An ISO 9001
Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
MATERIALS MANAGEMENT

TITLE **START UP SYSTEM CONTROL VALVES AND WARM KEEPING LEVEL CONTROL VALVE WITH ACCESSORIES & THEIR COMMISSIONING SPARES AS PER ATTACHED SPECIFICATIONS**	Phone: **+91 431 257 7985** Fax : **+91 431 252 0719** Email : **baski@bheltry.co.in**

	Reference Number: Enquiry **1801300351/01**	**Enquiry Date:** **12.03.2013**	**Due date for submission of quotation: 11.04.2013**
You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order			

BHEL/Trichy is looking for empanelment of new vendors for supply of "START UP SYSTEM CONTROL VALVES AND WARM KEEPING LEVEL CONTROL VALVE WITH ACCESSORIES & THEIR COMMISSIONING SPARES AS PER ATTACHED SPECIFICATIONS"

BHEL commercial terms & conditions with Price Bid formats and all annexure can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units>> Bharat Heavy Electricals Limited) or from http://eprocure.gov.in/epublish/app under enquiry reference "**XXXXXXXXXX**"

Tenders should reach us before 14:00 hours on the due date Technical bid will be opened at 14:30 hours on the due date Tenders would be opened in presence of the renderers who have submitted their offers and who may like to be present.	Yours faithfully, For **Bharat Heavy Electricals Limited** **AGM / MM**

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

PHONE :2577074
GRAMS : BHARATELEC
FAX NO: 2520719
E-mail: mkraj@bheltry.co.in
Web:

429-002/A

Enquiry No	Enquiry Date	Due Date for Quotation
1801300351 - 01	12.03.2013	11.04.2013

Please quote Enquiry No, Date and due date in all correspondences.
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Item	Description	Unit	Quantity	Delivery Quantity	Schedule Date
10	L180212486701001 SEPERATOR LEVEL CONTROL VALVE ASSEMBLY.	SET	4.000	4.00	26.06.13
20	L180212486701002 MINIMUMECONOMISER FLOWCONTROL VALVE ASSY	SET	2.000	2.00	26.06.13
30	L180212486701003 Common Electro Hydraulic Control Unit ,,One (1) Common Hydraulic Unit and Electronic Control Unit for the positioning control of the two BOILER SEPARATOR LEVEL CONTROL VALVES (HWL-1, HWL-2 VALVES) and Minimum Economizer Flow Control Valve (MEFCV)	SET	2.000	2.00	26.06.13
40	L180212486701005 FILLS OF HYDRAULIC FLUID	SET	4.000	4.00	26.06.13
50	L180212486701006 SPECIAL TOOLS	SET	2.000	2.00	26.06.13
60	L180212486701007 WARMUP SYSTEM LEVEL CONTROL VALVE ASSY	SET	2.000	2.00	26.06.13
70	L180212486701008 TUBINGS AND FITTINGS	SET	2.000	2.00	26.06.13
80	L180282498802001 One lot of commissioning spares for each valve (Two seperator control valves , one Minimum Economiser Flow control valve and one warm keeping level control valves) and Electro Hydraulic Power and control Kit as per SELLER'S specific recommendation	SET	2.000	1.00	24.06.13
				1.00	24.01.14

General Note:
PROJECT: YERMARUS 2X800MW UNIT - 1 & 2

The offers should reach us 30 minutes before the time of opening of tenders.
The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

N. BASKAR
Manager
MANAGER / PURCHASE / FB
(FOSSIL BOILERS)
BHEL, TRICHY-620 014.

Yours faithfully,

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HIGH PRESSURE BOILER PLANT
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THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

PHONE :2577074
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E-mail: mkraj@bheltry.co.in
Web:

1801300351 / 12.03.2013

1. All filled up Data sheets,Drawings,Calculations and catalogue are to be submitted along with the offer.
2. Offer to be submitted in TWO part bid system i.e. Technical offer with commercial terms and conditions and price bid in separate sealed cover.
3. Offer will be evaluated on total package basis.
4. Please submit Annexure-A (for indigenous vendors)/ Annexure E (for foreign vendors)-Commercial terms & Conditions, dully filled, signed & sealed.
6. We are here by attaching the "Special Conditions" Ref. FB : BOI: STARTUP Valve/01 along with this enquiry. Pl furnish your pointwise confirmation to our conditions.
7. Risk Purchase Clause is applicable.
8. For evalutaion , exchange rate (TT selling rate of SBI) as on scheduled date of tender opening(part 1 bid in case of two part bid) shall be considered.(for Foreign vendors)
9. Vendor quality plan shall be submitted along with the technical offer.
10. This is an open tender enquiry and the same has been published on http://eprocure.gov.in, www.bhel.com and www.tenders.gov.in

Enclosures:

ENCLOSURES:-

1. SPECIFICATION FOR START UP CONTROL VALVES (Specification no. BM/SCV:001) - 28 SHEETS
2. SPECIFICATION FOR WARM UP CONTROL VALVES (Specification No. BM/WLC:001) - 22 SHEETS
3. Warm Keeping Level Control Valve Data Sheet - 2 SHEET
4. TB DIAGRAM (3-97-599-20498) - 1 SHEET
5. Technical Specification of smart positioner -2 SHEETS
6. SITE LOCATION SPECIFICATION - 4 SHEETS
7. CHECK LIST FOR SH/RH VALVES - 1 SHEET
8. Terms & conditions for Indigenous vendors - 1 SHEET
9. Terms and onditions for Import vemdors -1 SHEET
10. ANNEXURE-A (APPLICABLE COMMERCIAL TERMS & CONDITIONS for indigenous vendor)- - 1 SHEET
11. Annexure E (Applicable commercial terms and conditons for import vendor) -1 SHEET
12. Special Terms & Conditions - 2 SHEETS

"LD clause has to be confirmed without fail."

"Payment to vendors will be made only thro E-Payment mode"

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Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

N. BASKAR
MANAGER - PURCHASE
(FOSSIL BOILERS)

Materials Management / FB
BHEL, TRICHY - 620 014.

ENGINEERING SPECIFICATION

FOR

STARTUP CONTROL VALVES

SPECIFICATION NO : BM/SCV :001

Prepared by:	Reviewed by:	Approved by:
A.Jai Ganesh Product Engineer PE / FB (BM)	I.Gopalan Senior Manager PE / FB (BM)	K.Periasamy Deputy General Manager PE / FB (BM)

Revision Log — Template Form Revision No.: 00

Revision No.	Date	Reason	Prepared		Reviewed		Approved	
			Name	Sign.	Name	Sign.	Name	Sign.
01	25.02.13	C&I and QA comments	A.Jai Ganesh		Gopalan.I		K.Periasamy	

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This Specification defines the minimum, acceptable requirements for the design and performance of one pair of BOILER SEPARATOR LEVEL CONTROL VALVES (HWL-1, HWL-2 VALVES) and one BOILER MINIMUM ECONOMIZER FLOW CONTROL VALVE (MEFCV VALVE) for a coal fired, supercritical, steam generating unit.

2.0 SCOPE OF WORK

2.1 Supplier shall provide equipment and components in accordance with the approved suppliers listed in this specification, unless otherwise approved by BHEL. Equipment or components not listed shall be Supplier's standard.

2.2 For skid mounted assemblies, all instrumentation and control wiring connections by BHEL to Supplier's equipment shall be external to the equipment on numbered terminal strips in junction boxes or electrical panels.

2.3 All piping furnished by the Supplier shall be provided in ISO standard sizes in nominal Metric units (DN sizes). All weld end preparations, socket weld couplings, threaded connections, flange sizes and ratings, at BHEL/Supplier terminal points shall comply with ISO standards in Metric units and also as per the data sheet.

2.4 Nozzles shall be prepared for connection with BHEL piping as follows:

- Welded connections 50 NB and smaller shall be socket weld couplings in accordance with the requirements of ASME B16.11.
- Welded connections 65NB and above shall be butt weld connections. Butt weld ends shall be beveled for welding in accordance with the requirements of BHEL.

2.5 All flanged connections shall be supplied in accordance with the requirements of ASME B16.5.

2.6 All materials shall be new and in accordance with applicable ASTM specifications or with other recognized standards such as SAE. No peening, caulking or filling shall be permitted in repairing cracks, pin-holes or blow-holes. Defects in fabricated steel shall be repaired by chipping out welds to bottom of vee and rewelding.

2.7 The use of asbestos or material containing asbestos shall not be permitted. The use of mercury or material containing mercury shall not be permitted. All nonmetallic materials shall be noted to BHEL for approval.

2.8 The equipment and materials specified are intended to be the minimum suitable for the intended service. They are not intended to limit the Supplier's responsibility for proper design and selection of equipment. It is the Supplier's responsibility to bid a complete system for the intended service and the specification is only for general guidelines. Any changes in proposed equipment or materials during design shall be approved by BHEL.

2.9 All quotations and attachments submitted to BHEL shall be in the English language.

2.10 All quotations and inquiries to BHEL shall be routed through Purchasing.

2.11 Parts subject to wear, corrosion, deterioration or requiring adjustment, inspection or repair shall be accessible and capable of reasonably convenient removal, replacement and repair.

2.12 The Supplier shall complete and submit the Supplier Data Sheets and guarantees located in Section 10.0 of this specification with the equipment offered in full conformance with the specification. The Supplier shall provide a complete written description of all omissions or exceptions to the requirements of this specification. This written description must be included in Section 11.0 EXCEPTIONS TO THE SPECIFICATION of this specification. Without the complete data sheets and the EXCEPTIONS TO THE SPECIFICATION sheets, the proposal will not be evaluated.

2.13 Optional equipment shall be priced separately.

2.14 Offers from Traders / Stickiest shall not be considered. Offers only from valve manufacturer shall be considered.

2.15 The Supplier shall be governed by the following regulations, codes, and standards, including their latest respective addenda, amendments, and errata.

AFBMA	Antifriction Bearing Manufacturers' Association
AGMA	American Gear Manufacturers' Association
AHI	American Hydraulic Institute
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute

API	American Petroleum Institute
ASME	American Society Mechanical Engineers
ASTM	American Society Testing and Materials
AWS	American Welding Society
EIA	Electronics Industries Association
FCI	Fluid Controls Institute, Inc.
IEC	International Electro technical Commission
IEEE	Institute of Electrical and Electronics Engineers
IPCEA	International Power Cable Engineers Association
ISA	Instrumentation Society of America
MSS	Manufacturers Standardization Society of the Valve & Fittings Industry
NEMA	National Electrical Manufacturers' Association
NEC	National Electrical Code
NFPA	National Fire Protection Association
OSHA	Occupational Safety Health Act
PFI	Pipe Fitting Institute
SAMA	Scientific Apparatus Makers Association
SSPC	Steel Structures Painting Council
UL	Underwriter's Laboratories

In addition to the codes and standards specifically mentioned above for the equipment / plant / system, all equipment parts, systems and works covered under this specification shall comply with all currently applicable statutory regulations and safety codes of the Republic of India as well as of the locality where they will be installed, including the following:

a) Bureau of Indian Standards (BIS)
b) Indian Electricity Act
c) Indian Electricity Rules
d) Indian Explosives Act
e) Indian Factories Act and State Factories Act
f) Indian Boiler Regulations (IBR)
k) Rules for Electrical installation by Tariff Advisory Committee (TAC).
l) Any other statutory codes / standards / regulations, as may be applicable.

Unless covered otherwise by Indian codes & standards and in case nothing to the contrary is specifically mentioned elsewhere in the specifications, the latest editions of the following codes and standards shall also apply:

a) American Petroleum Institute (API)
b) International Organization for Standardization (ISO)
c) Tubular Exchanger Manufacturer's Association (TEMA)
d American Welding Society (AWS)
e) Expansion Joint Manufacturers Association (EJMA)
f) Heat Exchange Institute (HEI)

g) Standards of the Hydraulic Institute, U.S.A.

Other International/ National standards such as DIN, VDI, BS, GOST etc. shall also be accepted for only material codes and manufacturing standards, subject to the Employer's approval, for which the Supplier shall furnish, adequate information to justify that these standards are equivalent or superior to the standards mentioned above. In all such cases the Supplier shall furnish specifically the variations and deviations from the standards mentioned elsewhere in the specification together with the complete word for word translation of the standard that is normally not published in English.

3.0 APPLICABLE CODES & STANDARDS

3.1 The valves shall comply with the applicable requirements of the latest edition of ASME B31.1, Power Piping Code.

3.2 Valve design in accordance with ASME B16.34.

3.3 The valve sizing shall be in compliance with latest edition of ISA S75.01 Hand book on Control Valves considering measures to avoid choked flow.

3.4 All pressure retaining parts of the valve shall be made of materials, including specific limitations on various materials, that are in full compliance with PG.-5 of ASME Code Section 1.

3.5 Materials

3.5.1 Only materials listed and rated in B16.34 are acceptable and materials offered shall be appropriate to the design conditions listed.

3.6 For valves of other than US standards, the Supplier shall specify (at the time of quotation) the Codes and Standards which will be used through the manufacturing and design processes. The Codes and Standards as specified will be subject to approval by **BHEL.**

3.7 Reference to the above Codes and Standards shall mean the latest revision, edition and addenda effective at the date of order unless specifically stated otherwise in this specification.

3.8 All welders and all welding procedures welders utilized shall be qualified in accordance with ASME Section IX. When welders and welding

procedures are qualified in accordance with codes other than those specified, the Supplier must take exception at the time of quotation.

3.9 All materials shall be readily identifiable. Mill test reports shall be obtained for all pressure boundary parts. These test reports shall be available for review at the Vendor's shops. Copies of these are to be supplied to the Company, if requested, prior to ordering.

3.10 Valve Revisions

3.10.1 Supplier Changes

3.10.1.1 Supplier shall fabricate the valves based on the drawings approved by BHEL.

3.10.2 If the valve design requires modification due to Supplier error during the Supplier tests or QA inspection, the Supplier will correct the design and reflect these changes in the AS-BUILT revision of the drawings.

4.0 EQUIPMENT FURNISHED BY SUPPLIER

4.1 Two (2) BOILER SEPARATOR LEVEL CONTROL VALVES (HWL-1, HWL-2 VALVES) complete with hydraulic actuator and associated positioning controls as per this specification.

4.2 One (1) BOILER MINIMUM ECONOMIZER FLOW CONTROL VALVE (MEFCV) complete with hydraulic actuator and associated positioning controls as per this specification.

4.3 One (1) Common Hydraulic Unit and Electronic Control Unit for the positioning control of the two BOILER SEPARATOR LEVEL CONTROL VALVES (HWL-1, HWL-2 VALVES) and Minimum Economizer Flow Control Valve (MEFCV) as per this specification.

4.4 Optional Equipment

4.4.1 The following equipment shall be proposed as an option.

☒ One *(1)* stainless steel tubing and fittings to connect all necessary hydraulic lines between the common SUPPLIER

supplied Common Hydraulic Unit and the three SUPPLIER supplied BOILER SEPARATOR LEVEL CONTROL VALVES (HWL-1, HWL-2 VALVES) and Minimum Economizer Flow Control Valve (MEFCV) hydraulic actuators. Each Valve location from the common hydraulic unit is furnished below.

a) HWL1 to Hydraulic Unit - 51 m
b) HWL2 to Hydraulic Unit - 60 m
c) MEFCV to Hydraulic Unit - 59 m

☒ *Two (2)* fills of hydraulic fluid, first for start up and second for hydraulic fluid change prior to operation.

☒ *One (1)* lot of special tools required for maintenance of system components. Supplier shall furnish all special tools and wrenches required for erection, calibration, servicing including instructions for their use. Tools shall be new. Tools shall be shipped to the project site in a suitable, separate container, clearly marked with the name of the equipment for which they are intended.

☒ *One (1)* lot of commissioning spares for each valve per SUPPLIER'S specific recommendation.

☒ ~~*One (1) lot of recommended spares for each valve per SUPPLIER'S specific recommendation for One(1) year warranty period of operation*~~ (Dealt By Spares Group)

☒ ~~*One (1) lot of recommended spares per SUPPLIER's specific recommendation for Three (3) years of operation after final acceptance*~~ (Dealt By Spares Group)

☐ ~~*Two (2) Two (2) BOILER SEPARATOR LEVEL CONTROL VALVES (HWL-1, HWL-2 VALVES) complete with hydraulic actuator and associated positioning controls per this specification in an angle valve body configuration in place of "Z" valve body.*~~

☐ ~~*One (1) BOILER MINIMUM ECONOMIZER FLOW CONTROL VALVE (MEFCV) with Hydraulic actuator utilizing the Common Hydraulic Unit in place of Electric Actuator*~~.

5.0 TERMINAL POINTS

5.1 At all valve inlets and outlets.

5.2 At the terminal junction boxes on each supplied valve, the terminals in the hydraulic power unit, and the terminals in the control cabinet.

6.0 FACILITY SITE SPECIFIC DATA

Please refer to attached specifications Annexure-I for Facility Site Specific Data.

7.0 DRAWINGS AND DATA BY SUPPLIER

7.1 All drawings, calculations, specifications, bills of materials and other data submitted shall be in Metric units. Dual Dimensions are acceptable with Metric (primary) and English (in parenthesis). Metric units shall comply with the International SI System.

7.1.1 The following units are to be used:

- Temperature °C
- Pressure Kg / cm^2 (g)
- Dimensions mm
- Flow kg/sec

7.2 Submitted With Quotation

- The Supplier shall provide dimensional outline drawings of the assembled unit(s). The drawings shall show overall dimensions, terminal box dimensions, mounting connections, clearances required for proper installation and maintenance shall state lifting requirements, and the weights of all major components.
- List of commissioning spares.
- List of special tools and equipment as required for assembling, complete dismantling, and maintenance of all equipment supplied,
- Performance data and curves.
- Completed Supplier Data Sheets per Section 10.0
- Any special requirements or operational limits shall be explicitly stated in each quotation.
- Field testing requirements.
- Actuator sizing calculations
- Terminal box wiring diagram
- Integrated Manufacturing and Quality Plan for BHEL's review

7.3 Descriptions of Equipment

- A written description of the equipment being offered shall be provided with the Bid. This information shall explain details of the design, construction, control, operation and performance.
- Consumable list including, compressed air, instrument air and electrical requirements indicating frequency of usage; intermittent or continuous.

- Experience List for valves in similar service including size, service, flow rate, pressure, temperature, and date placed in operation.

7.4 Submitted During Contract

- Detailed arrangement drawings of the assembled units including support details, flange connections, etc. All materials shall be readily identifiable on Supplier's drawings.
- Electrical wiring diagrams and connection details
- Instrument list
- Instrument data sheet(s) (ISA format or equal)
- Valve flow characteristic curve
- List of shop tests that will be conducted on the furnished equipment
- Complete set(s) of instruction, operation, maintenance, and erection manuals, quantities will be identified in the purchase order
- List of shop applied paints and protective finishes identifying compatible site applied coatings
- List of all lubricants required for the equipment operation identifying preferred acceptable substitutes
- Certification sheet for each valve containing the following information:
  - ✓ Manufacturer's Name
  - ✓ Manufacturer's serial number on the valve body
  - ✓ Flow direction arrow on the valve body
  - ✓ ASME material specification used for pressure parts including valve body and other pressure retaining parts
  - ✓ Maximum allowable pressure (design pressure), Kg / cm ^{2} (g) @ degrees C
  - ✓ Hydrostatic shell test pressure, Kg / cm ^{2} (g). Additional certification for valves manufactured to B16.34 Special Class.
  - ✓ Welding Certification: All welding on the valve has been performed using procedures and welders qualified in accordance with ASME Code Section IX.
  - ✓ Radiographs: Radiographic examination has been performed as required by ASME B16.34. One set of the completed radiographs, properly identified with the respective parts, will be retained and

available for inspection for a period of five (5) years.

- ✓ Surface examination of all castings performed by magnetic particle or liquid penetrant methods to the technique and acceptance standards of ASME B16.34.
- ✓ One (1) copy of each material manufacturer's certification.
- ✓ Authorized and dated signature certifying the above information to be complete and correct.
- ✓ Operation and Maintenance Manual describing the operation of the entire system shall be supplied (both hard copies and soft copies).

8.0 PERFORMANCE DATA & TECHNICAL REQUIREMENTS

8.1 Component Design Criteria

8.1.1 Function

8.1.1.1 Separator Level Control (HWL-1 & HWL-2) Valves:

8.1.1.1.1 The separator level control valves (HWL-1 & HWL-2) are used to control the water level in the water separator during "wet" mode operation of a supercritical boiler. As the level exceeds the set point first one, then the second valve will open. The valves will throttle saturated water from boiler at high pressure to a flash tank at atmospheric pressure. The water will be flashing to steam as it exits the valves.

8.1.1.2 Minimum Economizer Flow Control (MEFCV) Valve:

8.1.1.2.1 The Minimum Economizer Flow control valve (MEFCV) is used to control the economizer inlet flow during start-up and low load operation. Demand for this valve is established based on measured economizer inlet flow compared to a minimum boiler flow requirement.

8.2 Qualification and provenness criteria requirement.

8.2.1 The bidder shall offer and supply equipment of the type and rating which they have supplied, commissioned in at least one plant of super critical steam generating units with an operating pressure of 255 kg/cm2 in similar applications and are in successful operation for a period of not less than 2 years as on the date of techno-commercial bid opening.

8.2.2 The bidder can offer and supply such equipment for 660 to 800MW super critical units with collaboration or valid licensing agreement for design, engineering, manufacture, supply of such equipment in India provided the collaborator meets the above provenness criteria.

8.2.3 Bidder shall furnish Performance / End-user certificate for the supply of similar valves commissioned in power plants with an operating pressure of 255 kg/cm2 in English language.

9.0 DESIGN AND CONSTRUCTION

9.1 In general, all valves and associated accessories shall meet the applicable requirements of accepted standards and attached customer specifications.

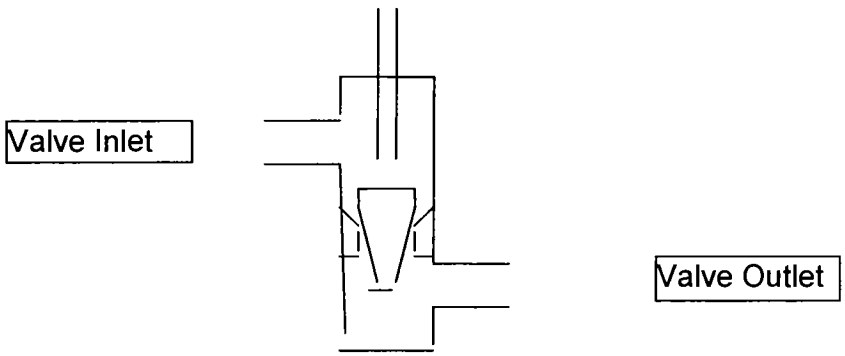
9.2 Design of the valves shall meet the latest edition of ASME B16.34.

9.3 The valve sizing shall be in compliance with latest edition of ISA S75.01 Hand book on Control Valves considering measures to avoid choked flow.

9.4 **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 15% of total valve stem travel.** All the Control 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.

9.5 The control valve size should not be smaller than connecting line size by more than 1 step.

9.6 Valves shall be straight through in "Z" valve configuration. "Z" configuration has parallel inlet and outlet nozzles in two different horizontal planes.



"Z" Valve

9.7 Valve shall be forged design.

9.8 Valve internals (seat, plug, cages, etc.) shall be replaceable without removing the valve hydraulic actuator from the valve body.

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

9.10 All control valves shall have stems, guide bushings, plugs, seat rings, stem lock pins, stuffing box parts and other trim parts made of stainless steel alloys and suitably hardened. Valve guide posts and bushings shall be stellite faced. Stellite faced guide posts and bushings shall be differential hardened for applications involving high pressure drop as well as for flashing and cavitation applications. **Trim material shall be 17-4 PH SS / 440C depending upon the service conditions to ensure required degree of hard facing so as to avoid erosion.** However , Bidder may offer valves with body and trim materials better than specified 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 Owner's consideration and approval..

9.11 The valve model proposed should be designed to prevent cavitation, wire drawing and flashing on the downstream side of the valve and piping for operation throughout the full range under the specified conditions. For cavitation service, the trim design shall be of multistage pressure drop type to prevent cavitation occurring downstream of trim / valve.

9.12 **Bidder shall furnish in his proposal detailed calculations to establish whether cavitation will occur or not under any operating condition for a particular application. These calculations shall be subject to Owner's review and approval and in case it is established at any stage of the contract that cavitation will occur, the Bidder shall provide anti-cavitation trim for the same at no extra price. Further the Bidder shall furnish in his proposal the detailed write up, technical literature, etc. clearly indicating as to how the occurrence of cavitation shall be prevented by the design of his offered anti-cavitation trim.**

9.13 Bidder to furnish calculation to check whether flashing or cavitation will occur for control valve services. Control Valves shall be provided with specially designed trims (such as cage guiding valves with holes in the cage to control the location of the Vena Contracts) which are suitable for withstanding high pressure drops and which minimize the adverse effects of flashing on Control Valve parts.

9.14 Valve sizing shall be in accordance with the latest edition of ISA Handbook on Control Valves with due consideration for the measures to avoid chocked flow. Bidder shall ensure that valve outlet velocity does not exceed 8 m / sec. for liquid services, 150 m / sec. for steam services and 50% of sonic velocity for flashing services.

9.15 Valve outlet shall have a 5 degree downward slope to ensure proper drainage of valve outlet.

9.16 Valve inlet and outlet cages shall be provided if required by the indicated process conditions.

9.17 For valves with butt weld ends, the supplier is required to prepare weld profiles to BHEL supplied information.

9.18 Both the valves and their accessories shall be designed for the process and local installation environment.

9.19 All valves and accessories shall be suitable for outdoor service. Electrical components (actuators, limit switches, solenoid valves, positioners, controllers, etc.) shall meet the requirements of IP 65.

9.20 The Supplier shall provide all necessary converters, positioners, position transmitters, etc. mounted on the control valve.

9.21 The direction of flow shall be clearly marked on each valve.

9.22 Control valves, their actuators and associated ancillary equipment must be selected to suit the application, design and working conditions specified and also the environmental conditions in which they are installed. The pressure and temperature rating of valve body shall be equal or exceed the process design conditions on control valve data sheet.

9.23 Valves and their actuators shall be adequately rated to suit the maximum differential pressure against which they will have to work, i.e. when the valve is fully closed.

9.24 Valve guiding and seating systems shall be so designed that smooth control is maintained over the full operational stroke. Design should be such that it eliminates vibration.

9.25 Valve's gland packing material shall be grafoil for all the valves.

9.26 The end for all the Control Valves shall be matched to the corresponding details for the piping on which the valve is installed. **All necessary expanders/reducers are to be supplied by the vendor to match the pipe sizes**

9.27 The boiler water system will be acid cleaned at site using a 1 to 1.5% (by weight) inhibited hydrofluoric acid. The valve internals must be capable of withstanding hydrofluoric acid without getting damaged.

9.28 The Leakage Class of separator level control valves (HWL-1 & HWL-2) and for Minimum economizer flow control valve (MEFCV) is to be Class-V or better as per FCI 70.2.

9.29 Hydraulic Valve Actuators

9.29.1 The separator level control valves (HWL-1 & HWL-2) shall be supplied with an Hydraulic actuator capable of a quick full stroke closing time of 3 sec against closing loads. Normal full stroke opening/closing time shall be 12 sec. The Hydraulic actuator for the minimum economizer flow control valve (MEFCV) full stroke opening/closing time shall be 12 sec.

9.29.2 The Hydraulic actuator shall be sized to operate against the process maximum differential pressure.

9.29.3 A mechanical position indicator shall be provided on the actuator.

9.29.4 The actuator shall be equipped with a hydraulic positioning valve to convert a 4 –20 mA DC signal from the DCS to a hydraulic signal.

9.29.5 The actuator shall be furnished with a 4 –20 mA DC valve position feedback signal.

9.29.6 The actuators for the HWL valves only shall be equipped with a safety quick closing system. The safety control system shall be activated by a signal (dry contact) from the DCS supplied by others. The safety control system shall be independent of other control device. The safety control system shall be capable of closing the valve with normal control system devices unavailable.

9.30 Hydraulic Unit and Electronic Control Unit (HWL-1, HWL-2 & MEFCV)

9.30.1 All control valves (HWL-1, HWL-2 & MEFCV) shall be supplied with a Hydraulic Unit and Electronic Control Unit. The hydraulic power unit serves to supply the necessary pressurized hydraulic fluid to the Hydraulic actuators. A common hydraulic power unit may be used for multiple Hydraulic Valve Actuators. The hydraulic power unit shall be equipped with an accumulator to maintain adequate pressure during peak operating requirements. The hydraulic

pumps shall be designed for the required pressure and mean oil consumption.

9.30.2 The hydraulic power unit shall be equipped with redundant motor-pump units with motor starters mounted in the Electronic Control Units. Each pump set shall be equipped with the necessary charging valve, check valves, filters, pressure reducing valves, pressure relief valves, and instrumentation required for operation of the hydraulic power unit.

9.30.3 The hydraulic power unit shall be equipped with an oil tank sized for the entire volume of oil. A tank air breather filter shall be furnished.

9.30.4 The hydraulic power unit shall be equipped with an accumulator sized to deliver the oil flow at required pressure for all conditions. The accumulator shall be equipped with a pressure gauge.

9.30.5 All necessary tubing run between various equipment supplied by the vendor, shall be in vendor's scope.

9.30.6 The Electronic Control Unit cabinet shall be a free standing IP 65 rated with front and rear access doors to be installed outdoors. The control cabinet shall contain processors or controllers and I/O necessary for valve positioning, hydraulic unit control and interface between the Hydraulic Unit / Electronic Control Unit and customer supplied DCS.

9.30.7 In addition to the following signal exchanges, if additional signals are envisaged as per vendor's design, then the same have to be terminated in the respective terminal boxes/junction boxes.

HWL-1 Position Demand (from DCS)	4-20 mA DC
HWL-1 Valve Position feedback (to DCS)	4-20 mA DC
HWL-1 Position Failure (to DCS)	Dry Contact
HWL-1 Quick Closing (from DCS)	Dry Contact
HWL-1 Valve Opened (to DCS)	Dry Contact
HWL-1 Valve Closed (to DCS)	Dry Contact
HWL-2 Position Demand (from DCS)	4-20 mA DC

HWL-2 Valve Position feedback (to DCS)	4-20 mA DC
HWL-2 Position Failure (to DCS)	Dry Contact
HWL-2 Quick Closing (from DCS)	Dry Contact
HWL-2 Valve Opened (to DCS)	Dry Contact
HWL-2 Valve Closed (to DCS)	Dry Contact
MEFCV Position Demand (from DCS)	4-20 mA DC
MEFCV Valve Position feedback (to DCS)	4-20 mA DC
MEFCV Position Failure (to DCS)	Dry Contact
MEFCV Opened (to DCS)	Dry Contact
MEFCV Closed (to DCS)	Dry Contact
Hydraulic Power Unit On (from DCS)	Dry Contact
Hydraulic Power Unit Off (from DCS)	Dry Contact
Hydraulic Power Unit Pressure too low (to DCS)	Dry Contact
Hydraulic Power Unit Auto (to DCS)	Dry Contact
Hydraulic Power Unit Alarm (to DCS)	Dry Contact
Hydraulic Power Unit Fault (to DCS)	Dry Contact

9.30.8 415 V, 3 Ø, AC Power supply feeder will be provided for the hydraulic power pack. 240 V, AC Power supply feeder will be provided. It is vendor's responsibility to further distribute the same to different points and further derivation of various control supplies/power supplies.

9.30.9 Vendor to offer the latest version of control system/positioners with additional features.

9.30.10 The offered Hydraulic Power Unit and the Control system/panels shall be suitable for outdoor applications.

9.30.11 All Cables (Power cables/Control Cables/Instrumentation cables) run between various equipment supplied vendor, shall be in vendor's scope. These cables shall be laid in conduits/cable trays.

9.30.12 All Cables (Power cables/Control Cables/Instrumentation cables) interfaced with various equipment supplied by the vendor, have to be terminated by using suitable Double compression, flame proof/weather proof, Brass with Nickel plated cable glands.

9.30.13 Vendor to provide suitable cable glands for all interfacing cables from/to DCS. Cable sizes will be indicated during engineering stage.

9.30.14 The make and model shall be of reputed vendor in hydraulic field. The vendor to furnish the vendor list for our approval.

9.30.15 It is preferred to use FRF fluid for high pressure system.

9.30.16 Test Certificates and Calibration Certifications shall be provided for all Instruments and Motors as applicable.

9.31 Valve Selection Criteria

9.31.1 The control valves, actuators and actuator hydraulic systems shall be sized based on the valve data sheets. These data sheets shall be filled in and submitted with the bid and with the first submittal of valve drawings.

9.31.2 The Supplier shall meet all process conditions shown on the data sheet or shall notify BHEL of any deviations. All deviations must be approved by BHEL before manufacture of the valve.

9.31.3 The Supplier shall guarantee total sound levels on Supplier furnished equipment shall not exceed 85 dB(A). Sound pressure level at all conditions shall not be greater than 85 dBA when measured at 1.0 meter downstream of the valve and 1.0 meter away from the pipe. The noise abatement shall be obtained by valve body, trim design and piping arrangement and not by the use of silencers

9.31.4 The bidder has to submit calculated noise levels (dBA) for the operating conditions specified with valve untagged.

9.32 Test and Examinations

9.32.1 All valves shall be tested in accordance with the quality assurance program agreed between the Owner and the Contractor, which shall meet the requirements of IBR and other applicable codes. Bidder shall have minimum manufacturing and testing facilities to meet the BHEL

requirement. In case of outsourcing, the same shall be indicated in the offer.
Bidder shall submit Manufacturing Quality Plan detailing Inspection and Test plan of raw material, in process and final inspection along with the offer. The tests shall include but not limited to the following

1) Non-destructive examination shall be performed as per ASME-B-16.34 (Steel Valves).

2) 100% radio graphic test on casings of all valves having rating of 600 lbs or above; magnetic particles / dye penetrant examination on all internal and external machined surfaces and 100% ultra sonic testing of forgings and bars (of size 40 mm and above) of all valves with rating of 600 lbs or above shall be performed as per ASME B16.34.

3) Material, mechanical and chemical test shall be performed in a manner as specified in the relevant codes.

4) The material test certificates (correlated to melt number) shall be furnished by the vendor for identification and correlation.

5) The butt-welding end of all valves, dye-penetrate test as per ASTM E165 shall be carried out on 100% of the valves and the result shall show no defects.

6) 100% MPI shall be done on base/body casing with pressure rating 1500 class and above in line with ASME B16.34.

7) **Hydrostatic Test**

Valves shall be subjected to hydrostatic shell test in accordance with ASME-B16.34 prior to seat leakage test. If the valves are reworked on the pressure parts for any reason after hydrostatic test, they must be retested. Valves shall be hydrostatically tested in Manufacturer's Works in accordance with code requirements. All hydrostatic testing and inspection shall be completed before any paint is applied to valve body. Certificates of inspection shall be executed in accordance with the latest codes and required codes shall be forwarded to the Engineer. All gaskets used for test shall be of the same material and design as specified for the finished

product. Where mechanical gasket joints are broken following tests, new gaskets shall be furnished with the equipment, and the joints shall be retested.

8) **Leakage Test**

Valve closure test and seat leakage tests shall be performed in accordance with ASME -B16.34 and as per applicable Leakage Class. The leakage from packing shall be zero or bubble tight.

9) **Functional Tests**

The fully assembled or completed valves including the actuators control devices and accessories shall be functionally tested to demonstrate the operability and response time of the valve and the actuator. This may be done by cycling the valves 3 or 4 times form open to close position. The same controller can be used to test each valve. These tests shall also include the verification of control valve operation features such as stay put operation, fail to open, fail to close on signal failure etc. in line with the specification requirements.

10) Cv Test (If applicable)

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 the test reports, shall be furnished for Owner's approval. This is to be performed specifically for this project even though Cv test reports of earlier projects are available.

9.33 Additional requirements

1. Machined surfaces shall be suitably protected.

2. Valve ends shall be protected by means of metallic covers/polythene caps/rubber and protectors to prevent damage to ends & also to avoid foreign material entering the valve while shipment & storage.

3. All valves shall be packed suitably in wooden cases in order to avoid damage during transit and also during storage at site.

4. Valve tag nos. shall also be incorporated in all the dispatch documents.

5. All unpainted surfaces shall be protected with a rust preventive, which can be removed by solvent washing. The use of grease or oil other than light grade mineral oil for corrosion protection is prohibited.

6. Paint specifications are to be submitted for purchaser's review with bid.

7. All exposed machined surfaces shall be coated with suitable rust preventative coating prior to shipment.(two coats of primer of thickness 35 microns)

8. The seller shall adequately crate, block, anchor and protect equipment as required to prevent damage during overseas shipment and outdoor storage for a period of one (1) year at the site.

9. All threaded connections, bores shall be plugged or capped with standard pipe plugs or caps.

10. List of commissioning spares shall be quoted if applicable.

11. List of recommended spares for 5 years trouble free operation of valves shall be quoted.

12. Recommended list of special tools and equipment (required for assembling, complete dismantling and maintenance of all equipment supplied) to be provided and also to be supplied along with valve.

9.34 Evaluations

9.34.1 Bids will be analyzed, not only to determine conformity to the requirements of this Specification, but also to evaluate any features of design, construction, and guaranteed performance of the equipment offered which would result in a higher or lower capital, operating, or maintenance cost to BHEL.

9.34.2 Nothing in this specification shall be construed to relieve the vendor from his responsibility. This specification covers briefly the requirements of the system. It is the responsibility of the

vendor to take care of other basic and essential requirements. In case of any discrepancy in the contents expressed in the specification, vendor shall include all items required for completeness of the system even if it is not specified explicitly in this specification.

10.0 SUPPLIER'S DATA SHEETS (TO BE SUBMITTED WITH THE BID)

10.1 Valve Data Sheets

10.1.1 All data to be in Metric units. The Supplier shall fill in the valve data sheets for each valve.

Customer No: 1802 & 1803 Tag Nos.: 01HAG15AA301 / AA302 **Qty.: 2 Nos. / BOILER**

SEPERATOR LEVEL CONTROL VALVE DATA SHEET

	PART – A (TO BE FILLED UP BY PURCHASER)		PART – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**YERMARUS – 2 x 800 MW**	
	SERVICE	**HWL 1 & 2**	
	LOCATION	OUTDOOR	
	DUTY	MODULATING	
	PIPE SIZE (inlet / outlet)	D 508x70/ D508X70	
	PIPE MATERIAL (inlet / outlet)	**SA106 Gr.C/ SA106 Gr.C**	
	MEDIUM	FEED WATER	
BODY	MODEL No.		
	TYPE OF BODY : GUIDING : No. OF PORTS	Z type	
	BODY SIZE: PORT SIZE: DESIGN CV		
	BODY RATING (ASME)		
	END CONNECTION & RATING (ASME)	**BUTT WELDED; REFER ***	
	BODY MATERIAL	**F11**	
	PACKING MATERIAL	GRAFOIL	
	BONNET TYPE		
	TRIM FORM		
	TRIM MATERIAL: SEAT / PLUG		
	: CAGE / STEM		
	BALANCED / UNBALANCED		
	FLOW		
	VALVE OUTLET VELOCITY	< 50% Sonic Velocity	
	REQUIRED LEAKAGE CLASS	**V OR BETTER**	
	NOISE LEVEL (dBA)	LESS THAN 85 dBA	
	VALVE LIFT mm		
	ANTI FLASHING TRIM		
ELECTRO HYDRAULIC ACTUATOR	MODEL No. & SIZE		
	CLOSE AT: OPEN AT (Kg/cm^2 (g))		
	SHUT OFF DIFFERENTIAL		
	STEM OREINTATION		
	MANUAL OVERRIDE	YES	
	TRAVEL TIME FOR		
	OPEN TO CLOSE, CLOSE TO OPEN, TRIP	<12 Secs / <12 Secs / < 3 secs	
	VALVE POSN. ON SIGNAL (4-20mA) FAILURE	FAIL TO CLOSE	
	VALVE POSN. ON FLUID SUPPLY FAILURE	FAIL TO CLOSE	
PERFORMANCE OF VALVE	LINEARITY	± 2%	
	HYSTERISIS	± 1%	
	SENSITIVITY	± 0.5%	
	ACCURACY (OVERALL)	± 2%	

SERVICE CONDITIONS

Sl. No.	LOAD	No of valve Operating	FLOW Kg/sec	INLET PR. $kg/cm^2(g)$	OUTLET PR. $kg/cm^2(g)$	INLET TEMP (°C)	Sp. Gravity	Calc. Cv	Valve Lift %	Valve outlet velocity	Noise Level dBA
01.	Cold Min flow	1	34.56	5.1	0.0	37.7					
02.	Cold start	1	247.0	4.8	0.0	37.7					
03.	Cold Start Swell	2	387.1	4.0	0.0	100					
04.	Hot Min flow	1	34.56	165.1	0.0	348.8					
05.	Hot start	1	247.0	144.3	0.0	338.1					
06.	Hot Start Swell	2	387.1	143.4	0.0	337.6					

* EP Style: For UNIT -1 As per ASME B16.25 Fig-3(C), d1=384.5mm , For UNIT -2 Style 'P', d1=384.5mm

ACTUATOR SIZING PRESSURE : 323.5 kg/cm² (g)
BODY DESIGN: PRESSURE / TEMPERATURE : 298.1 kg/cm² (g) / 373.9°C
TEST PRESSURE : 2 x Design Pressure

IBR FORM – III C : REQUIRED
TOTAL WEIGHT (VALVE+ACTUATOR+ACCESSORIES) : Kgs.
Valves shall be directly weld able to connecting pipe without the use of Reducers. ONLY "Z" VALVES ACCEPTABLE.

PART – A (TO BE FILLED UP BY PURCHASER)			PART – B (TO BE FILLED UP BY BIDDER)
ACCESSORIES	ELECTRO HYDRAULIC POSITIONER POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE E/H CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR HYDRAULIC POWER UNIT(COMMON FOR HWL AND MEFCV) ELECTRONIC CONTROL UNIT (COMMON FOR HWL AND MEFCV)	REQUIRED REQUIRED REQUIRED NOT REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED	
ELECTRO HYDRAULIC POSITIONER	MANUFACTURER & MODEL No. ENCLOSURE CLASS INPUT SIGNAL OUTPUT SIGNAL INCREASE IN SIGNAL	 IP-65 4 - 20 mA TO SUIT ACTUATOR TO OPEN / TO CLOSE	
LIMIT SWITCH	MANUFACTURER & MODEL No. OPEN: INT: CLOSE CONTACT TYPE RATING (AC/DC) ENCLOSURE CLASS	 1 No. FOR OPEN &1 No. FOR CLOSE DPDT 2 NO + 2 NC 5A 240V, AC and 0.2A, 220V, DC IP65 / NEMA 4	
POSITION TRANSMITTER	MANUFACTURER & MODEL No. TYPE SUPPLY OUTPUT RATING ACCURACY ENCLOSURE CLASS	 LVDT 2 WIRE TYPE 24V DC 4 – 20 mA / 0-100 Ohms +/- 1% FS IP65 / NEMA 4	
HANDWHEEL	ORIENTATION	SIDE MOUNTED	
JUNCTION BOX	No. OF WAYS SIZE CABLE GLANDS: (SIZE / QNTY) ENCLOSURE CLASS	THIRTY SIX REQUIRED REQUIRED IP65 / NEMA 4	
E/H CONVERTER	INPUT SIGNAL : POWER SUPPLY SPLIT RANGE ENCLOSURE CLASS	4 – 20mA, DC / 24V, DC YES / NO // YES / NO IP65 / NEMA 4	

	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR SEAL
SIGN. :				SIGN.:
NAME :	A.JAI GANESH	I.GOPALAN	K. PERIASAMY	NAME:
DATE :	26/02/13			DATE:

Customer No: 1802 & 1803 Tag Nos.: 01HAG 31AA301 **Qty.: 1 Nos. / BOILER**

MINIMUM ECONOMISER FLOW CONTROL VALVE DATA SHEET

	PART – A (TO BE FILLED UP BY PURCHASER)		PART – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**YERMARUS – 2 x 800 MW**	
	SERVICE	**MEFCV**	
	LOCATION	OUTDOOR	
	DUTY	MODULATING	
	PIPE SIZE (inlet / outlet)	D 323.9x45/ D323.9X45	
	PIPE MATERIAL (inlet / outlet)	**SA106 Gr.C/ SA106 Gr.C**	
	MEDIUM	FEED WATER	
BODY	MODEL No.		
	TYPE OF BODY : GUIDING : No. OF PORTS	"Z"	
	BODY SIZE: PORT SIZE: DESIGN CV		
	BODY RATING (ASME)		
	END CONNECTION & RATING (ASME)	**BUTT WELDED; REFER ***	
	BODY MATERIAL	**SA105**	
	PACKING MATERIAL	GRAFOIL	
	BONNET TYPE		
	TRIM FORM		
	TRIM MATERIAL: SEAT / PLUG		
	: CAGE / STEM		
	BALANCED / UNBALANCED		
	FLOW		
	VALVE OUTLET VELOCITY	< 8 m/s	
	REQUIRED LEAKAGE CLASS	**V OR BETTER**	
	NOISE LEVEL (dBA)	LESS THAN 85 dBA	
	VALVE LIFT mm		
	ANTICAVITATION TRIM		
ELECTRO HYDRAULIC ACTUATOR	MODEL No. & SIZE		
	CLOSE AT: OPEN AT (Kg/cm^2 (g))		
	SHUT OFF DIFFERENTIAL		
	STEM OREINTATION		
	MANUAL OVERRIDE	YES	
	TRAVEL TIME FOR		
	OPEN TO CLOSE, CLOSE TO OPEN, TRIP	<12 Secs / <12 Secs / < 3 secs	
	VALVE POSN. ON SIGNAL (4-20mA) FAILURE	STAYPUT	
	VALVE POSN. ON SUPPLY FAILURE	STAYPUT	
PERFORMANCE OF VALVE	LINEARITY	± 2%	
	HYSTERISIS	± 1%	
	SENSITIVITY	± 0.5%	
	ACCURACY (OVERALL)	± 2%	

SERVICE CONDITIONS

Sl. No.	LOAD	FLOW Kg/sec	INLET PR. $kg/cm^2(g)$	OUTLET PR. $kg/cm^2(g)$	INLET TEMP (°C)	Pr. Drop $kg/cm^2(g)$	Sp. Gravity	Calc. Cv	Valve Lift %	Valve outlet velocity	Noise Level dBA
01.	Ambient	247	18.2	10.5	37.7	7.7					
02.	Cold start 80 bar	247	93.4	89.8	295.0	3.6					
03.	Hot start 140 bar	247	152.1	150.6	336.7	1.5					
04.	Hot start 160 bar	247	171.6	170.9	347.2	0.7					

* EP Style: For UNIT -1 As per ASME B16.25 Fig-3(C), d1=244.1mm, For UNIT -2 Style: 'P', d1=244.1mm

ACTUATOR SIZING PRESSURE	:	323.5 kg/cm² (g)
BODY DESIGN: PRESSURE / TEMPERATURE	:	323.5 kg/cm² (g) / 347.2°C
TEST PRESSURE	:	2 x Design Pressure
IBR FORM – III C	:	REQUIRED
TOTAL WEIGHT (VALVE+ACTUATOR+ACCESSORIES)	:	Kgs.

Valves shall be directly weldable to connecting pipe without the use of Reducers. ONLY "Z" VALVES ACCEPTABLE.

PART – A (TO BE FILLED UP BY PURCHASER)			PART – B (TO BE FILLED UP BY BIDDER)
ACCESSORIES	ELECTRO HYDRAULIC POSITIONER	REQUIRED	
	POSITION LIMIT SWITCH	REQUIRED	
	POSITION TRANSMITTER	REQUIRED	
	SOLENOID VALVE	NOT REQUIRED	
	E/H CONVERTER	REQUIRED	
	JUNCTION BOX	REQUIRED	
	HAND WHEEL (SIDE MOUNTED)	REQUIRED	
	LOCAL POSITION INDICATOR	REQUIRED	
	HYDRAULIC POWER UNIT(COMMON FOR HWL AND MEFCV)	REQUIRED	
	ELECTRONIC CONTROL UNIT (COMMON FOR HWL AND MEFCV)	REQUIRED	
ELECTRO HYDRAULIC POSITIONER	MANUFACTURER & MODEL No.		
	ENCLOSURE CLASS	IP-65	
	INPUT SIGNAL	4 - 20 mA	
	OUTPUT SIGNAL	TO SUIT ACTUATOR	
	INCREASE IN SIGNAL	TO OPEN / TO CLOSE	
LIMIT SWITCH	MANUFACTURER & MODEL No.		
	OPEN: INT: CLOSE	1 No. FOR OPEN &1 No. FOR CLOSE	
	CONTACT TYPE	DPDT 2 NO + 2 NC	
	RATING (AC/DC)	5A 240V, AC and 0.2A, 220V, DC	
	ENCLOSURE CLASS	IP65 / NEMA 4	
POSITION TRANSMITTER	MANUFACTURER & MODEL No.		
	TYPE	LVDT 2 WIRE TYPE	
	SUPPLY	24V DC	
	OUTPUT RATING	4 – 20 mA / 0-100 Ohms	
	ACCURACY	+/- 1% FS	
	ENCLOSURE CLASS	IP65 / NEMA 4	
HANDWHEEL	ORIENTATION	SIDE MOUNTED	
JUNCTION BOX	No. OF WAYS	THIRTY SIX	
	SIZE	REQUIRED	
	CABLE GLANDS: (SIZE / QNTY)	REQUIRED	
	ENCLOSURE CLASS	IP65 / NEMA 4	
E/H CONVERTER	INPUT SIGNAL : POWER SUPPLY	4 – 20mA, DC / 24V, DC	
	SPLIT RANGE	YES / NO // YES / NO	
	ENCLOSURE CLASS	IP65 / NEMA 4	

	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR SEAL
SIGN. :				SIGN.:
NAME :	A.JAI GANESH	I.GOPALAN	K. PERIASAMY	NAME:
DATE :	26/02/13			DATE:

10.2 Guarantees

CUSTOMER NAME	
PROPOSAL NUMBER	
SUPPLIER NAME	

The Supplier shall clearly state at the time of quotation all performance guarantees specific to the equipment offered.

11.0 EXCEPTIONS TO THE SPECIFICATION

CUSTOMER NAME	
PROPOSAL NUMBER	
SUPPLIER NAME	

I have conformed to Sections 1.0 through 10.0 and Appendix A except as specifically noted as follows:

12.0 APPENDIX A, CONTRACT SPECIFIC REQUIREMENTS

Please refer to attached specifications Annexure-I for Facility Site Specific Data.

1.0 Site Location

The site is located in Raichur, Karnataka, India.

This is an outdoor unit located in a hot, humid and tropical environment, highly polluted with coal / ash dusts.

2.0 Climate

Outdoor Temperature (Ambient)	10 – 45 °C
Relative Humidity (range)	25 – 80 %
Dry Bulb,	27 °C
Wet Bulb,	19 °C

All electrical equipment except battery shall be designed considering 50°C as ambient temperature. Battery shall be designed considering minimum ambient temperature.

2.1 Ambient Pressure — *729* mm Hg

2.2 Annual Average Rainfall — 720 mm
Max 24-hour Rainfall — 115 mm
Max intensity Rainfall — 38 mm / hr
Period — June to September

2.3 Wind — 39 m/s
As per IS: 875 Part 3; 1987
Reaffirmed in 2003

2.4 Altitude: — 351 m ASL

2.5 Service Air: — 7 kg/cm^2

2.6 Instrument Air (Dry, oil-free) — 3.5 to 7.0 kg/cm^2

2.7 Cooling Water (DM water) and Service Water:

<u>Cooling Water (DM water)</u>
Temperature — 38 °C
Pressure — 6 kg/cm^2

<u>Service Water</u>
Temperature — 38 °C
Pressure — 7 kg/cm^2

2.8 Auxiliary Steam:

Design Pressure	xxx kg/cm^2 (later)
Design Temperature	xxx °C (later)
Operating Pressure	16 kg/cm^2 (a)
Operating Temperature	210 °C – For SCAPH, Oil Heating, Heat Tracing, etc.
Operating Temperature	310 °C – For Mill Inerting and Airheater Soot Blowing.

2.9 Electrical Power for Motors and Auxiliaries:

Supply	Description	Consumer
LT Supply	415V, 3-Phase, 3 Wire, 50 Hz solidly earthed AC.	Motors up to 174 kW
HT Supply	3.3 kV, 3-Phase, 3 Wire, 50 Hz medium earthed AC.	Motors 175 kW to 1499 kW
HT Supply	11 kV, 3 Phase, 3 Wire, 50 Hz medium earthed AC.	Motors above 1500 kW
DC Supply	220V, 2 Wire, unearthed DC	Motor starters, DC solenoids, DC alarm, control and protections
AC Supply	415 V, 3 phase, 3 wire solidly earthed AC.	Motor control center
AC Supply	110 V, 1 phase, 50 Hz, 2 wire AC supply.	AC control & protective devices.
AC Supply	240V, 1 phase 50 Hz, 2 wire AC supply from UPS system for I&C (including indicator recorders) and UCMS only.	Uninterrupted power supply.
AC Supply	24 V 1 phase, 50 Hz, AC with one point earthed. This shall be derived by CONTRACTOR by providing 415 V, 3 phase, 3 wire, AC supply through an adequately rated step-down transformer of adequate rating with MCCB / MCB on primary / secondary sides.	Winding heating of motors below 30 KW.
DC Supply	24 V DC, 2 wire, supply from battery chargers for instrumentation system only.	Solid state controls (including solenoid valves).
AC Supply	240 V, 1 phase, 2 wire, 50 Hz system.	Lighting fixtures.
AC Supply	240 V, 1 phase, 2 wire, 50 Hz system.	Lighting fixtures and space heaters in panels.
AC Supply	415 V, 3 phase, 4 wire, 50 Hz AC supply with neutral lead solidly earthed.	Construction supply.

2.10 Range of Variation

All devices shall be suitable for continuous operation over the entire range of voltage and frequency indicated below without any change in their performance.

AC Supply Voltage ± 10%
Frequency ± 5%

Combined voltage and frequency ± 10% (absolute sum)

DC Supply Voltage (+) 10% to (-) 20 %

3.0 Units of Measure

All quotations and attachments shall be submitted to the Purchaser in SI metric units.

4.0 Nameplates, Operator Panels, and Gauge Faces

All nameplates and equipment operator panels including alarm and CRT devices are to have the information shown in the English language with SI metric units of measure.

All gauge faces shall have the SI metric scale in the primary position and the US Customary units in the secondary position.

5.0 Shipment:

See appropriate section of the Purchase Order (PO).

6.0 Noise Levels

The equivalent weight average of sound level measure at a distance of 1.5 m above the floor level and 1.0 m horizontally from the base of any equipments (except pulverizers, safety valves and air motors) furnished and installed under these specifications, expressed in decibel to a reference of 0.0002 microbar, shall not exceed 85 dB(A).

Pulverizer sound levels shall not exceed 90 dB(A).

The methods for measuring, calculating, and reporting procedures for noise generated by a sound source shall be in accordance with ASME S1.2, "American National Standard Method for the Physical Measurement of Sound."

The **SUPPLIER** shall provide silencers or sound enclosures as required to meet these requirements.

7.0 Cleaning, Painting and Coating Requirements

See appropriate section of the Purchase Order (PO).

8.0 Seismic Conditions

Zone III (As per IS: 1893; Reaffirmed in 2008).

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: SCV_MAIN SPEC	
		SECTION: Boiler Mountings/PE (FB)	
		REV. NO.: 00	DATE: -25.04.11
		PAGE NO : 1 OF 22	

ENGINEERING SPECIFICATION

FOR

WARMKEEPING LEVEL CONTROL VALVE

SPECIFICATION NO : BM/WLC :001

Prepared by:	Reviewed by:	Approved by:
A.Jai Ganesh Product Engineer PE / FB (BM)	I.Gopalan Senior Manager PE / FB (BM)	K.Periasamy Deputy General Manager PE / FB (BM)

Revision Log — Template Form Revision No.: 00

Revision No.	Date	Reason	Prepared		Reviewed		Approved	
			Name	Sign.	Name	Sign.	Name	Sign.

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This Specification defines the minimum, acceptable requirements for the design and performance of one (1) WARMKEEPING LEVEL CONTROL VALVE for a coal fired, supercritical steam generating unit.

2.0 SCOPE OF WORK

2.1 Supplier shall provide equipment and components in accordance with the approved suppliers listed in this specification, unless otherwise approved by BHEL. Equipment or components not listed shall be Supplier's standard.

2.2 For skid mounted assemblies, all instrumentation and control wiring connections by BHEL to Supplier's equipment shall be external to the equipment on numbered terminal strips in junction boxes or electrical panels.

2.3 All piping furnished by the Supplier shall be provided in ISO standard sizes in nominal Metric units (DN sizes). All weld end preparations, socket weld couplings, threaded connections, flange sizes and ratings, at BHEL/Supplier terminal points shall comply with ISO standards in Metric units.

2.4 Nozzles shall be prepared for connection with BHEL piping as follows:

- Welded connections 50 NB and smaller shall be socket weld couplings in accordance with the requirements of ASME B16.11.
- Welded connections 65NB and above shall be butt weld connections. Butt weld ends shall be beveled for welding in accordance with the requirements of BHEL.

2.5 All flanged connections shall be supplied in accordance with the requirements of ASME B16.5.

2.6 All materials shall be new and in accordance with applicable ASTM specifications or with other recognized standards such as SAE. No peening, caulking or filling shall be permitted in repairing cracks, pin-holes or blow-holes. Defects in fabricated steel shall be repaired by chipping out welds to bottom of vee and rewelding.

2.7 The use of asbestos or material containing asbestos shall not be permitted. The use of mercury or material containing mercury shall not be permitted. All nonmetallic materials shall be noted to BHEL for approval.

2.8 The equipment and materials specified are intended to be the minimum suitable for the intended service. They are not intended to limit the Supplier's responsibility for proper design and selection of equipment. It is the Supplier's responsibility to bid a complete system for the intended service and the specification is only for general guidelines. Any changes in proposed equipment or materials during design shall be approved by BHEL.

2.9 All quotations and attachments submitted to BHEL shall be in the English language.

2.10 All quotations and inquiries to BHEL shall be routed through Purchasing.

2.11 Parts subject to wear, corrosion, deterioration or requiring adjustment, inspection or repair shall be accessible and capable of reasonably convenient removal, replacement and repair.

2.12 The Supplier shall complete and submit the Supplier Data Sheets and guarantees located in Section 10.0 of this specification with the equipment offered in full conformance with the specification. The Supplier shall provide a complete written description of all omissions or exceptions to the requirements of this specification. This written description must be included in Section 11.0 EXCEPTIONS TO THE SPECIFICATION of this specification. Without the complete data sheets and the EXCEPTIONS TO THE SPECIFICATION sheets, the proposal will not be evaluated.

2.13 Optional equipment shall be priced separately.

2.14 The Supplier shall be governed by the following regulations, codes, and standards, including their latest respective addenda, amendments, and errata.

AFBMA	Antifriction Bearing Manufacturers' Association
AGMA	American Gear Manufacturers' Association
AHI	American Hydraulic Institute
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society Mechanical Engineers

ASTM	American Society Testing and Materials
AWS	American Welding Society
EIA	Electronics Industries Association
FCI	Fluid Controls Institute, Inc.
IEC	International Electro technical Commission
IEEE	Institute of Electrical and Electronics Engineers
IPCEA	International Power Cable Engineers Association
ISA	Instrumentation Society of America
MSS	Manufacturers Standardization Society of the Valve & Fittings Industry
NEMA	National Electrical Manufacturers' Association
NEC	National Electrical Code
NFPA	National Fire Protection Association
OSHA	Occupational Safety Health Act
PFI	Pipe Fitting Institute
SAMA	Scientific Apparatus Makers Association
SSPC	Steel Structures Painting Council
UL	Underwriter's Laboratories

In addition to the codes and standards specifically mentioned above for the equipment / plant / system, all equipment parts, systems and works covered under this specification shall comply with all currently applicable statutory regulations and safety codes of the Republic of India as well as of the locality where they will be installed, including the following:

a) Bureau of Indian Standards (BIS)
b) Indian Electricity Act
c) Indian Electricity Rules
d) Indian Explosives Act
e) Indian Factories Act and State Factories Act
f) Indian Boiler Regulations (IBR)
k) Rules for Electrical installation by Tariff Advisory Committee (TAC).
l) Any other statutory codes / standards / regulations, as may be applicable.

Unless covered otherwise by Indian codes & standards and in case nothing to the contrary is specifically mentioned elsewhere in the specifications, the latest editions of the following codes and standards shall also apply:

a) American Petroleum Institute (API)
b) International Organization for Standardization (ISO)
c) Tubular Exchanger Manufacturer's Association (TEMA)
d American Welding Society (AWS)
e) Expansion Joint Manufacturers Association (EJMA)
f) Heat Exchange Institute (HEI)
g) Standards of the Hydraulic Institute, U.S.A.

Other International/ National standards such as DIN, VDI, BS, GOST etc. shall also be accepted for only material codes and manufacturing standards, subject to the Employer's approval, for which the Supplier shall furnish, adequate information to justify that these standards are equivalent or superior to the standards mentioned above. In all such cases the Supplier shall furnish specifically the variations and deviations from the standards mentioned elsewhere in the specification together with the complete word for word translation of the standard that is normally not published in English.

3.0 APPLICABLE CODES & STANDARDS

3.1 The valves shall comply with the applicable requirements of the latest edition of ASME B31.1, Power Piping Code.

3.2 Valve design in accordance with ASME B16.34.

3.3 The valve sizing shall be in compliance with latest edition of ISA S75.01 Hand book on Control Valves considering measures to avoid choked flow.

3.4 All pressure retaining parts of the valve shall be made of materials, including specific limitations on various materials, that are in full compliance with PG.-5 of ASME Code Section 1.

3.5 Materials

3.5.1 Only materials listed and rated in B16.34 are acceptable and materials offered shall be appropriate to the design conditions listed.

3.6 For valves of other than US standards, the Supplier shall specify (at the time of quotation) the Codes and Standards which will be used through the manufacturing and design processes. The Codes and Standards as specified will be subject to approval by **BHEL.**

3.7 Reference to the above Codes and Standards shall mean the latest revision, edition and addenda effective at the date of order unless specifically stated otherwise in this specification.

3.8 All welders and all welding procedures welders utilized shall be qualified in accordance with ASME Section IX. When welders and welding procedures are qualified in accordance with codes other than those specified, the Supplier must take exception at the time of quotation.

3.9 All materials shall be readily identifiable. Mill test reports shall be obtained for all pressure boundary parts. These test reports shall be available for review at the Vendor's shops. Copies of these are to be supplied to the Company, if requested, prior to ordering.

3.10 Valve Revisions

3.10.1 Supplier Changes

3.10.1.1 Supplier shall fabricate the valves based on the drawings approved by BHEL.

3.10.2 If the valve design requires modification due to Supplier error during the Supplier tests or QA inspection, the Supplier will correct the design and reflect these changes in the AS-BUILT revision of the drawings.

4.0 EQUIPMENT FURNISHED BY SUPPLIER

4.1 **One (1) Warm keeping Level Control Valve** complete with pneumatic actuator, smart positioner, position transmitter, and air set shall be supplied per boiler. There is **one (1)** contract with **two (2)** boilers per contract and **one (1)** warm keeping level control valve per boiler.

4.2 Optional Equipment

The following equipment shall be proposed as an option when indicated with an X.

☒ ***One (1)*** lot of special tools required for maintenance of system components. Seller shall furnish all special tools and wrenches required for erection, calibration, servicing including instructions for their use. Tools shall be new. Tools shall be shipped to the project site in a suitable, separate container, clearly marked with the name of the equipment for which they are intended.

☒ ***One (1)*** lot of commissioning spares for each valve per SELLER'S specific recommendation.

☒ ~~*One (1) lot of recommended spares for each valve per SELLER'S specific recommendation for One (1) year warranty period of operation*~~ (Dealt By Spares Group)

☒ ~~*One (1) lot of recommended spares per SELLER's specific recommendation for Three (3) years of operation after final acceptance*~~ (Dealt By Spares Group)

5.0 TERMINAL POINTS

5.1 At all valve inlets and outlets.

5.2 At instrument air connection point on each air set.

5.3 At the electrical terminals in suitable (NEMA 4) electrical enclosures / termination boxes on all control equipment such as motors, sensors, actuating devices, control panel stations, and control cabinets.

6.0 FACILITY SITE SPECIFIC DATA

Please refer to attached specifications Annexure-I for Facility Site Specific Data.

7.0 DRAWINGS AND DATA BY SUPPLIER

7.1 All drawings, calculations, specifications, bills of materials and other data submitted shall be in Metric units. Dual Dimensions are acceptable with Metric (primary) and English (in parenthesis). Metric units shall comply with the International SI System.

7.1.1 The following units are to be used:

- Temperature °C
- Pressure Kg / cm^2 (g)
- Dimensions mm
- Flow kg/sec

7.2 Submitted With Quotation

- The Supplier shall provide dimensional outline drawings of the assembled unit(s). The drawings shall show overall dimensions, terminal box dimensions, mounting connections, clearances required for proper installation and maintenance shall state lifting requirements, and the weights of all major components.
- List of commissioning spares.
- List of special tools and equipment as required for assembling, complete dismantling, and maintenance of all equipment supplied,
- Performance data and curves.
- Completed Supplier Data Sheets per Section 10.0
- Any special requirements or operational limits shall be explicitly stated in each quotation.
- Field testing requirements.
- Terminal box wiring diagram
- Integrated Manufacturing and Quality Plan for BHEL's review

7.3 Descriptions of Equipment

- A written description of the equipment being offered shall be provided with the Bid. This information shall explain details of the design, construction, control, operation and performance.
- Consumable list including, compressed air, instrument air and electrical requirements indicating frequency of usage; intermittent or continuous.

- Experience List for valves in similar service including size, service, flow rate, pressure, temperature, and date placed in operation.

7.4 Submitted During Contract

- Detailed arrangement drawings of the assembled units including support details, flange connections, etc. All materials shall be readily identifiable on Supplier's drawings.
- Electrical wiring diagrams and connection details
- Instrument list
- Instrument data sheet(s) (ISA format or equal)
- Valve flow characteristic curve
- List of shop tests that will be conducted on the furnished equipment
- Complete set(s) of instruction, operation, maintenance, and erection manuals, quantities will be identified in the purchase order
- List of shop applied paints and protective finishes identifying compatible site applied coatings
- List of all lubricants required for the equipment operation identifying preferred acceptable substitutes
- Certification sheet for each valve containing the following information:
  - ✓ Manufacturer's Name
  - ✓ Manufacturer's serial number on the valve body
  - ✓ Flow direction arrow on the valve body
  - ✓ ASME material specification used for pressure parts including valve body and other pressure retaining parts
  - ✓ Maximum allowable pressure (design pressure), Kg / cm^2 (g) @ degrees C
  - ✓ Hydrostatic shell test pressure, Kg / cm^2 (g). Additional certification for valves manufactured to B16.34 Special Class.
  - ✓ Welding Certification: All welding on the valve has been performed using procedures and welders qualified in accordance with ASME Code Section IX.
  - ✓ Radiographs: Radiographic examination has been performed as required by ASME B16.34. One set of the completed radiographs, properly identified with the respective parts, will be retained and

available for inspection for a period of five (5) years.

- ✓ Surface examination of all castings performed by magnetic particle or liquid penetrant methods to the technique and acceptance standards of ASME B16.34.
- ✓ One (1) copy of each material manufacturers certification.
- ✓ Authorized and dated signature certifying the above information to be complete and correct.

8.0 PERFORMANCE DATA & TECHNICAL REQUIREMENTS

8.1 Component Design Criteria

8.1.1 Function

Warmkeeping level control Valve:

The control valve is used to control the water separator wet leg level. The control valve shall close on loss of air or signal. The control valve may be exposed to the maximum differential pressure shown on the valve data sheet for extended periods of time. There shall be no damage to the valve bodies/components other than seat wear resulting from this exposure.

9.0 DESIGN AND CONSTRUCTION

9.1 In general, all valves and associated accessories shall meet the applicable requirements of accepted standards and attached customer specifications.

9.2 Design of the valves shall meet the latest edition of ASME B16.34.

9.3 The control valve shall be a globe valve.

9.4 The valve sizing shall be in compliance with latest edition of ISA S75.01 Hand book on Control Valves considering measures to avoid choked flow.

9.5 All the Control Valves and accessories offered by the Bidder, shall be of proven make, whose guaranteed and trouble free performance has been proven at least for two years in not less than three coal fired utility stations of reheat type

9.6 **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 15% of total valve stem travel.** All the Control 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.

9.7 The control valve size should not be smaller than connecting line size by more than 1 step.

9.8 Valve shall be forged / casted design.

9.9 The trims of all regulating control valves should be cage guided type. Top guided design is not acceptable.

9.10 Bonnet joints for all Control Valves shall be of the flanged and bolted type. Bonnet joints shall be designed for easy disassembly and for assurance of correct valve stem alignment. Bonnet joints of the internal threaded or union type will not be acceptable

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

9.12 All control valves shall have stems, guide bushings, plugs, seat rings, stem lock pins, stuffing box parts and other trim parts made of stainless steel alloys and suitably hardened. Valve guide posts and bushings shall be stellite faced. Stellite faced guide posts and bushings shall be differential hardened for applications involving high pressure drop as well as for flashing and cavitation applications. **Trim material shall be 17-4 PH SS / 440C depending upon the service conditions to ensure required degree of hard facing so as to avoid erosion.** However , Bidder may offer valves with body and trim materials better than specified 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 Owner's consideration and approval..

9.13 The valve model proposed should be designed to prevent cavitation, wire drawing and flashing on the downstream side of the valve and piping for operation throughout the full range under the specified conditions. For cavitation service, the trim design shall be of multistage pressure drop type to prevent cavitation occurring downstream of trim / valve.

9.14 **Bidder shall furnish in his proposal detailed calculations to establish whether cavitation will occur or not under any operating condition for a particular application. These calculations shall be subject to Owner's review and approval and in case it is established at any stage of the contract that cavitation will occur, the Bidder shall provide anti-cavitation trim for the same at no extra price. Further the Bidder shall furnish in his proposal the detailed write up, technical literature, etc. clearly indicating as to how the occurrence of cavitation shall be prevented by the design of his offered anti-cavitation trim.**

9.15 Bidder to furnish calculation to check whether flashing or cavitation will occur for control valve services. Control Valves shall be provided with specially designed trims (such as cage guiding valves with holes in the cage to control the location of the Vena Contracts) which are suitable for withstanding high pressure drops and which minimize the adverse effects of flashing on Control Valve parts.

9.16 Valve sizing shall be in accordance with the latest edition of ISA Handbook on Control Valves with due consideration for the measures to avoid chocked flow. Bidder shall ensure that valve outlet velocity does not exceed 8 m / sec. for liquid services, 150 m / sec. for steam services and 50% of sonic velocity for flashing services.

9.17 Valve outlet shall have a 5 degree downward slope to ensure proper drainage of valve outlet.

9.18 Valve inlet and outlet cages shall be provided if required by the indicated process conditions.

9.19 For valves with butt weld ends, the supplier is required to prepare weld profiles to BHEL supplied information.

9.20 Both the valves and their accessories shall be designed for the process and local installation environment.

9.21 All valves and accessories shall be suitable for outdoor service. Electrical components (actuators, limit switches, solenoid valves, positioners, controllers, etc.) shall meet the requirements of IP 65.

9.22 The Supplier shall provide all necessary converters, positioners, position transmitters, etc. mounted on the control valve.

9.23 The direction of flow shall be clearly marked on each globe valve.

9.24 Control valves, their actuators and associated ancillary equipment must be selected to suit the application, design and working conditions specified and also the environmental conditions in which they are installed. The pressure and temperature rating of valve body shall be equal or exceed the process design conditions on control valve data sheet.

9.25 Valves and their actuators shall be adequately rated to suit the maximum differential pressure against which they will have to work, i.e. when the valve is fully closed.

9.26 Valve guiding and seating systems shall be so designed that smooth control is maintained over the full operational stroke. Design should be such that it eliminates vibration.

9.27 Valve's gland packing material shall be grafoil for all the valves.

9.28 The end for all the Control Valves shall be matched to the corresponding details for the piping on which the valve is installed. **All necessary expanders/reducers are to be supplied by the vendor to match the pipe sizes**

9.29 **Extension bonnets shall be used on all valves when the maximum temperature of the flowing fluid is greater than 280 deg.C.**

9.30 The boiler water system will be acid cleaned at site using a 1 to 1.5% (by weight) inhibited hydrofluoric acid. The valve internals must be capable of withstanding hydrofluoric acid without getting damaged.

9.31 The Leakage Class of Warm keeping level control Valve is to be Class-IV or better as per FCI 70.2.

9.32 PNEUMATIC VALVE ACTUATORS

1. All Control Valves shall be furnished with pneumatic spring to close diaphragm/piston type actuators depending upon the process requirements.

2. The Bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut-off pressures. The Bidder shall ensure while sizing the actuators that proper and adequate size is selected which do not restrict or endanger the plant operation and ensure the required leakage class. The actuator size of the valve actuator shall be subject to owner's approval during detailed engg. stage.

3. The actuators shall be designed to produce the required stem force with supply air pressure of 3 to 5 kg/sq.cm. unless otherwise specified.

4. Valve actuators shall be capable of operating at an ambient temperature of 60°C continuously.

5. All actuators shall also have provisions for manual operation during emergency / maintenance along with graduated local position indicator.

6. 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 light seating unless otherwise specified.

9.33 VALVE ACCESSORIES FOR PNEUMATIC ACTUATORS

1. All accessory devices like SMART positioners, solenoid valves (If applicable), air locks, air filter regulators, limit switch assemblies, junction boxes, hand jack / hand wheels, pneumatic tubing, etc. shall be provided as per the requirements.

2. **The solenoid valve (If applicable), limit switches are to be wired to the junction box. From the position transmitter to the actuator JB, the cable shall enter through double compression type brass chrome plated cable gland suitable for 0.5 sq.mm type 'F' instrumentation cable and for the**

cabling from JB to DDCMIS one 9 pin plug and socket suitable for 2 pair 'F' type instrumentation cable is to be provided. For the solenoid valve command from DDCMIS, cable gland suitable for 0.5 sq.mm type 'G' instrumentation cable 4 pair to be indicated.

3. Solenoid valve coils (If applicable) shall be Class 'H', high temperature construction and shall be suitable for continuous and heavy duty. All solenoid valves shall be of universal type and brass material.

4. The air locks shall be of the automatic reset type. The air lock pressure shall be field adjustable.

5. The limit switches, position transmitter and other electrical equipments shall be properly wired to the Terminal Boxes mounted on the control valve.

6. Contracts of limit switches shall be snap action type. The mechanical lifting life of the switching element shall be 10 million operating cycles. The creeping action type is not acceptable. Mercury contracts will not be accepted.

7. Only double throw contacts shall be used. These contacts shall be equipped with suitable resistors in order to provide connecting cable wire break / short circuit detection. The connecting cables shall have sufficient core number for this purpose. All external screws, bolts and nuts shall be of stainless steel.

8. There shall not be any backlash, play, etc. with linkage mechanism, actuator and final control element. Care shall be taken in the design that the thermal expansion of the tubing shall not be subject to stress on linkage arrangement.

9. The material of JB shall be GI of 2 mm thick or polyuherene of minimum 4mm thick and protection Class of IP-55. Please indicate. Vendor should provide spare terminals for (E/P) converter in JB which is under BHEL scope of supply.

10. **The interconnection tubing shall be fully annealed soft temperature copper tubing conforming to ASTM B68 or B75 (USA) Swage Type flareless tubing fitting shall be used for tubing connections (Swage Lock or Approved equal). The thickness of Copper tubing shall be 0.065-inch thickness and tubing to be PVC coated and tube fittings shall be of Brass.**

11. Limit Switches shall be 2 NO + 2NC, SPDT contact, enclosure : IP-55 and rated for 5A / 240V AC or 0.25 A / 220 V DC .

12. Air supply regulator shall be with 2" Pressure Gauge

9.34 Valve Selection Criteria

9.34.1 The control valves and actuators shall be sized based on the valve data sheets. These data sheets shall be filled in and submitted with the bid and with the first submittal of valve drawings.

9.34.2 The Supplier shall meet all process conditions shown on the data sheet or shall notify BHEL of any deviations. All deviations must be approved by BHEL before manufacture of the valve.

9.34.3 The Supplier shall guarantee total sound levels on Supplier furnished equipment shall not exceed 85 dB(A). Sound pressure level at all conditions shall not be greater than 85 dBA when measured at 1.0 meter downstream of the valve and 1.0 meter away from the pipe. The noise abatement shall be obtained by valve body, trim design and piping arrangement and not by the use of silencers

9.34.4 The bidder has to submit calculated noise levels (dBA) for the operating conditions specified with valve untagged.

9.35 Test and Examinations

9.35.1 All valves shall be tested in accordance with the quality assurance program agreed between the Owner and the Contractor, which shall meet the requirements of IBR and other applicable codes. Bidder shall have minimum manufacturing and testing facilities to meet the BHEL requirement. In case of outsourcing, the same shall be indicated in the offer.
Bidder shall submit Manufacturing Quality Plan detailing Inspection and Test plan of raw material, in process and final inspection along with the offer. The tests shall include but not limited to the following

1) Non-destructive examination shall be performed as per ASME-B-16.34 (Steel Valves).

2) 100% radio graphic test on casings of all valves having rating of 600 lbs or above; magnetic particles / dye penetrant examination on all internal and external machined surfaces and 100% ultra sonic testing of forgings and bars (of size 40 mm and above) of all valves with rating of 600 lbs or above shall be performed as per ASME B16.34.

3) Material, mechanical and chemical test shall be performed in a manner as specified in the relevant codes.

4) The material test certificates (correlated to melt number) shall be furnished by the vendor for identification and correlation.

5) The butt-welding end of all valves, dye-penetrate test as per ASTM E165 shall be carried out on 100% of the valves and the result shall show no defects.

6) 100% MPI shall be done on base/body casing with pressure rating 1500 class and above in line with ASME B16.34.

7) **Hydrostatic Test**

Valves shall be subjected to hydrostatic shell test in accordance with ASME-B16.34 prior to seat leakage test. If the valves are reworked on the pressure parts for any reason after hydrostatic test, they must be retested. Valves shall be hydrostatically tested in Manufacturer's Works in accordance with code requirements. All hydrostatic testing and inspection shall be completed before any paint is applied to valve body. Certificates of inspection shall be executed in accordance with the latest codes and required codes shall be forwarded to the Engineer. All gaskets used for test shall be of the same material and design as specified for the finished product. Where mechanical gasket joints are broken following tests, new gaskets shall be furnished with the equipment, and the joints shall be retested.

8) **Leakage Test**

Valve closure test and seat leakage tests shall be performed in accordance with ASME -B16.34 and as per applicable Leakage Class. The leakage from packing shall be zero or bubble tight.

9) **Functional Tests**

The fully assembled or completed valves including the actuators control devices and accessories shall be functionally tested to demonstrate the operability and response time of the valve and the actuator. This may be done by cycling the valves 3 or 4 times form open to close position. The same controller can be used to test each valve. These tests shall also include the verification of control valve operation features such as stay put operation, fail to open, fail to close on signal failure etc. in line with the specification requirements.

10) Cv Test (If applicable)

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 the test reports, shall be furnished for Owner's approval. This is to be performed specifically for this project even though Cv test reports of earlier projects are available.

9.36 **Additional requirements**

1. Machined surfaces shall be suitably protected.
2. Valve ends shall be protected by means of metallic covers/polythene caps/rubber and protectors to prevent damage to ends & also to avoid foreign material entering the valve while shipment & storage.
3. All valves shall be packed suitably in wooden cases in order to avoid damage during transit and also during storage at site.
4. Valve tag nos. shall also be incorporated in all the dispatch documents.
5. All unpainted surfaces shall be protected with a rust preventive, which can be removed by solvent washing.
6. Paint specifications are to be submitted for purchaser's review with bid.

7. All exposed machined surfaces shall be coated with suitable rust preventative coating prior to shipment.

8. The seller shall adequately crate, block, anchor and protect equipment as required to prevent damage during overseas shipment and outdoor storage for a period of one (1) year at the site.

9. All threaded connections shall be plugged or capped with standard pipe plugs or caps.

10. List of commissioning spares shall be quoted if applicable.

11. List of recommended spares for 5 years trouble free operation of valves shall be quoted.

12. Recommended list of special tools and equipment (required for assembling, complete dismantling and maintenance of all equipment supplied) to be provided and also to be supplied along with valve.

9.37 Evaluations

9.37.1 Bids will be analyzed, not only to determine conformity to the requirements of this Specification, but also to evaluate any features of design, construction, and guaranteed performance of the equipment offered which would result in a higher or lower capital, operating, or maintenance cost to BHEL.

10.0 SUPPLIER'S DATA SHEETS (TO BE SUBMITTED WITH THE BID)

10.1 Valve Data Sheets

10.1.1 All data to be in Metric units. The Supplier shall fill in the valve data sheets for each valve. (Data sheets attached in ANNEXURE A)

10.2 Guarantees

CUSTOMER NAME	
PROPOSAL NUMBER	
SUPPLIER NAME	

The Supplier shall clearly state at the time of quotation all performance guarantees specific to the equipment offered.

11.0 EXCEPTIONS TO THE SPECIFICATION

CUSTOMER NAME	
PROPOSAL NUMBER	
SUPPLIER NAME	

I have conformed to Sections 1.0 through 10.0 and Appendix A except as specifically noted as follows:

12.0 APPENDIX A, CONTRACT SPECIFIC REQUIREMENTS AND DATA SHEETS.

Please refer to attached specifications Annexure-I for Facility Site Specific Data.

BHEL	SPECIFICATION FOR WARMKEEPING LEVEL CONTROL VALVE	SPECIFICATION NO.: WLC_MAIN SPEC	
		SECTION: Boiler Mountings/PE (FB)	
		REV. NO.: 00	DATE: -12.05.11
		PAGE NO : 1 OF 2	

Customer No: 1802 & 1803 Tag Nos.: 01HAG16AA101 **Qty.: 1 No. / BOILER**

WARMKEEPING LEVEL CONTROL VALVE DATA SHEET

	PART – A (TO BE FILLED UP BY PURCHASER)		PART – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**YERMARUS – 2 x 800 MW**	
	SERVICE	**Warm Keeping Level Control**	
	LOCATION	OUTDOOR	
	DUTY	MODULATING	
	PIPE SIZE (inlet / outlet)	D 60.3x11.07 / D 60.3x11.07	
	PIPE MATERIAL (inlet / outlet)	**SA106 Gr.C/ SA106 Gr.C**	
	MEDIUM	WATER	
BODY	MODEL No.		
	TYPE OF BODY : GUIDING : No. OF PORTS	GLOBE / CAGE / ONE	
	BODY SIZE: PORT SIZE: DESIGN CV		
	END CONNECTION & RATING (ASME)	**SOCKET WELDED**	
	BODY MATERIAL	**A216 WCB /WCC**	
	PACKING MATERIAL	GRAFOIL	
	BONNET TYPE	**STD / EXTENDED / FINNED**	
	TRIM FORM	LINEAR	
	TRIM MATERIAL: SEAT / PLUG : CAGE / STEM		
	BALANCED / UNBALANCED	BALANCED	
	FLOW	FLOW TO CLOSE	
	VALVE OUTLET VELOCITY	< 8 m/s	
	REQUIRED LEAKAGE CLASS	**I V OR BETTER**	
	NOISE LEVEL (dBA)	LESS THAN 85 dBA	
	VALVE LIFT mm		
	ANTICAVITATION TRIM		
PNEUMATIC ACTUATOR	MODEL No. & SIZE	SPRING ACTION CLOSES THE VALVE	
	CLOSE AT : OPEN AT ($Kg/cm^2(g)$)		
	TRAVEL TIME FOR		
	OPEN TO CLOSE, CLOSE TO OPEN	<10 Secs / <10 Secs	
	VALVE POSN. ON SIGNAL AIR FAILURE	FAIL TO CLOSE	
	VALVE POSN. ON SUPPLY AIR FAILURE	FAIL TO CLOSE	
PERFORMANCE OF VALVE	LINEARITY	± 2%	
	HYSTERISIS	± 1%	
	SENSITIVITY	± 0.5%	
	ACCURACY (OVERALL)	± 2%	

SERVICE CONDITIONS

Sl. No.	LOAD	FLOW Kg/sec	INLET PR. $kg/cm^2(g)$	OUTLET PR. $kg/cm^2(g)$	INLET TEMP (°C)	PRES.DR OP $kg/cm^2(g)$	Sp. Gravity	Calc. Cv	Valve Lift %	Valve outlet velocity	Noise Level dBA
01.	BMCR	0.321	272.9	259.9	350.1	13.0					
02.	40 % TMCR	0.206	138.3	136.0	301.0	2.3					

ACTUATOR SIZING PRESSURE : 314.2 kg/cm^2 (g)
BODY DESIGN: PRESSURE / TEMPERATURE : 314.2 kg/cm^2 (g) / 373.9°C

IBR FORM – III C : REQUIRED
TOTAL WEIGHT (VALVE+ACTUATOR+ACCESSORIES) : Kgs.
Valves should be directly weldable to connecting pipe without the use of Reducers. ONLY GLOBE VALVES ARE ACCEPTABLE.

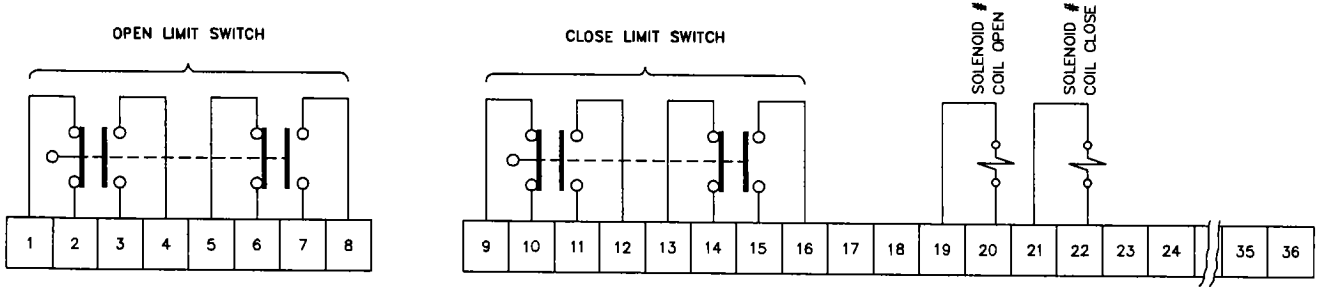
DATA SHEET – A FOR CONTROL VALVE (WITH PNEUMATIC ACTUATOR) (TO BE FILLED UP BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
ACCESSORIES	POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE I/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR VOLUME BOOSTER & DUMP VALVE	REQUIRED REQUIRED REQUIRED REQUIRED INBUILT IN SMART POSITIONER NOT REQUIRED INBUILT IN SMART POSITIONER REQUIRED REQUIRED REQUIRED REQUIRED / NOT REQUIRED	
SMART POSITIONER REFER SPEC ENCLOSED	MANUFACTURER & MODEL No. BYPASS : GAUGES : ENCLOSURE CLASS INPUT SIGNAL in mA OUTPUT SIGNAL	 YES / NO / TWO : IP-55 4 – 20mA TO SUIT ACTUATOR	
AIR FILTER REGULATOR	MANUFACTURER & MODEL No. AIR SUPPLY PRESSURE in kg/cm²(g) OUTPUT PRESSURE in kg/cm²(g) OUTPUT GAUGE	 3 to 5 TO SUIT ACTUATOR REQUIRED	
AIR LOCK	MANUFACTURER & MODEL No. SET PRESSURE in kg/cm²(g) SUPPLY PRESSURE in kg/cm²(g) RESET TYPE VENT PLUG	 3 to 5 AUTO	
LIMIT SWITCH	MANUFACTURER & MODEL No. OPEN : INT : CLOSE CONTACT TYPE RATING (AC/DC) ENCLOSURE CLASS	 1 No. for OPEN & 1 No. for CLOSE DSPDT 2 NO + 2 NC 5A 240V, AC and 0.2A, 220V, DC IP65	
POSITION TRANSMITTER	MANURACTURER & MODEL No. TYPE SUPPLY OUTPUT RATING ACCURACY ENCLOSURE CLASS	INBUILT IN SMART POSITIONER	
SOLENOID VALVE	MANURACTURER & MODEL No. RATING OPERATION / 3 WAY, SINGLE COIL, UNIVERSAL COIL INSULATION CLASS ENCLOSURE CLASS	 24V, DC STAYPUT / CLASS-H IP65 / NEMA4	NOT REQUIRED
HANDWHEEL	ORIENTATION	SIDE MOUNTED	
JUNCTION BOX	No. OF WAYS SIZE CABLE GLANDS: (SIZE / QNTY) ENCLOSURE CLASS	THIRTY SIX REQUIRED IP55	
I/P CONVERTER	INPUT SIGNAL : POWER SUPPLY SPLIT RANGE ENCLOSURE CLASS	INBUILT IN SMART POSITIONER	

AIR CONNECTION SIZE SHOULD BE ¼" NPT (F)

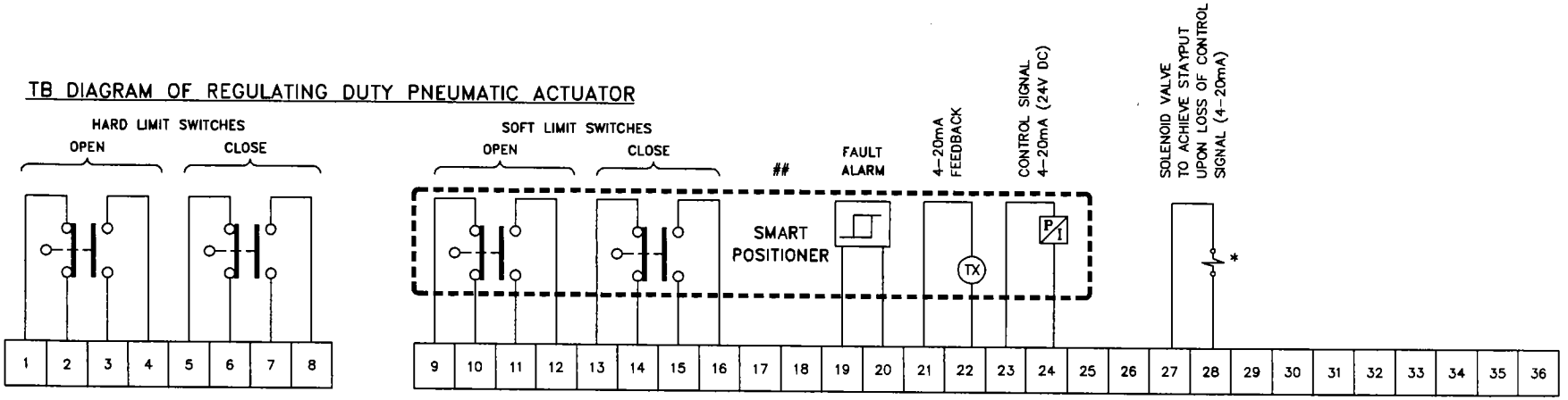
	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR SEAL
SIGN. :				SIGN.:
NAME :	A.JAI GANESH	I.GOPALAN	K. PERIASAMY	NAME:
DATE :	26/04/17			DATE:

DRAWING NO: 3-97-599-20498

TB DIAGRAM OF OPEN/CLOSE DUTY PNEUMATIC ACTUATOR



TB DIAGRAM OF REGULATING DUTY PNEUMATIC ACTUATOR



NOTE

1. # – SINGLE COIL OR DUAL COIL FOR THE RESPECTIVE APPLICATION SHALL BE DECIDED BASED ON THE PROCESS/CONTRACT REQUIREMENT.
2. ## – SMART POSITIONER SHALL BE 2 WIRE TYPE (POWERED FROM THE OUTPUT MODULE OF THE CONTROL SYSTEM THROUGH THE SAME CONTROL SIGNAL 4–20mA)
3. * – ADDITIONAL SOLENOID VALVE MAY BE USED IN ORDER TO ACHEIVE STAYPUT ON LOSS OF CONTROL SIGNAL (4–20mA), IF STAYPUT IS NOT AN INTEGRAL FEATURE OF THE SMART POSITIONER.

REV	DATE	ALTERED :
		CHD./APPD. :
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: RAICHUR POWER CORPORATION LTD. (A JVC OF KPCL & BHEL)
YERMARAS THERMAL POWER PROJECT
2x800MW, UNIT-1&2, Cust. No. 1802 & 1803.

CONSULTANT: EVONIK ENERGY SERVICES (INDIA) LIMITED

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPPALLI – 620014

	NAME	SIGNATURE	DATE	NO. OF VAR
DRN	A.Thambu raj	30.12.11	30-12-11	—
CHD	M.Muruga Prabu		30-12-11	
APPD	V.M.Selvaraaj		30-12-11	

DEPT. : C & I	ALL DIMENSIONS ARE IN MM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No. OF ITEMS
CODE : 392		NTS	—	—	—	—

TITLE: TERMINAL BLOCK DIAGRAM FOR PNEUMATIC ACTUATOR (DRAWN FOR INTERMEDIATE POSITION OF ACTUATOR)
Sheet 01 of 01

CARD CODE: U 01

DRAWING NO: 3-97-599-20498

REV: 00

File Name : YERPCTB1

Technical Specification of the SMART positioner

General instructions to the vendor:

Vendor to submit this document along with the technical offer giving compliance to various clauses of the technical specification for evaluation.

Vendor to submit the Terminal block wiring diagram of the SMART positioner along with the offer.

Vendor to quote the SMART positioner along with the position feedback module and alarm module. (if it is an optional item)

Vendor to take care of the special technical requirements (if applicable) given in the annexure.

Make of the SMART Positioner			**Model No.:**
Sno	**Technical Description/Requirement**		**Vendor Compliance**
1	SITE CONDITIONS :- Altitude above Sea Level Atmosphere Relative humidity Design Ambient temperature	 270 Metres Tropical,Dusty,Windy&Heavily polluted atmosphere 0 – 95 % -30°C TO 80°C	
2	Type of Input	4-20 mA, 24VDC , 2 wire system (Loop powered from the external supply)	
3	Operational signal range	3.6 mA - 21 mA (4-20 mA). Split range operation shall also be possible.	
4	Voltage	Vendor to specify.	
5	Input Impedance	Vendor to specify.	
6	Supply Air pressure	5 – 7 Kg/cm^2	
7	Sensitivity, Characteristic Deviation, Hysteresis	Vendor to specify.	
8	Type of Acting (Direct/Reverse)	Vendor to match with the type of actuator.	
9	Stroke time	Vendor to match with the actuator stroking time.	

10	No. of pneumatic outputs (Single/Double)	Vendor to match with the type of actuator	
11	Pneumatic Process Connection	¼" NPT(F)	
12	Communication by Hart Protocol	SMART positioner shall be compatible for Remote calibration & Diagnostics using Hart Management System	
13	Calibration	Auto Start with self calibration, Remote Calibration and manual Calibration shall be possible.	
14	Mode of Configuration	SMART positioner shall be calibrated using 1. Local key. 2. Hand held programmer. 3. Personal Computer.	
15	Position feed back	4-20mA position feedback signal shall be provided.	
16	Indication for travel	Both Electronic & Mechanical Indication shall be provided.	
17	Electrical Cable entry	Side or bottom entry to avoid water ingress. ¾" Dia plain hole.	
18	Casing	Aluminium	
19	Protection Class	IP 65	
20	Action of actuator during 4 to 20 mA control signal failure.	Depending on the actuator application, either Fail Safe position or Stay put (Fail freeze) function has to be configurable with alarm output in the SMART positioner. Vendor to refer the actuator datasheet and to suit with the requirement of the actuator. Achieving Fail freeze facility has to be integral feature of the SMART positioner.	
21	Diagnostic / Test Features (Soft output shall be available for all the signals indicated).	1. Open / Close limit switch actuation provision throughout the stroke length. 2. On loss of demand signal,	

		alarm shall be provided. 3. Rising or falling indication. 4. Manual/Auto operation indication. 5. Signal air failure alarm. 6. Power air failure alarm. 7. Travel/ Stroke counter. 8. Diagnosis of leakage in actuator. 9. On line partial closure test 10. Valve signature analysis 11. Valve friction/jamming detection	
22	Valve signature Test Reports	All the test reports related to valve characteristics shall be provided by the vendor.	
23	Accessories	For Supply & output pressure, gauges shall be provided.	
24	EMC Compliance	SMART positioner shall conform to IEC 61000-6-2, 3, IEC 61326; or equivalent standards.	
25	Influence of Temperature rise & Vibration effect on SMART Positioner	Vendor to specify	

	CHECK LIST FOR SH/RH BLOCK/CONTROL VALVES AND SBPRV	SPEC. NO. : YERMA_CHKLIST	
		SECTION: Boiler Mountings/PE (FB)	
		REV NO.: 00	Date:25.02.13
		SHEET : 1 OF 1	

CUSTOMER NAME : YERMARUS- 2X800MW **CUST. Nos.:1802 ,1803**

Vendor should submit this **Filled up** Check list along with Technical and Unpriced Offer during Initial Offer submission and with each Revised Submission . Put tick mark " √ " in appropriate boxes relevant to the submission. Indicate Revision Number in case of revised submission. Offer will not be evaluated without receipt of filled up Check list signed and company seal affixed .

SL NO	ENCLOSURES / DETAILS FURNISHED	FIRST SUBMISSION REV 00	REVISED SUBMISSION REV____
01	Completely Filled up **BHEL Datasheets** for all services clearly indicating Vendor name, models, size, Rating, Materials, Cv, Lift%, Valve weight etc with vendor signature and Company seal.	YES ☐ NO ☐	YES ☐ NO ☐
02	Valve & Accessory models like Actuator, Positioner, Air lock, Limit switch, Position Transmitter, Solenoid valve, I/P Converter, Terminal Box etc. offered meets all the Specification indicated in BHEL datasheets and accepting IBR Form-IIIC submission.	YES ☐ NO ☐	YES ☐ NO ☐
03	Valves can be directly welded to connecting line sizes indicated in BHEL Datasheets without reducers	YES ☐ NO ☐	YES ☐ NO ☐
04	Lift % vs. Cv% curve for each and every valve model offered (Excluding Block Valve).	YES ☐ NO ☐	YES ☐ NO ☐
05	Terminal Box wiring diagram (For Pneumatic Actuators)	YES ☐ NO ☐	YES ☐ NO ☐
06	Vendor's Pneumatic Hookup diagram as applicable for each service considering whether actuator is Single Acting or Double Acting	YES ☐ NO ☐	YES ☐ NO ☐
07	Sizing Calculations showing Formula used with variables and constants for each of the following: i) Cv sizing for all services ii) Actuator sizing for all services iii) Noise calculation for control valves iv) Cavitation check calculation for SH/RH Spray control valves v) Valve outlet velocity calculation	 YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐	 YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐
08	Valve and All Accessory catalogs if models are revised or these are offered for the first time.	YES ☐ NO ☐	YES ☐ NO ☐
09	The Quantities, Models and other vendor indicated details in **Quotation (Unpriced Bid)** are matching with BHEL Enquiry Sl.Nos. Quantities and those filled in BHEL Datasheets	YES ☐ NO ☐	YES ☐ NO ☐
10	Duly filled up "BHEL Special Contract Requirements" with Vendor Seal and Signature (**If applicable and sent by BHEL**)	YES ☐ NO ☐	YES ☐ NO ☐
11	ELECTRICAL ACTUATOR DETAILS (If applicable for this project) 1) Electrical Actuator –vendor wiring diagram 2) Actuator vendor's datasheets 3) BHEL datasheets for actuator	YES ☐ NO ☐	YES ☐ NO ☐
	VALVE VENDOR NAME :		
	SIGNATURE OF COMPANY REPRESENTATIVE WITH DATE :		
	SEAL OF COMPANY REPRESENTATIVE :		

NB: STRIKEOUT WHICHEVER IS NOT APPLICABLE

REF: FB: BOI: STARTUP Valve/01 **DT**: 12.03.2013

SPECIAL CONDITIONS

1. This tender is for the supply of Start Up System Control Valves and Warm Keeping Level Control Valves with accessories and their commissioning spares, as per technical specifications attached and quantity mentioned in our enquiry.

2. The vendor shall have adequate experience in manufacturing and supply of these valves.

3. The tender is in two part bid system. One part consisting of Technical bid with Commercial terms & conditions and other part is Price Bid. Techno-Commercial bid and Price bid are to be submitted in separate sealed covers. In addition to technical and commercial conditions, vendors who are not registered vendor of BHEL, Trichy have to submit the filled in "Supplier Registration Forms" (available in www.bhel.com) along with the technical bid. Based on this and other conditions, as well as technical capability, vendors will be short-listed. Both these covers are to be put in a single cover duly super scribing the Enquiry Number. The technico-commercial bid will be opened on the due date and based on the acceptance of techno-commercial bid and vendor evaluation, the price bid/Reverse Auction of the qualified vendors will be opened on a suitable date with due intimation.

   Following will be the criteria for vendors to qualify:
   a. Vendor should have been approved by BHEL Trichy for this items under Permanent category already (OR)
   b. Vendor should submit the following documents for considering them for approval vendor:
      i. Duly filled-in Supplier Registration Forms, alongwith all credentials and supporting documents, Certificate of Rating from D&B (Dun & Brad) sheet or equivalent agencies, Financial Performance / Profit & Loss Account / Balance sheet for last three years etc.
      ii. Availability of minimum manufacturing, handling, testing and measuring facilities as detailed in the Supplier Registration Form.
      iii. BHEL will have the right for spot assessment of the facilities for assessment.
      iv. Qualifying to our techno commercial requirements of the Enquiry.
      v. **Offers are liable for rejection, if not satisfying above qualifying criteria or If the forms or documents are incomplete.**

4. Tender will be finalized on package basis and Total cost to BHEL only.

5. BHEL may to negotiate the L1 rate, if not meeting our budget/estimated cost.

6. BHEL may re-float the tender opened, if L1 price is not the acceptable price to BHEL.

7. BHEL standard LD condition is 0.50 % per week to a maximum of 15 % for the undelivered portion of materials

8. Risk Purchase clause is applicable.

9. For indigenous vendors, 100 % payment will be made in 45 days from the date of receipt of materials with 10 % performance bank guarantee in BHEL standard format.

10. For indigenous vendors, offer shall be quoted on Ex-works basis

11. For Import orders, 100% payment will be made through irrevocable unconfirmed LC at sight against presentation of original shipping documents including clean Bill of Lading and LC opening charges to BHEL account. LC will have validity of 90 days including negotiation period and any extension of LC validity to seller's account. LC will be opened after hearing tentative readiness of materials.

12. In case of Foreign vendors, they have to indicate Country of origin and prices shall be quoted on FOB/Named sea port or Airport basis.

13. All bank charges outside India to Seller's account (for Import orders)

14. For Foreign offers, Foreign Exchange rate (of SBI) prevailing on Techno-Commercial bid opening date will be taken for calculation

15. Please indicate Net / Gross weight of the total consignment in your technical offer.

16. Performance Bank Guarantee for 10% value of order in BHEL format shall be submitted along with negotiation documents. This will have validity till the end of guarantee period.

17. Prices shall be firm and shall have validity of 60 days.

18. All applicable Taxes, Duties and any other extra cost applicable shall be indicated clearly in the offer.

19. Delivery period shall be indicated in the offer.

(N.Baskar)
Manager/Purchase/BOI
<baski@bheltry.co.in>

TERMS AND CONDITIONS

1. a) **QUOTATIONS** : Each tender should be sent in double cover, inner cover should be sealed with tenderer's distinctive seal and superscribed with correct tender No. item of supply and due date of opening. The outer cover should only bear the address of this office and should not have any indication that a tender is within. Two or more quotation should not be sent in one cover but the quotation against each tender should be sent separately to avoid confusion. Tender should not be addressed to any individual's name but only by designation.

b) Tenders should be free from CORRECTION AND ERASURES. Corrections if any, must be attested. All amounts shall be indicated both in words as well as in figures. Where there is difference between amount quoted in words and figures, amount quoted in words shall prevail.

c) Price should be nett F.O.R despatching station inclusive of risk in transit and remain valid for 60 days from the due date.

d) If any Sales Tax is payable as extra to the quoted price it should be specifically stated in quotations alongwith CST & TNGST No failing which the purchaser will not be liable for payment of Sales Tax. Our T.N.G.S.T No 3560005 Dt. 01-04-1995 CST No. 239383 Dt. 11.6.1991.

e) No revision of prices will be entertained after tenders are opened.

f) Manufacturer's Name, Trade Mark or Patent No. if any should be specified. Illustrative leaflets giving technical particulars are required alongwith quotation wherever necessary.

g) Products with I.S.I Certification marks will be preferred.

h) The purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any tender in part or full without assigning any reason whatsoever.

2. **SAMPLES** : Wherever possible, sample should be submitted separately whether specifically requested or not so as to reach the purchaser on or before the due date of the enquiry. They should be clearly marked with the enquiry No and the date on the outside cover to facilitate identification.

3. **PACKING AND MARKING:** The supplier shall arrange for securely protecting and packing the stores to avoid loss or damages during transit.

4. **TERMS OF PAYMENT** : Payment will be made within 30 days of satisfactory receipt of materials at site. Wherever required by the purchaser, the successful tenderer must send the operation and maintenance manuals, test certificates, drawings, etc., for the materials ordered. These should be sent immediately after despatch of the materials and a statement to that effect should be made in the invoice. Failure to comply with this provision will result in delay in payment of the bills. Goods despatched either by V.P.P or by the document presented through bank will not be accepted unless agreed to by the Purchaser.

The duplicate copy of the invoice meant for the transporters should accompany the material as stipulated under C.E. Rules 52A and 173C (or) 57GG. A photostat copy of the above Invoice for each delivery challan should be submitted alongwith the original bills routed through bank or submitted directly to BHEL Finance Department.

5. **SECURITY DEPOSIT** : For purchases over Rs. 5,000/- the successful tenderer/s may be requested to furnish a Bank Guarantee. Security Deposit for an appropriate value as may be determined by BHEL.

6. **LIQUIDATED DAMAGES/ PENALTY AND INTEREST ON ADVANCES FOR DELAY IN DELIVERY:**

If the supplier fails to deliver the raw material / equipment / components within the period specified in the contract the purchaser shall deduct Liquidated Damages a sum equivalent to 0.5 % of the price for each week of delay upto a maximum of 15% of the price of the delayed / undelivered goods. In addition to the recovery of interest at normal cash credit rate plus 2% for the unadjusted portion of the advances. If the delay in delivery of a part contributes to delay in execution of total system, LD and interest on advances will be recovered on the total contract price / total advance paid .

7. **RISK PURCHASE** : Alternatively the purchaser at his option will be entitled to terminate the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or despatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitute therefor. The supplier shall be liable for any loss which the Purchaser may sustain by reason of such risk purchases in addition to penalty at the rate mentioned in clause 6 above.

8. **PREFERENTIAL DELIVERY** : It should be noted if a contract is placed on a higher tenderer as a result of this invitation to tender in preference to the lowest acceptable offer in consideration of the earlier delivery, the seller will be liable to pay to the purchaser the difference between the contract rate and that of the lowest acceptable tender on the basis of final price F.O.R. destination, including all elements of freights, sales tax, duties and other incidents, incidental in case of failure to complete supplies in terms of such contract within the date of delivery specified in the tender and incorporated in the contract.

9. **MODVAT CREDIT** : If any Excise Duty is payable, the chapter head/sub-head reference and the rate of the duty should be quoted. If the tender is availing MODVAT credit for this inpute materials, the effect of proforma credit should be passed on to the purchaser. Tenderer under "MODVAT" shall be preferred.

10. **Purchase** : Preference will be given to CPSUs as per. Government Guidelines.

11. **GENERAL** : The purchaser reserves the right to split up the tender and place order for individual terms with different tenderers and also increase or decrease the quantity.

Any Other conditions which might have been quoted by the Seller and are in contravention to the terms prescribed in the order and which have not been spefcifically accepted in by Purchaser will not be applicable to the contract.

IMPORT ENQ

TERMS AND CONDITIONS

1. OFFER:

Offer in ENGLISH LANGUAGE AND IN TRIPLICATE in a SEALED COVER SUPERSCRIBING the enquiry number ad the due date shall be submitted addressed to:

THE MANAGER / PURCHASE / FB
BHARAT HEAVY ELECTRICALS LIMITED
HIGH PRESSURE BOILER PLANT
THIRUCHIRAPPALLI – 620 014
TAMIL NADU
INDIA

offers should be firm for net FOB Nearest Sea Port price and C&F chennai port, indicating the shipping specifications and the earliest delivery inrespectof offers from overseas suppliers. Offers from indigenous sources shall be firm for FOR TIRUCHIRAPPALLI

2. DOCUMENTS:

(1) offers should be accompanied by detailed technical literature, catalogue and detailed dimensional drawings in ENGLISH and in TRIPLICATE, or otherwise, the offers will not be considered.

(2) incase overseas suppliers route their offer through their accredited selling agents, a letter of authority should be furnished mentioning the name and address of their selling agents, who are authorized to bid, negotiate and conclude a contract on their behalf.

3.AGENCY COMMISSION:

(1) inrespectof offers from overseas suppliers, agency commission, if any, payable to their agents in India, shall invariable be shown separately in the Performa invoice and this will be paid by us in India, in Indian rupees, on satisfactory completion of the contract.

(2) if overseas principal has any til- up with any third party in respect of agency commission it should be declared while submitting offers.

(3) copies of current agency agreement / authorization letter in respect of agency commission shall be furnished along with offer, if not made available earlier.

(4) for calculation of rupee equivalent of agency commission, exchange rate as prevailing on the date of order will be taken.

4. SPARES:

The tenderer should quote separately for spares that are required for two years trouble free operation. The spares offer should accompany the offer of main equipment, Otherwise the quotations will be overlooked.

5. VALIDITY:

The offers for main equipment and spares shall be kept open for acce,ptance for 120 days (one hundred and twenty days) from the date of opening of the tender.

6. TEST CERTIFICATES, OPERATING AND MAINTENANCE MANUALS:

The tenderer shall clearly mention in their offer, that test certificates and operation and maintenance manuals, etc., as called for in the technical specification, in the required number of copies will be provided at no extra cost. If any amount is payable as extra, the same shall be indicated separately in the offer.

7. TERMS OF PAYMENT:

In the event of and order the purchaser will arrange for and irrevocable letter of credit against presentation of documents. Under no circumstances confirmed and irrevocable latter of credit will be established by the purchaser.

8. GENERAL:

(1) preference will be given to suitable indigenous or ex-stock in ported offers, failing which imported offers from incoming consignment against the indigenous supplies "stock and license" will be accepted, if "stock and sale license" is not available with the indigenous suppliers, the same shall be indicated in their offer.

(2) bank guarantee: the supplier in the event of an order, should furnish a bank guarantee from an approved bank at no extra cost in a Performa which will be supplied to the supplier, along with the order, for an amount equivalent to 10% of the value of the contract. The bank guarantee should remain in full force and effect during the period that would be taken for successful completion of the contract and shall continue to be enforceable till 12 months from the date of receipt of consignment at purchaser's site or 18 months from the date of last shipment at the port of delivery whichever is earlier.

9. LD/ PENALTY AND INTEREST ON ADVANCES FOR DELAY IN DELIVERY:

" if the supplier fails to delivery the raw materials / equipment / components within the period specified in the contract the purchaser shall deduct liquidated damages a sum equivalent to 0.5% of the price for each week of delay upto a maximum of 15% of the price of the delayed / undelivered goods, in addition to the recovery of interest at normal cash credit rate plus 2% for the unadjusted portion of the advances. If the delay in delivery of a part contributes to delay in execution of total system, LD and interest on advances will be recovered on the total contract price / total advance paid"

REF:MM/SD(FB)/01		ANNEXURE-A
APPLICABLE COMMERCIAL TERMS & CONDITIONS		
BHEL ENQUIRY NO:		**DT:**
Sl. No.	**Conditions**	**Vendor Confirmation**
1	Offer shall have validity of minimum 60 days from the date of tender opening	
2	Price quoted shall be "FIRM" till execution of full supply and "NO PVC" is applicable	
3	Tender will be finalized on the basis of "TOTAL COST" basis to BHEL	
4	Delivery Terms shall be Ex Works only (indicate Packing & Forwarding cost, if applicable)	
5	Freight & Insurance is on BHEL Scope	
6	Excise duty with Cess: As applicable	
7	Sales Tax / Local taxes/VAT: As applicable	
8	LD Clause: Delay in dispatches shall attract a penalty of Liquidated damages (LD) @ 0.5% per week subjected to a maximum of 15% on undelivered portion	
9	Payment shall be "100% after receipt and acceptance of material at our end"	
10	In case of order, Documents (Drawings, Data sheet & Quality plan in triplicate) shall be submitted within two weeks from the receipt of order	
11	Delivery period: Shall be indicated	
12	Guarantee period (as per our specification)	
13	Submission of Performance Bank Guarantee	
14	Risk Purchase Clause	
15	BHEL may finalise the tender through Reverse Auction Process	

REF:MM/BOI/01		ANNEXURE E
APPLICABLE COMMERCIAL TERMS AND CONDITIONS FOR IMPORT ENQUIRY		
BHEL ENQUIRY NO.		**DT**
SI NO.	**Conditions**	**VENDOR CONFIRMATION**
1	Offer shall have validity of 60 days from the date of tender opening	
2	Price quoted shall be 'FIRM' till execution of full supply and "NO PVC" is applicable	
3	Tender will be finalized on the basis of "TOTAL COST" basis to BHEL	
4	In case of order, Documents (Drawings, Data sheet & Quality plan in triplicate) shall be submitted within two weeks from the receipt of order	
5	Bank Charges: Bank Charges outside India are to be borne by vendor only and the bank charges within INDIA shall be borne by BHEL	
6	Delivery period: Shall be indicated	
7	Guarantee / warranty: we require a guarantee for equipments supplied, for a period of 18 months from the date of commng or 24 months from the date of supply whichever is later.	
8	Delivery term: Offer shall be submitted on FOB/ named sea port or air port basis.	
9	Payment terms: 100% payment shall be released thru irrevocable unconfirmed letter of credit in any one of the Indian First class Banks. LC shall be opened only on hearing tentative matl readiness. LC will be kept valid for a period of 90 days only, including presentation period or CAD Basis	
10	LC Opening Charges to BHEL Account and any extension is to sellers account	
11	BHEL may finalise the tender through Reverse Auction Process	
12	O & M manuals: BHEL require 1 sets of printed O & M manuals with 3 soft copies in CD-ROM at no cost to be sent to BHEL/ Trichy and 3 sets of printed O &M manuals to be sent along with valves directly to site.(for each boiler)	
13	Tender will be opened on two part bid system. The technical bid with commercial terms and conditions separately and price bid separately.	
14	LD Clause: Delay in dispatches shall attract a penalty of Liquidated damages (LD) @ 0.5% per week subjected to a maximum of 15% on undelivered portion	
15	Repair & replacements: Within the guarantee period vendor has to replace / rectify the defective/ damaged items on free of cost within a reasonable time of reporting from our end. All incidental charges like freight, insurance and customs duty are to your account only. The defective parts and components shall be collected by your Indian agent or / authorized person, only after completing the replacement / repairs. The defective parts / components will not be returned back to vendor works by us due to procedural problems	
16	Inspection & testing requirements: inspection and testing requirements are to be carried out as per the specification and BHEL/customer approved QAP and all test certificates are to be submitted in complete set as indicated in our specification/QAP.	
17	Performance bank guarantee: BHEL requires a Performance Bank Guarantee to a value of 10% of supply value covering the guarantee period. The PBG shall be in BHEL format (format enclosed) which is to be opened in any one of the first class Indian banks. All bank charges shall be to vendor account only.	
18	Risk Purchase Clause: The Purchaser at his option will be entitled to terminate the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or despatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitute therefor. The supplier shall be liable for any loss which the purchaser may sustain by reason of such risk purchases in addition to penalty as per LD clause.	
19	For Evaluation, exchange rate (TT selling rate of SBI) as on scheduled date of tender opening (part -I bid in case of two part bid) shall be considered.	
20	Test certificate shall be submitted prior to despatch for our review and approval. Shipment shall be made only after obtaing despatch clearance from BHEL	