box and hand wheel for all control valves. All accessories shall be mounted integrally, tubed and supplied.



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SECTION - III

EQUIPMENT SPECIFICATION

- | | |
|---|------------------------------------|
| 1. High capacity PR valve TAG No. AS-10 | 4-00-306-39886/REV00 (4 SHEETS) |
| 2. Low capacity PR valve TAG No. AS-19 | 4-00-306-39888/REV00 (4 SHEETS) |
| 3. Spray Water Common block valve TAG No. CD-15 | 4-00-306-39893/REV00 (4 SHEETS) |
| 4. High capacity spray CV TAG No.CD-02, CD-04 | 4-00-306-39889/REV00 (4 SHEETS) |
| 5 Low capacity spray CV TAG No.CD-08,CD-11 | 4-00-306-39890/REV00 (4 SHEETS) |
| 6. High Capacity desuperheater TAG No.DESH-01 | 4-00-306-39891/REV00 (2 SHEETS) |
| 7 Lo Desuperheater TAG No.DESH-02 | 4-00-306-39892/REV00 (2 SHEET) |
| 9. Schematic Arrangement of Aux. PRDS station | 4-00-301-39885/REV00 (1 SHEET) |



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Section IV

General technical requirements

- 1.0 The Control valves and accessories furnished by the bidder shall be designed, constructed and tested in accordance with the latest applicable requirements of code for power piping ASME B31.1, 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.
- 2.0 The design of all valve bodies shall meet the specification requirements and shall conform to the requirements of ASME for dimensions, material thickness and material specification for their respective pressure classes.
- 3.0 The valve sizing shall be suitable for obtaining maximum flow conditions with valve openings 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 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 velocity at valve outlet does not exceed 8 m/sec for liquid service, 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 Owner's approval during detailed engineering.



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- 4.0 Control valves for steam and water applications shall be designed to prevent cavitation, wire drawing, flashing on the downstream side of valve and downstream piping. Thus for cavitation / flashing service, only valve with anti cavitation trim shall be provided. Detailed calculations to establish whether cavitation will occur or not for any given application shall be furnished.
- 5.0 Control valves for spray water application shall have leakage rate as per leakage class V. All other control valves shall have leakage rate as per leakage class IV
- 6.0 The control valve induced noise shall be limited to 85 dBa at 1.0 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.
- 7.0 The characteristic of control valves shall be determined based on the application / service.
- 8.0 **Valve construction:**
- 8.1 All valves shall be of globe body design & straightway pattern with single or double port, unless otherwise specified or recommended by the manufacturer to be of angle body type. Rotary valve may alternatively be offered when pressure and pressure drops permit.
- 8.2 Valves with high lift cage-guided plugs & quick-change trims shall be supplied.
- 8.3 Cast Iron valves are not acceptable.



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- 8.4 Bonnet joints for all control valves shall be of flanged and bolted type or other construction acceptable to the owner. Bonnet joints of internal threaded or union type are not acceptable.
- 8.5 Plug shall be of one-piece construction either cast, forged or machined from solid bar stock. Plug shall be screwed and pinned to valve stems or shall be integral with the valve stems.
- 8.6 All valves connected to vacuum on down stream side shall be provided with packing suitable for vacuum application (e.g Double Vee type chevron packing)
- 8.7 Valve characteristic shall match with the process characteristics.
- 8.8 Extension Bonnets shall be provided when the maximum temperature of following fluid is greater than 280° C
- 8.9 Flanged valves shall be rated at no less than ASME pressure class of 300 lbs.
- 9.0 **Valve Actuators:**
- 9.1 All control valves shall be furnished with pneumatic actuators. The Bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut off pressure and leakage class requirements. The valve actuators shall be capable of operating at 60° C continuously.
- 9.2 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/cm² per linear millimetre of seating surface, shall be provided in the selection of actuator to ensure tight seating unless otherwise specified.
- 9.3 The travel time for the actuators shall not exceed 10 seconds.



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110.0 Control valve Accessory Devices:

10.0 Control valve Accessory Devices:

10.1 All control valve accessories such as I/P converters, air locks, hand wheels / hand-jacks, Torque switches, smart positioners, solenoid valves, diffusers, external volume chambers, Position transmitters (capacitance type only), tubing and air sets and junction boxes etc. Shall be provided as per requirements.

11.0 NAME PLATE:

11.1 Name plate shall be of engraved chromium plate or label with engraving filled with enamel. Nameplate data shall be inscribed on the plate in such a manner that it cannot erode or peel off. Name Plate inscriptions shall be bilingual in Hindi followed by English. Alternatively two separate plates one with Hindi and other with English inscriptions may be provided.

11.2 Name plate shall be marked in accordance with MSS standard SP-25 and ASME B16.34 as a minimum.

11.3 Valves shall be identified by owner's tag no. on a metal tag permanently attached to a non pressure part, such as the yoke by a stainless steel wire.

11.4 All exposed steel surfaces are to be painted before despatch as per technical Requirements.

Section V

Spares & Special Tools

1.0 Commissioning spares

Commissioning spares are those spares, which may be required during start up, and commissioning of the unit. Bidder must quote for these spares and unit prices to be indicated.



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2.0 Recommended spares

Recommended spares for all the items for three-year operation. Bidder must quote unit prices. Bidder shall indicate the shelf life for gaskets, packing etc. The recommended spares list shall be independent of the list of mandatory spares. The purchaser reserves the right to buy any or all of the recommended spare parts.

3.0 Mandatory spares

Mandatory spares are those spares, which are considered essential by the purchaser for Normal operation of the plant. If such spares are indicated, bidder shall indicate the Price for each and every item in the schedule of mandatory spares whether or not the Bidder considers it necessary for the purchaser to have it. If the bidder fails to comply With the above or fails to quote the price of any mandatory spares the cost of such Spares shall be deemed to be included in the contract price.

4.0 Bidder shall quote separately the special tools if any required for erection, commissioning and maintenance of the equipment if the bidder considers it as essential whether or not the requirement of such tools are indicated in this specification. However, if the requirements of such tools are indicated, bidder shall indicate the price for each and every item of the special tools indicated. If the bidder fails to comply with the above or



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fails to quote the price of special tools indicated, the cost of such special tools shall be deemed to be included in the contract price. All tools shall be new and unused.

- 5.0 Bidder shall identify the Commissioning spares, Recommended spares and Mandatory Spares in the cross sectional drawing or in the catalogue for easy reference.
- 6.0 All spares supplied under this contract shall be strictly interchangeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site. eg. Small Items shall be packed in sealed transparent plastic bags with dissector packs as necessary.
- 7.0 Each spare shall be clearly marked or labelled on the outside of the packing with its description. When more than one spare part is packed in a single case a general description of the contents shall be indicated on the outside of such cases and a detailed list enclosed. All cases, containers and other package must be suitably marked and numbered for the purpose of identification.
- 8.0 All spare parts furnished shall be new and unused. The contractor shall guarantee that in the event of any of the spares offered goes out of production notice shall be given to the owner sufficiently in advance to enable him to order this requirement of spares in one lot, if he so desires.
- 9.0 Bidder shall indicate the service expectancy period for the spare parts under normal operating conditions before the replacement is necessary.



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- 10.0 Complete manufacturing drawings of items shall be given to the owner as and when any spare parts is discontinued from manufacturing.
- 11.0 Bidder shall furnish the list of spare and special tools required as per the Table V-A and V-B.
- 12.0 Requirement of Mandatory Spares are indicated in Table V-C.



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TABLE V-A

LIST OF SPARES
(To be filled in by the bidder)

| Sl. no | Description of spare | Reference Drawing. | Item no. | Qty. reqd For commissioning Spare. | Qty. reqd For Recommended Spare. | Qty. reqd For mandatory Spare. | For COST / No |
|--------|----------------------|--------------------|----------|------------------------------------|----------------------------------|--------------------------------|---------------|
| | | | | | | | |

Signature of the bidder.



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TABLE V-B

LIST OF special tools
 (To be filled in by the bidder)

| Sl. no | Description of the tool | Reference Drawing | Item no. | Quantity | COST / No |
|--------|-------------------------|-------------------|----------|----------|-----------|
| | | | | | |

Signature of the bidder.



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TABLE-V-C
MANDATORY SPARES

| S No. | Description | Qty | Unit |
|-------|--|--|--------|
| 1. | <u>High Capacity PRDS system</u> | | |
| 1.0 | Desuperheater Liner | 1 | Set |
| 1.1 | <u>Steam Pressure reducing cum desuperheating valves</u> | | |
| | i) Stem | 1 | Number |
| | ii) Disc | 1 | Number |
| | iii) Body seat rings | 2 for each type, Size & rating of valves | Number |
| | iv) Gland packing | 2 for each type, Size & rating of valves | Number |
| | v) Pressure seal ring | 4 | Number |
| | vi) Gasket | 2 | Number |
| 1.2 | <u>High capacity spray water line control valves.</u> Valve trim including cage, plug, stem, seat rings, guide bushings, stem packing | 1 For each Type, size and rating Of valves | Number |
| 2. | <u>Low capacity PRDS system (CRH)</u> | | |
| | i. <u>Steam pressure reducing valve:</u> | | |
| | ii. Stem | 1 | Number |
| | iii. Disc | 1 | Number |
| | iv. Body seat rings | 2 for each type, size and rating | Number |
| | v. Gland packing | 2 for each Type, size and rating of valve | Number |
| | vi. Pressure seal ring | 3 | Number |
| | vii. Gasket | 1 | Number |



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| 2.2 | <u>Low capacity spray water line control valves.</u> Valve trim including cage, plug, stem, seat rings, guide bushings, stem packing | 1 for each Type, size and rating of valves | Number |
| 3.0 | <u>Actuators & Assemblies</u> | | |
| | i) Actuator assembly | 10% or 1 no. Each type, model And rating whichever is more | |
| | ii) Position Feedback Transmitter | 20% or two no. Of each type Whichever is more | |
| | iii) Diaphragms, O-rings, seals etc. of all type, make etc. | 200% for each model | |
| | iv) Pneumatic air filter/regulator of each type, make rating etc. | 5% or one no. Whichever is more | |
| | v) Pressure gauges of all types, make rating etc. | 5% or one no. Of each type Whichever is more | |
| | vi) Solenoid valves | 10% or two no. Of each type Whichever is more | |
| | vii) Airlock Relays | 10% or two no. Of each type Whichever is more | |
| | viii) Positioner unit | 20% or one no. Of each type Whichever is more | |
| | ix) Pneumatic Relays | 10% or two no. Of each type Whichever is more | |



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Quality Assurance, Inspection and Testing

1.0 General:

1.1 All equipment covered under this specification shall be subject to inspection and test by the purchaser during manufacture, erection and commissioning. The approval of the purchaser of the results of the tests and inspection will not however, prejudice the right of the owner to reject the equipment if it does not comply with the specification when erected or does not give complete satisfactory service. The cost of all such tests shall be borne by the contractor.

1.2 Testing / Inspection procedures as detailed herein to give a basic quality control programme to be followed by the Bidder, are in no way comprehensive and in no way form a complete quality assurance programme. Any other inspection stage not mentioned in these clauses but required as per the Bidder's process control shall be deemed to be included. Any tests necessary from operation, safety and reliability point of view shall also be included. Such tests shall be subject to the approval / recommendation of the Purchaser.

1.3 The Bidder shall furnish the quality control procedures to be adopted for assuring quality of each equipment under this specification from the receipt of material at site, during storage, erection, pre-commissioning to final trial run and commissioning of the valves. These procedures shall necessarily include all checks / tests conducted at site for preservation, pre-assembly, alignment, positioning of equipment, foundation preparation, welding / bolting, heat



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treatment, non-destructive examination, hydraulic test, performance test etc. The above shall be discussed and finalised with the Purchaser.

2.0 Shop Tests:

2.1 The contractor shall permit the Purchaser, if he so desires to maintain one or more of his representatives in the Contractor's shops and/or at the shops of his sub-contractors for the purpose of inspecting the various steps in the shop fabrication and the various tests to be performed for the materials supplied under this specification. The Purchaser's representative(s) shall have complete access to all parts of the shop wherein work under this specification is to be performed.

2.2 The contractor shall adopt good quality control procedures and provide inspection in his works and that of his sub-contractors to ensure the mechanical accuracy of components, compliance with drawings, identify and acceptability of all material, part and equipment. He shall conduct all tests required to ensure that the equipment furnished conforms to the requirements of the applicable codes. All tests and test procedures proposed by the manufacturer/fabricator shall be submitted to the purchaser for his prior approval. The purchaser shall be notified well in advance of the fabrication and major tests of the appurtenances and equipment, for the purpose of making general inspections and progress reports.

2.3 The Purchaser's representative shall have full access to the shops where the equipment to be supplied is being tested and all test records including records on heat treatment, radiography, ultrasonic test, magnetic particle test, material analyses etc. shall be made available to him. When the contractor offers finished



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- equipment for final inspection, notice of at least 15 days shall be given to the purchaser to enable his inspector to plan and carry out the inspection.
- 2.4 No material shall be despatched to the site from the manufacturers works until the owner has arranged for and carried out inspection to his satisfaction or has waived this requirement in writing.
- 2.5 Material test and analysis:
All materials shall be furnished in strict accordance with the applicable codes and the detailed specifications herein. All sources of material shall be disclosed and relevant test certificates giving precise details of identification of material, the physical and chemical properties of the material shall be submitted to the owner for approval. Test coupons shall be cast from the same melt for the body & disc.
- 2.6 Shell Test:-
All valves shall be subjected to shell test as per ANSI B16.34 and MSS-SP-61. All gaskets used for test shall be of the same material and design as specified for the finished products. Where mechanical gasket joints are broken following tests, new gaskets shall be fitted with the equipment and the joints shall be re-tested.
- 2.7 100% visual check shall be carried out for dimensions, end connection details and Surface finish of the equipment.
- 2.8 The complete inspection shall be carried out as per the owner's quality plan.
- 2.9 The inspection shall be carried out as per the drawing approved by the purchaser



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Section VII

Documents to be furnished along with the offer

- Note: a) All documents shall be in ENGLISH language only
b) Only units followed in this specification are to be used.

| Sl.no | Description | To be filled by the bidder. Bidder's drawing or document reference (if not furnished "not furnished" with reason |
|-------|---|--|
| 1.0 | General arrangement drawing of the valves with operators and other special accessories indicating clearly a) overall dimensions, b) Weight of valve, actuator & special accessories, c) Model no. d) Make & country of Manufacture, e) Rating/Design code f) Type g) End connection details h) Type of operator i) Make of operator and Model No. j) Valve Tag nos. | |
| 2.0 | Cross sectional drawing of the valve with operators and special accessories indicating minimum the following: | |



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| 3.0 | <p>i) Names of all parts</p> <p>ii) Material of construction of all parts(Material specification shall not be in general terms like carbon steel, Alloy steel etc. Material specification shall conform to International standards. In case of Material specification other than ASTM, equivalent ASTM material specification to be indicated. No part of the valve to be left in the Tabulation).</p> <p>Minimum the following parts to be covered if applicable.</p> <ul style="list-style-type: none">a) Bodyb) Bonnet, Capc) Discd) Steme) Plugf) Disc seatg) Stem guideh) Gasketi) Gland packingj) Bolts & studsk) Nuts | |
|-----|--|--|



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| | | |
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| | <p>i) Hand wheel</p> <p>iii) Weight of all parts</p> <p>iv) Erection, commissioning and Mandatory Spares identification along with their Quantity.</p> <p>v) Weight of valve & actuator separately Total weight and flooded weight</p> <p>vi) Class rating as per ASME B16.34</p> <p>vii) Make & Country of Manufacture</p> <p>viii) Actuator Make & Type</p> <p>ix) End connection details</p> | |
| 4.0 | Relevant catalogues for the valves | |
| 5.0 | List of Tender deviations (It will be presumed that the bidder has no tender deviations in case bidder failing to furnish the same). | |

Certified that all the information called for is available in the document or drawing indicated above.



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TECHNICAL SPECIFICATION FOR AUX.PRDS CONTROL VALVES

Certified that our supply of valves will be in line with the Technical specification except the deviations furnished in Table IIIA and in the list of Tender deviations enclosed if any.

(signature of the bidder)



Bharat Heavy Electricals Limited
Piping Centre Chennai-17

| | | |
|--------------------------------|---------|--------------|
| Specification Number | Rev.no. | Sheet Number |
| PC: TSP: NABI:003,004 & 005 | 00 | 24 of 27 |

TECHNICAL SPECIFICATION FOR AUX.PRDS CONTROL VALVES

SECTION VIII

Documents to be furnished after award of the contract

- Note:
- All documents shall be in ENGLISH language only
 - Only units followed in this specification are to be used.
 - All documents shall contain the project name
 - Applicable valve tag nos.

| Sl.no | Description | Ref. Drawing | No of days reqd. To submit for approval after LOA / TOA or to resubmit for approval after BHEL comments. | No. of copies to be sent for approval. | No of days to furnish final drg after approval. | No of copies to be furnished after final approval. |
|-------|---|--------------|--|--|---|--|
| 1.0 | General arrangement drawing as per point 1 , section VII. | | 15 | 5 | 5 | 15 |
| 2.0 | Cross sectional drawing as per point 2 , section VII | | 15 | 5 | 5 | 15 |
| 3.0 | Applicable catalogue of valve. | | 15 | 5 | 5 | 15 |



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| | | |
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TECHNICAL SPECIFICATION FOR AUX.PRDS CONTROL VALVES

| | | | | | |
|-----|---|-------|---|---|----|
| 4.0 | Erection, commissioning, operation and maintenance Manual containing minimum of the following detail. | LATER | 5 | 5 | 15 |
| | 1) General arrgt. & cross sectional arrgt. Drgs as per point 1&2 of section VII respectively | 15 | 5 | 5 | 15 |
| | 2) Actuator data sheet and wiring diagram of actuators. | | | | |
| | 3) List of Ball & Roller bearing schedule. | | | | |
| | 4) List of lubrication oil schedule | | | | |
| | 5) Do's and Do not's for valves & actuators. | | | | |
| | 6) Erection procedure & precautions to be taken. | | | | |
| | 7) Commissioning procedure & precautions to be taken. | | | | |
| | 8) Operating & maintenance instructions. | | | | |



Bharat Heavy Electricals Limited
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TECHNICAL SPECIFICATION FOR AUX.PRDS CONTROL VALVES

| | | | | | | |
|-----|---|--|-----------------|-----|----|----|
| 5.0 | Test certificates. | | Not Applicable. | Nil | 45 | 15 |
| | 1) Raw material test certificates (chemical & mechanical) | | | | | |
| | 2) Hydro test certificates. | | | | | |
| | 3) Seat test certificates | | | | | |
| | 4) Back seat test certificates | | | | | |
| | 5) NDT & other test certificates as per ASME B 31.1 | | | | | |
| 6.0 | IBR and other mandatory requirements if required. | | Not Applicable | Nil | 45 | 15 |
| 7.0 | Reproducible of drawings in sl no: 1.0 & 2.0 | | Not Applicable | Nil | 60 | 15 |

Certified that the drawings / documents will be submitted / furnished as per the above Table.



Bharat Heavy Electricals Limited
Piping Centre Chennai-17

| Specification Number | Rev.no. | Sheet Number |
|--------------------------------|---------|--------------|
| PC: TSP: NABI:003,004 & 005 | 00 | 24 of 27 |

TECHNICAL SPECIFICATION FOR AUX.PRDS CONTROL VALVES

SECTION – III-- EQUIPEMENT SPECIFICATION

| | BONGAIGAON |
|---|---------------------------------|
| 1. High capacity Pressure control valve TAG No. AS-10 | 4-00-306-39886/REV00 (4 SHEETS) |
| 2. Low capacity Pressure control valve TAG No. AS-19 | 4-00-306-39888/REV00 (4 SHEETS) |
| 3. Common spray block valve TAG No. CD-15 | 4-00-306-39893/REV00 (4 SHEETS) |
| 4. High capacity spray CV TAG No. CD-02,CD-04 | 4-00-306-39889/REV00 (4 SHEETS) |
| 5 Low capacity spray CV TAG No. CD-08,CD-11 | 4-00-306-39890/REV00 (4 SHEETS) |
| 6.High capacity Desuperheater , TAG NO:DESH-01 | 4-00-306-39891/REV00 (2 SHEETS) |
| 7.Low Capacity Desuperheater TAG No.DESH-02 | 4-00-306-39892/REV00 (2 SHEET) |
| 8.Schematic Arrangement of Aux. PRDS station | 4-00-301-39885/REV00 (1 SHEET) |

(Signature of the Bidder)

SUB SECTION - IV:I-08

CONTROL VALVES & ACTUATORS

**NABINAGAR THERMAL POWER PROJECT
(4 X 250 MW)
STEAM GENERATOR WITH ELECTROSTATIC
PRECIPITATOR PACKAGE**

**TECHNICAL SPECIFICATIONS
SECTION VI, PART - B
BID DOCUMENT NO.: CS-0270-101-2**

| 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 special requirements of Control Valves such as Pressure and Temperature Control valves of Auxiliary PRDS, Start Up Drain control valves etc., refer corresponding mechanical sections. | | |
| 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. | | |
| NABINAGAR THERMAL POWER PROJECT (4X250 MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE | TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOCUMENT NO.: CS-0270-101-2 | SUB-SECTION-IV:1-08 CONTROL VALVES, ACTUATORS & ACCESSORIES | PAGE 1 OF 6 |

| CLAUSE NO. | TECHNICAL REQUIREMENTS | | | | | | | | | | | |
|---|--|--|--|--|---------|---------|---------------|---------------|---|-----------------------------|---|--|
| 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. | | | | | | | | | | | |
| 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 <table border="1" data-bbox="408 1470 1362 1736"> <thead> <tr> <th data-bbox="408 1470 469 1537">Sr. No.</th> <th data-bbox="469 1470 654 1537">Service</th> <th data-bbox="654 1470 1024 1537">Body material</th> <th data-bbox="1024 1470 1362 1537">Trim Material</th> </tr> </thead> <tbody> <tr> <td data-bbox="408 1559 469 1603">1</td> <td data-bbox="469 1559 654 1670">Non-corrosive, non-flashing</td> <td data-bbox="654 1559 1024 1670">Carbon steel ASTM-A216 Gr. WCB for fluid temperature below 275 Deg. C</td> <td data-bbox="1024 1559 1362 1670">316SS stellited with stellited faced guide posts and bushings.</td> </tr> </tbody> </table> | | | | Sr. No. | Service | Body material | Trim Material | 1 | Non-corrosive, non-flashing | Carbon steel ASTM-A216 Gr. WCB for fluid temperature below 275 Deg. C | 316SS stellited with stellited faced guide posts and bushings. |
| Sr. No. | Service | Body material | Trim Material | | | | | | | | | |
| 1 | Non-corrosive, non-flashing | Carbon steel ASTM-A216 Gr. WCB for fluid temperature below 275 Deg. C | 316SS stellited with stellited faced guide posts and bushings. | | | | | | | | | |
| NABINAGAR THERMAL POWER PROJECT (4X250 MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE | TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOCUMENT NO.: CS-0270-101-2 | SUB-SECTION-IV-I-08 CONTROL VALVES, ACTUATORS & ACCESSORIES | PAGE 2 OF 6 | | | | | | | | | |

| CLAUSE NO. | TECHNICAL REQUIREMENTS | | |
|---|--|--|------------------------|
| 4.00.00 | <p>and non-cavitation service Alloy steel ASTM-A217Gr. WC9 for fluid temperature above 275 Deg. C</p> <p>2. Severe flashing/cavitation services Alloy steel ASTM-A217 Gr. 440 C WC9</p> <p>3. Low flashing/cavitation service Alloy steel ASTM-A217 Gr. 17-4 PH SS WC6</p> <p>4. Condensate, DM water service 316 SS 316 SS</p> <p>NOTE Valve body rating shall meet the process pressure and temperature requirement as per ANSI B16.34.</p> <p>However, Bidder may offer valves with body and trim materials better than specified materials and in such cases Bidder shall furnish the comparison of properties including cavitation resistance, hardness, tensile strength, strain energy, corrosion resistance and erosion resistance etc. of the offered material vis-a-vis the specified material for Employer's consideration and approval.</p> <p>END PREPARATION</p> <p>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.</p> | | |
| 5.00.00 | <p>VALVE ACTUATORS</p> <p>All control valves shall be furnished with pneumatic actuators. The Bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut off pressure and leakage class requirements. The valve actuators shall be capable of operating at 60 deg.C continuously.</p> <p>Valve actuators and stems shall be adequate to handle the unbalanced forces occurring under the specified flow conditions or the maximum differential pressure specified. An adequate allowance for stem force, at least 0.15 Kg/sq.cm. per linear millimeter of seating surface, shall be provided in the selection of the actuator to ensure tight seating unless otherwise specified.</p> <p>The travel time of the pneumatic actuators shall not exceed 10 seconds.</p> | | |
| <p>NABINAGAR THERMAL POWER PROJECT (4X250 MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE</p> | <p>TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOCUMENT NO.: CS-0270-101-2</p> | <p>SUB-SECTION-IV-I:08 CONTROL VALVES, ACTUATORS & ACCESSORIES</p> | <p>PAGE 3 OF 6</p> |

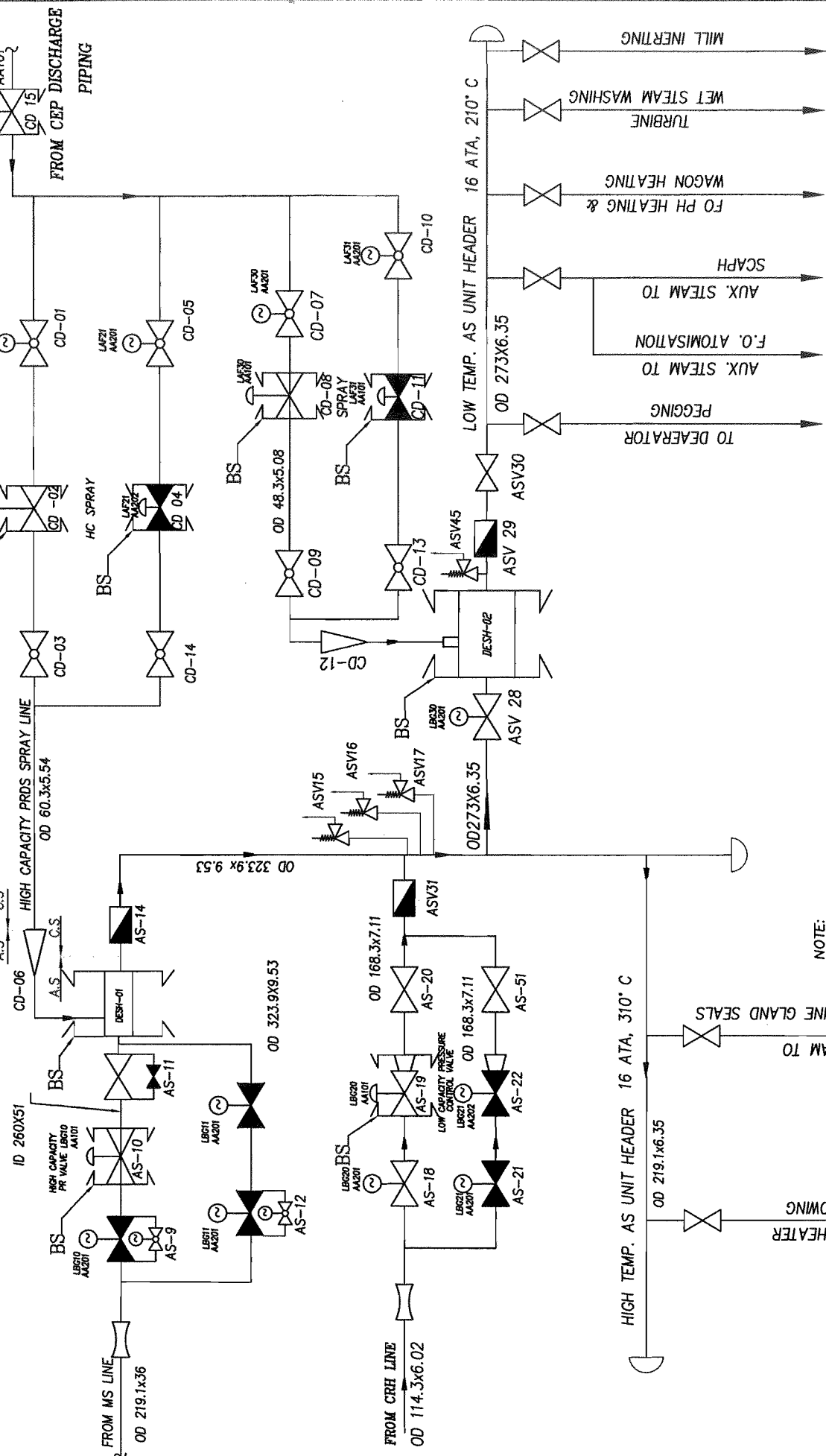
| CLAUSE NO. | TECHNICAL REQUIREMENTS | | |
|---|--|--|------------------------|
| 6.00.00 | CONTROL VALVE ACCESSORY DEVICES | | |
| 6.01.00 | All pneumatic actuated control valve accessories such as air locks, hand wheels/hand-jacks, limit switches, microprocessor based electronic Positioner, diffusers, external volume chambers, position transmitters (capacitance or resistance type only), reversible pilot for Positioner, tubing and air sets, solenoid valves and junction boxes etc. shall be provided as per the requirements. | | |
| 7.00.00 | SPECIFICATIONS FOR MICROPROCESSOR BASED ELECTRONIC POSITIONER | | |
| Electrical | Input Signal | 4-20 mA | |
| | Power Supply | Loop Powered from the output card of Control System. | |
| | Hart Protocol | Compatibility For Remote Calibration & Diagnostics(Super-Imposed Hart Signal On Input Signal(4-20 mA)) | |
| | Valve Position Sensing | Position Sensing (Non Contact-Type),4-20 Ma O/P Signal For Control System To Be Provided | |
| Environment | Operating Temp | (-)30 To 80 Deg. C | |
| | Humidity | 0-95 % | |
| | Protection Class | IP-65 Minimum | |
| Software For Configuration And Diagnostic | Software | Windows Based Software. Software Shall Meet the Requirement For Configuration, Diagnostics, Calibration And Testing Of The Actuator | |
| | Diagnostic/Test Features | Advanced Diagnostic Features Like Stroke Counter Or Travel Counter, Leakage In Actuators, On Line Partial Closure Test, Valve Signature Analysis, Step Response Test, Valve Friction /Jamming Detection Etc To Be Provided | |
| | Factory Valve Signature Tests Reports (Pr Vs Valve Travel And Travel Vs I/P Signal) are to be provided. | | |
| Hardware | PC | For Configuration/Software Ref PC Specified Under DDCMIS Section | |
| Tests Certificates | Test certificates as per Manufacture Standard/Relevant Standard are To Be Submitted | | |
| NABINAGAR THERMAL POWER PROJECT (4X250 MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE | TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOCUMENT NO.: CS-0270-101-2 | SUB-SECTION-IV:I-08 CONTROL VALVES, ACTUATORS & ACCESSORIES | PAGE 4 OF 6 |

| CLAUSE NO. | TECHNICAL REQUIREMENTS | | |
|---|--|--|--|
| | Configuration/ | Remote Calibration, Auto & Manual Calibration Shall Be Possible | |
| | Operating | Operating Range | Full Range & Split Range Signal Range |
| | Modes | Valve Action | Direct & Reverse. Valve Action |
| | | Flow Characterization | Possible To Fit Valve Characteristic Curve Linear & Equal Percentage |
| | Fail Safe/Fail Freeze | Fail Safe/Fail Freeze Feature is to Be Provided. | |
| | Pneumatic | Air Capacity | Sufficient To Handle The Valves Selected/Boosters To Be Supplied If Required. |
| | | Air Supply Pressure | To Suit The Air Supply Pressure/Quality Available. |
| | | Process Connection | 1/4 Inch NPT |
| | Performance | Characteristic Deviation | <=0.5 % Of Span |
| | | Ambient Temp Effect | <=0.01 %/Deg C Or Better |
| | EMC & CE Compliance | Required To International Standard Like EN/IEC. | En50081-2& En50082 Or Equivalent |
| | Accessories | In Built Operator Panel | Display With Push Buttons For Configuration And Display On The Positioner Itself (Password Protected/Hardware Lock) |
| | | Hand Held Hart Calibrator | Universal Hart Calibrator To Be Provided, One Per Unit |
| | | Press Gauge Block | For Supply & Output Pr., Filter Regulator Other Accessories Shall Be Provided As On Required Basis For Making System Complete. |
| | | Electrical Cable Entry | 1/2-Npt,Side Or Bottom Entry To Avoid Water Ingress |
| NABINAGAR THERMAL POWER PROJECT (4X250 MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE | TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOCUMENT NO.: CS-0270-101-2 | SUB-SECTION-IV:I-08 CONTROL VALVES, ACTUATORS & ACCESSORIES | PAGE 5 OF 6 |

| CLAUSE NO. | TECHNICAL REQUIREMENTS | | |
|---|--|--|---|
| | | Valves Mounting Assembly | For Sliding Stem/Rotary/Single Acting/Double Acting On Required Basis |
| 8.00.00 8.01.00 8.02.00 8.03.00 8.04.00 8.05.00 | <p data-bbox="401 415 720 444">TEST AND EXAMINATION</p> <p data-bbox="401 475 1367 592">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 data-bbox="401 623 894 652">Non Destructive Test as per ANSI B-16.34.</p> <p data-bbox="401 683 1318 712">Hydrostatic shell test in accordance with ANSI B 16.34 prior to seat leakage test.</p> <p data-bbox="401 743 1367 802">Valve closure test and seat leakage test in accordance with ANSI-B 16.34 and as per the leakage class indicated above.</p> <p data-bbox="401 833 1367 915">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 data-bbox="401 946 1367 1028">CV Test: CV test shall be carried out as type test on each size, type and design of the valves as per ISA 75.02 standard and test report shall be furnished for Employer's approval.</p> | | |
| 9.00.00 | <p data-bbox="401 1070 786 1099">CONTROL VALVE QUANTITIES</p> <p data-bbox="401 1130 1367 1300">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> | | |
| NABINAGAR THERMAL POWER PROJECT (4X250 MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE | TECHNICAL SPECIFICATIONS SECTION-VI, PART-B BID DOCUMENT NO.: CS-0270-101-2 | SUB-SECTION-IV:I-08 CONTROL VALVES, ACTUATORS & ACCESSORIES | PAGE 6 OF 6 |

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING No
4-00-301-39885



NOTE: EQUIPMENT IN BIDDER'S SCOPE HAVE BEEN MARKED AS BS

| | |
|--|--------------------|
| NABINAGAR THERMAL POWER PROJECT 4X250MW | |
| PREPARED SUKUMAR | CHECKED SUKUMAR |
| APPROVED CV NATHAN | |
| DRAWING No 4-00-301-39885 | |
| TITLE AUX. PRDS STATION | |
| REV 00 | SIZE A4 |

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