



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)
Tiruchirappalli – 620014, TAMIL NADU, INDIA
MATERIALS MANAGEMENT

<p align="center">TITLE</p> <p>START UP SYSTEM CONTROL VALVES WITH ACCESSORIES & ITS COMMISSIONING SPARES AS PER ATTACHED SPECIFICATIONS</p>	<p>Phone: +91 431 257 7985 Fax : +91 431 252 0719 Email : baski@bheltry.co.in</p>
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	Reference Number: Enquiry 1801201355/01	Enquiry Date: 20.10.2012	Due date for submission of quotation: 13.11.2012
<p>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</p>			

BHEL/Trichy is looking for empanelment of new vendors for supply of "START UP SYSTEM CONTROL VALVES WITH ACCESSORIES & ITS COMMISSIONING SPARES AS PER ATTACHED SPECIFICATIONS"

<p>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) under enquiry reference "XXXXXXXXXX"</p>	
<p>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.</p>	<p>Yours faithfully, For Bharat Heavy Electricals Limited</p> <p>AGM / MM</p>



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
	1801201355	20.10.2012	13.11.2012
Please quote Enquiry No, Date and due date in all correspondences. This is only a request for quotation and not an order			

Item	Description	Unit	Quantity	Delivery Quantity	Schedule Date
10	A170612486701004 TUBINGS AND FITTINGS	SET	3.000	3.00	24.04.13
20	L170612486701001 SEPERATOR LEVEL CONTROL VALVE ASSEMBLY.	SET	6.000	6.00	24.04.13
30	L170612486701002 MINIMUMECONOMISER FLOWCONTROL VALVE ASSY	SET	3.000	3.00	24.04.13
40	L170612486701003 „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	3.000	3.00	24.04.13
50	L170612486701005 FILLS OF HYDRAULIC FLUID	SET	6.000	6.00	24.04.13
60	L170612486701006 SPECIAL TOOLS	SET	3.000	3.00	24.04.13
70	L170782498803001 One lot of commissioning spares for each valve (Two seperator control valves , one Minimum Economiser Flow control valve) and Electro Hydraulic Power and control Kit as per SELLER'S specific recommendation	SET	3.000	3.00	24.10.13

General Note:


PROJECT: LALITHPUR 660MWX3, Unit -1,2 & 3

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. Tender may be finalised through Reverse auction.

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.

VIGILANCE AWARENESS WEEK
29 TH OCT-3 RD NOV 2012
FOR VIGILANCE RELATED COMPLAINTS
CONTACT GM / VIGILANCE
PHONE:0431-2577552,2577752

Yours faithfully,
For BHARAT HEAVY ELECTRICALS LIMITED


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



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TAMILNADU (INDIA)

Page
2/2

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

1801201355 / 20.10.2012

5. 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.

Enclosures:

1. Specifiation for Start Up Control valves- 28 Sheets
- 2 Surface Preperation and Coating Requirements- 11 Sheets
3. Special Conditions- 2 sheets
4. Annexure E(Applicable Commercial terms & Conditions For Import vendor)- 1 Sheet
5. Annexure A (Applicable Commercial terms & Conditions For Indigenous vendor) - 1 Sheet
- 7 Enquiry Terms & Conditions (Import) - 1 Sheet
8. Enquiry Terms & Conditions(Indigenous)- 1 Sheet

"LD clause has to be confirmed without fail."

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.

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


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

REF: FB: BOI: STARTUP Valve/01

DT: 20.10.2012

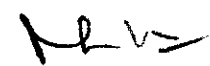
SPECIAL CONDITIONS

1. This tender is for the supply of Startup system control valve and Warm keeping control valves with accessories, 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>

N. BASKAR
Manager
Materials Management / FB
BHEL, TRICHY - 620 014.

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 falling 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 input 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 specifically accepted in by Purchaser will not be applicable to the contract.

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	

TERMS AND CONDITIONS

- 1. OFFER:**
Offer in ENGLISH LANGUAGE AND IN TRIPLICATE in a SEALED COVER SUPERSCRIBING the enquiry number and 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 in respect of 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) in case 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) In respect of offers from overseas suppliers, agency commission, if any, payable to their agents in India, shall invariably 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 tie-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 acceptance 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 an order the purchaser will arrange for and irrevocable letter of credit against presentation of documents. Under no circumstances confirmed and irrevocable letter 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 safe 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"

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	LC Opening Charges to BHEL Account and any extension is to sellers account		
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	In case of order, Documents (Drawings, Data sheet & Quality plan in triplicate) shall be submitted within two weeks from the receipt of order		
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 order 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.		



**SPECIFICATION FOR STARTUP
CONTROL VALVES**

SPECIFICATION NO.: SCV_MAIN SPEC

SECTION: Boiler Mountings/PE (FB)

REV. NO.: 00

DATE: -01.09.12

PAGE NO : 2 OF 28

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SPECIFICATION FOR STARTUP CONTROL VALVES

SPECIFICATION NO.: SCV_MAIN SPEC

SECTION: Boiler Mountings/PE (FB)

REV. NO.: 00

DATE: -01.09.12

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- 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



SPECIFICATION FOR STARTUP CONTROL VALVES

SPECIFICATION NO.: SCV_MAIN SPEC

SECTION: Boiler Mountings/PE (FB)

REV. NO.: 00

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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.



SPECIFICATION FOR STARTUP CONTROL VALVES

SPECIFICATION NO.: SCV_MAIN SPEC

SECTION: Boiler Mountings/PE (FB)

REV. NO.: 00

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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.



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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



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supplied BOILER SEPARATOR LEVEL CONTROL VALVES (HWL-1, HWL-2 VALVES) and Minimum Economizer Flow Control Valve (MEFCV) hydraulic actuators. Each Valve will be located 30.5 meters (100 ft) from the Common Hydraulic Unit.

- 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.*~~



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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 Surface Preparations and Coatings Requirements.



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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 / cm² (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.



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- 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 / cm² (g) @ degrees C
 - ✓ Hydrostatic shell test pressure, Kg / cm² (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



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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

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.



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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 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
- 9.5 **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.
- 9.6 The turndown of the valve offered should not be less than 50:1 for all control valve applications.
- 9.7 The control valve size should not be smaller than connecting line size by more than 1 step.



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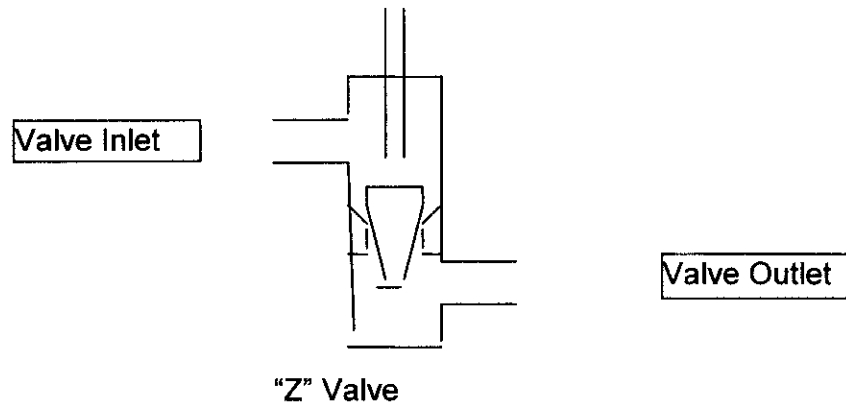
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- 9.8 Valves shall be straight through in "Z" valve configuration. "Z" configuration has parallel inlet and outlet nozzles in two different horizontal planes.



- 9.9 Valve shall be forged design.
- 9.10 The trims of all regulating control valves should be cage guided type. Top guided design is not acceptable.
- 9.11 Valve internals (seat, plug, cages, etc.) shall be replaceable without removing the valve hydraulic actuator from the valve body.
- 9.12 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
- 9.13 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.
- 9.14 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**



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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.

- 9.15 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.
- 9.16 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.
- 9.17 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.
- 9.18 Valve sizing shall be in accordance with the latest edition of ISA Handbook on Control Valves with due consideration for the measures to avoid choked 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.
- 9.19 Valve outlet shall have a 5 degree downward slope to ensure proper drainage of valve outlet.
- 9.20 Valve inlet and outlet cages shall be provided if required by the indicated process conditions.



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- 9.21 For valves with butt weld ends, the supplier is required to prepare weld profiles to BHEL supplied information.
- 9.22 Both the valves and their accessories shall be designed for the process and local installation environment.
- 9.23 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.
- 9.24 The Supplier shall provide all necessary converters, positioners, position transmitters, etc. mounted on the control valve.
- 9.25 The direction of flow shall be clearly marked on each globe valve.
- 9.26 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.
- 9.27 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.
- 9.28 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.
- 9.29 Valve's gland packing material shall be grafoil for all the valves.
- 9.30 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**
- 9.31 **Extension bonnets shall be used on all valves when the maximum temperature of the flowing fluid is greater than 280 deg.C.**
- 9.32 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.



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

9.34 Hydraulic Valve Actuators

- 9.34.1 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.
- 9.34.2 The Hydraulic actuator shall be sized to operate against the process maximum differential pressure.
- 9.34.3 A mechanical position indicator shall be provided on the actuator.
- 9.34.4 The actuator shall be equipped with a hydraulic positioning valve to convert a 4 –20 mADC signal from the DCS to a hydraulic signal.
- 9.34.5 The actuator shall be furnished with a 4 –20 mADC valve position feedback signal.
- 9.34.6 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.



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

- 9.35.1 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.
- 9.35.2 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.
- 9.35.3 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.
- 9.35.4 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.
- 9.35.5 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.
- 9.35.6 The Electronic Control Unit as a minimum shall have the following signals to/from the customer supplied DCS:
- | | |
|----------------------------------|-------------|
| HWL-1 Position Demand (from DCS) | 4-20 mADC |
| HWL-1 Valve Position (to DCS) | 4-20 mADC |
| HWL-1 Position Failure (to DCS) | dry contact |



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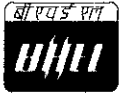
HWL-1 Quick Closing (from DCS)	dry contact
HWL-1 Valve Closed (to DCS)	dry contact
HWL-2 Position Demand (from DCS)	4-20 mADC
HWL-2 Valve Position (to DCS)	4-20 mADC
HWL-2 Position Failure (to DCS)	dry contact
HWL-2 Quick Closing (from DCS)	dry contact
HWL-2 Valve Closed (to DCS)	dry contact
MEFCV Position Demand (from DCS)	4-20 mADC
MEFCV Valve Position (to DCS)	4-20 mADC
MEFCV Position Failure (to DCS)	dry contact
ECU/Hyd Power Unit Alarm (to DCS)	dry contact
ECU/Hyd Power Unit Fault (to DCS)	dry contact

9.36 Valve Selection Criteria

- 9.36.1 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.
- 9.36.2 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.
- 9.36.3 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
- 9.36.4 The bidder has to submit calculated noise levels (dBA) for the operating conditions specified with valve untagged.

9.37 Test and Examinations

- 9.37.1 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. The BHEL Approved Quality Plan is to be followed. The tests shall include but not limited to the following



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- 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 900 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 50 mm and above) of all valves with rating of 900 lbs or above shall be performed as per ASME B16.34.

3) **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.

4) **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.

5) **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 from 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



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to close on signal failure etc. in line with the specification requirements.

6) 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.

9.38 Evaluations

- 9.38.1 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.



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ACTUATOR SIZING PRESSURE : 318.3 kg/cm² (g)
 BODY DESIGN: PRESSURE / TEMPERATURE : 295.3 kg/cm² (g) / 375°C




IBR FORM - III C : REQUIRED

TOTAL WEIGHT (VALVE+ACTUATOR+ACCESSORIES) : Kgs.

Valves should be directly weld able to connecting pipe without the use of Reducers.

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) VOLUME BOOSTER & DUMP VALVE	REQUIRED REQUIRED REQUIRED NOT REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED IF REQUIRED	
ELECTRO HYDRAULIC POSITIONER	MANUFACTURER & MODEL No. BYPASS : GAUGES : ENCLOSURE CLASS INPUT SIGNAL OUTPUT SIGNAL	YES / NO : TWO/THREE : IP-65 4 - 20 mA TO SUIT ACTUATOR	
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	

AIR CONNECTION SIZE SHOULD BE 1/2" NPT (F)

SIGN. : NAME : DATE :	PREPARED BY  A. JAI GANESH 05/09/12	CHECKED BY  K. SRDHAR	APPROVED BY  K. PERIASAMY 10/09/12	VENDOR SEAL SIGN. : NAME : DATE :
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ACTUATOR SIZING PRESSURE : 318.3 kg/cm² (g)
 BODY DESIGN: PRESSURE / TEMPERATURE : 318.3 kg/cm² (g) / 348°C

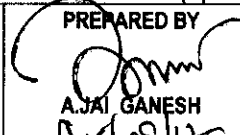
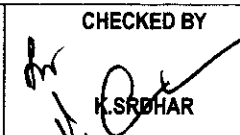
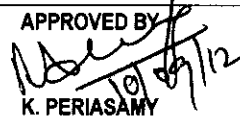
IBR FORM - III C : REQUIRED

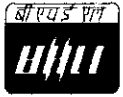
TOTAL WEIGHT (VALVE+ACTUATOR+ACCESSORIES) : Kgs.

Valves should be directly weldable to connecting pipe without the use of Reducers. ONLY GLOBE "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) VOLUME BOOSTER & DUMP VALVE	REQUIRED REQUIRED REQUIRED NOT REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED REQUIRED IF REQUIRED	
ELECTRO HYDRAULIC POSITIONER	MANUFACTURER & MODEL No. BYPASS : GAUGES : ENCLOSURE CLASS INPUT SIGNAL OUTPUT SIGNAL	YES / NO : TWO/THREE : IP-65 4 - 20 mA TO SUIT ACTUATOR	
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	

AIR CONNECTION SIZE SHOULD BE 1/2" NPT (F)

	PREPARED BY  A. JAI GANESH 05/09/12	CHECKED BY  K. SRITHAR	APPROVED BY  K. PERIASAMY 10/09/12	VENDOR SEAL SIGN.: NAME: DATE:
--	--	--	---	--



SPECIFICATION FOR STARTUP CONTROL VALVES

SPECIFICATION NO.: SCV_MAIN SPEC

SECTION: Boiler Mountings/PE (FB)

REV. NO.: 00

DATE: -01.09.12

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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.



**SPECIFICATION FOR STARTUP
CONTROL VALVES**

SPECIFICATION NO.: SCV_MAIN SPEC

SECTION: Boiler Mountings/PE (FB)

REV. NO.: 00

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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:

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: SCV_MAIN SPEC	
		SECTION: Boiler Mountings/PE (FB)	
		REV. NO.: 00	DATE: -25.04.11
		PAGE NO : 28 OF 28	

12.0 APPENDIX A, CONTRACT SPECIFIC REQUIREMENTS

Please refer to attached Annexure-I for Surface Preparations and Coatings Requirements.



SPECIFICATION FOR STARTUP CONTROL VALVES

SPECIFICATION NO.: SCV_MAIN SPEC

SECTION: Boiler Mountings/PE (FB)

REV. NO.: 00

DATE: -01.09.12

PAGE NO : 3 OF 28

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.
- 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.



Surface Preparation and Coating Requirements

CUST NAME : LALITPUR 3X660MW

CUST NO : 1706,1707 &1708

REV. NO.: 00

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PURPOSE

This technical specification summarizes the surface preparation, shop painting, coatings and other products used to protect the steam generator tubular products, boiler components and equipment, and manufactured products supplied by BHEL and its suppliers.

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Surface Preparation and Coating Requirements

CUST NAME : LALITPUR 3X660MW

CUST NO : 1706,1707 &1708

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1.0 INSTRUCTIONS TO SUPPLIER

- 1.1 Equipment such as pulverizers, sootblowers, feeders, small fans, motors, pumps, valves, etc shall be prepared and painted per manufacturer's standard for a minimum of 10 year power station operating life in a tropical environment. Equipment must arrive at the site with a finished coat. Supplier shall provide a reasonable quantity of touch-up paint labeled with BHEL Purchase Order (P.O) number for associated components. Equipment manufactures are to submit their paint specifications for review by BHEL, immediately after receipt of purchase orders.
- 1.2 Suppliers of components such as Structural Steel, Pressure Parts, Ducts and Piping shall comply with the requirements that follow in this specification. Suppliers are to submit their paint specifications to BHEL immediately after receipt of purchase orders for review and approval by BHEL. Shop prime coating is by the Supplier. Finish painting is at site by the Erection contractor.
- 1.3 Provisions shall be made to ensure that water does not enter any equipment during shipment or in storage at the plant site.
- 1.4 Paint containing lead, Polychlorinated biphenyls (PCB's), or any other hazardous materials is not allowed.
- 1.5 All paints shall be delivered to job site in manufacturer's sealed containers. Each container shall be labeled by the manufacturer with the manufacturer's name, type of paint, batch number, color, BHEL's PO numbers.
- 1.6 The following regulations, codes, and standards of the Republic of India shall govern the supply and application of paint:

BIS	Bureau of Indian Standards Indian Factories Act and State Factories Act
IBR	Indian Boiler Regulations Regulations of the Central Pollution Control Board, India Regulations of the Ministry of Environment & Forest (MoEF), Gov't of India, Pollution Control Regulations of Department of Environment, Gov't of India Bihar State Pollution Control Board.
IS: 1477	Code of Practice for Painting of Ferrous Metals in Buildings, Part I – Pretreatment, 1971 edition reaffirmed in 1995 Part II – Painting, 1971 edition reaffirmed in 2000
IS : 2074	Specification for red oxide-zinc chrome, priming, and ready mixed paint air drying.



Surface Preparation and Coating Requirements

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- IS : 2629 Recommended Practice for Hot-Dip Galvanizing of Iron and Steel 1985 edition reaffirmed in 2006
- IS : 4759 Code of practice for hot dip zinc coating on structural steel and other allied products.

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

- ANSI American National Standards Institute
ASTM American Society of Testing and Materials
OSHA Occupational Safety Health Act
SSPC Society for Protective Coatings
SSPC-PA 1 Shop, Field and Maintenance Painting
SSPC-SP 1 Solvent Cleaning
SSPC-SP 2 Hand Tool Cleaning
SSPC-SP 3 Power Tool Cleaning
SSPC-SP 6/NACE No. 3 Commercial Blast Cleaning
SSPC-SP 10/NACE No. 2 Near White Blast Cleaning
SSPC-SP11 Power Tool Clearing to Bare Metal

1.8 Shipping rigs to be retained during the storage period shall be given two coats of Yellow primer.

2.0 SURFACE PROTECTION - FURNISHED BY SUPPLIER

- 2.1 This technical specification requires components be provided with adequate protection for overseas freight shipments and a 2-year storage period at the construction site in a tropical climate.
- 2.2 Surface preparation methods and paint/primer materials shall be of the type specified herein. If the Supplier desires to use any paint/primer materials or surface preparation other than that specified, specific approval shall be obtained by the Supplier in writing from BHEL for using the substitute material.
- 2.3 Machine finished surfaces, polished surfaces, or other bare metal surfaces which are not to be painted, such as machinery shafts and couplings shall be provided temporary protection during storage and constructional periods by a coating of a suitable non- drying, oily type, or rust preventive compound.
- 2.4 The Supplier shall provide the coating Material Safety Data Sheets (MSDS) and Paint Specification Data Sheets to BHEL office via "SupplierNet" and shall also include a hardcopy in the shipment.



Surface Preparation and Coating Requirements

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- 2.5 The Supplier shall have available the MSDS and Specification Data Sheets for coatings being used in their shop at the time of fabrication.
- 2.6 Touch up paint: Suppliers of large orders (more than 10 tons) shall provide one 5-gallon (20-liter) container of touch up paint for brush on field application for every 15,000 sq ft of shop painted surface area, but in any case a minimum of 5-gallon (20-liter). Touch up paint containers shall be labeled with BHEL WBS and PO numbers.

3.0 SURFACE PREPARATION AND PAINTING REQUIREMENTS

- 3.1 Refer to Table A – for surface preparation and type of paint protection.
- 3.2 Drawings and bills of material shall specify the applicable cleaning, painting and coating instructions.
- 3.3 The Supplier shall apply paint in accordance with the paint manufacturer's instructions.
- 3.4 Unless otherwise specified, all surfaces shall be clean, free from loose rust, grease or oil (other than light grade mineral oil), dirt, weld scales (slag) and burrs, loose mill scale, moisture or other foreign matter and be suitable for the coating and component expected service life.
- 3.5 Coat scarfed ends of tubing and pipe (except stainless steel) prepared for field butt-welded joints with deoxaluminite on the inside and outside surfaces.
- 3.6 Metal pipe caps over six inches in diameter, used to protect pipe ends, shall have all surfaces painted with one coat of red oxide primer or PCL-1 before shop attachment.
- 3.7 Stainless, Galvanized or Aluminized surfaces need not be painted.
- 3.8 Separately shipped small parts such as loose spacers, washers, etc., must be treated with a rust preventive and packed in separate water tight containers. Containers shall be labeled with item description and BHEL WBS and PO numbers.
- 3.9 The preparation of the surfaces, the painting systems and the galvanizing must be selected to **provide a minimum use of 10 years** before requiring to be repainted for the first time.



Surface Preparation and Coating Requirements

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3.10 Surfaces to be galvanized are:

- Handrails
- Toe Plates
- Platform grating
- Diamond plate used for platforms

Items to be galvanized shall comply with the requirements of IS: 2629 -1985 edition, Reaffirmed in 2006



Surface Preparation and Coating Requirements

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TABLE A SURFACE PREPARATION AND COATING

COMPONENT	BHEL - STANDARD PREPARATION	BHEL - COATING
1) PRESSURE PARTS		
HEADERS, TUBES, LINKS & LEADS	<p>External Surfaces Prepared per SSPC-SP-2 or SP-3 Header Internal Surfaces are not to be coated with a rust preventative.</p> <p>Header openings shall be closed with hand hole plates and soft gaskets before applying external coatings. Avoid seams and wrinkles in tape.</p> <p>Stainless steel portions of headers or header assemblies – need not be painted.</p> <p>Metal pipe caps over 6” OD used to protect pipe ends shall have all surfaces painted with one coat of red oxide primer, before sealing with tape.</p>	<p>All Scarfed Tube Ends – For Field Welded Butt Joints – Except Stainless Steel – Shop Coated with Deoxaluminite Inside and Outside Surfaces.</p> <p>External Surfaces Only: Two Coats of Red Oxide Primer or Quaker Chemical Ferrocote PCL-1, or equal, (60 micron) DFT</p> <p>Internal Surfaces: No Paint on internal surfaces</p> <p>Steam Generator – Gas touched interior surfaces – Roof, Walls, Arch and Hopper – OD shall be prime painted white – for construction.</p>
TUBE PANELS (FURNACE AND BACKPASS)	<p>Prepared per SSPC-SP-2 or SP-3 Tube ends and Tube openings shall be metal capped and sealed with masking tape or plastic plugged and protected with U-shaped plates and duct tape per drawing A-990-340 before applying external coating.</p>	<p>Both sides of panels to be painted with Two Coats of Quaker Chemical Ferrocote PCL-1, or equal.</p> <ul style="list-style-type: none"> • Two coats of Red color paint shall be applied to the exterior (outer) side of the furnace or backpass panels. • Two coats of White color paint shall be applied to the interior (inner) side of the furnace/backpass panel to allow for illumination during construction. The interior side is the gas touched surface which forms the internal walls of the furnace or backpass.
PRESSURE PART HANGERS & SUPPORT STEEL	<p>Structural Steel - Prepared per SSPC-SP-6</p> <p>Hanger – Coat threads with oil and wrap with sleeve-web or Denso tape.</p>	<p>Structural Steel & Hanger Rod</p> <p>Surfaces painted all sides.</p> <p>Prime Coat: One base coat Inorganic Ethyl Zinc Silicate Primer (75 micron) DFT minimum</p> <p>See Paragraph 1.2</p>



Surface Preparation and Coating Requirements

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TABLE A SURFACE PREPARATION AND COATING

COMPONENT	BHEL - STANDARD PREPARATION	BHEL - COATING
SEAL BOXES AND MISCELLANEOUS ATTACHMENTS	Prepared per SSPC-SP-2 or SP-3	Two Coats Red Oxide Primer
2) BOILER SEPARATOR & STORAGE TANKS		
2a) INTERNALS		
INTERNAL SURFACES	Remove all mill scale, dirt and grease from internal surfaces. Separator/Tank Internal Surfaces are not to be coated with a rust preventative.	None
2b) EXTERNALS		
EXTERNAL SURFACES	Prepared per SSPC-SP-2 or SP-3	External Surfaces Only: Prime Coat: Two Coats Red Oxide Primer
FLANGED ENDS, DRILLED HOLES & OPENINGS, EXCEPT MANHOLE OPENINGS	Flanged ends and machined surfaces shall be protected from rubbing during shipment. Drilled holes to be metal plugged. Metal nipple caps shall be protected with all surfaces painted with one coat of red oxide primer, before sealing with tape. Header openings shall be closed with hand hole plates and soft gaskets before applying external coatings. Avoid seams and wrinkles in tape.	Flanged Ends & Machined Surfaces – One coat rust inhibitor or cup grease.



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TABLE A SURFACE PREPARATION AND COATING

COMPONENT	BHEL - STANDARD PREPARATION	BHEL - COATING
ENDS SCARFED FOR WELDING	<p>Tube ends and Tube openings shall be metal capped and sealed with masking tape or plastic plugged and protected with U-shaped plates and duct tape per drawing A-990-340 before applying external coating.</p> <p>Metal pipe caps over 6" OD used to protect pipe ends shall have all surfaces painted with one coat of red oxide primer, before sealing with tape.</p> <p>Header openings shall be closed with hand hole plates and soft gaskets before applying external coatings. Avoid seams and wrinkles in tape.</p>	<p>Weld Scarf Coating</p> <p>All Scarfed Tube Ends – For Field Welded Butt Joints – Except Stainless Steel - Shop Coated with Deoxaluminite Inside and Outside Surfaces before protected per Tube End – Standard Preparation.</p>
MANHOLE COVERS	Prepared per SSPC-SP-6	<p>None Inside</p> <p>External Surfaces Only: Two coats Aluminum Heat Resistant Paint Rated for 315°C (600°F) Service</p>
3) WINDBOX AND SOFA REGISTERS AND AIR PREHEATER:		
External Surfaces:	Prepared per SSPC-SP-6 (Sa 2.0)	Prime Coat: Red Oxide Primer or Quaker Chemical Ferrocote PCL -1, or equal (60 micron) DFT
Internal Surfaces: (Does not apply to Air Heater Baskets or Seal Plates)	Prepared per SSPC-SP-3	Prime Coat: Red Oxide Primer or Quaker Chemical Ferrocote PCL -1, or equal (50 micron) DFT
WINDBOX AND SOFA BOX	Prepared per SSPC-SP-2 or SP-3	<p>Carbon Steel Surfaces Shall Be Painted on All Sides – Including External and Internal Surfaces: Two Coats Red Oxide Primer</p> <p>Machined Exposed Surfaces: One coat Rust Inhibitor or Rust Preventative.</p> <p>Stainless Steel portions need not be coated or painted.</p>
4) PIPING:		
4a) UNINSULATED PIPING		



Surface Preparation and Coating Requirements

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TABLE A SURFACE PREPARATION AND COATING

COMPONENT	BHEL - STANDARD PREPARATION	BHEL - COATING
External Surfaces:	Prepared per SSPC-SP-6 (Sa 2.0) After Deoxaluminite coating where applicable on pipe ends: <ul style="list-style-type: none"> • Both ends and all openings shall be capped – protected for shipping and sealed with masking tape before applying external coating. 	Prime Coat: Inorganic Ethyl Zinc Silicate (75 micron) DFT All Scarfed Ends - For Field Welded Butt Joints – Except Stainless Steel – Shop Coat with Deoxaluminite Outside Surfaces before protected per Tube End – Standard Preparation. Flanged Ends & Machined Surfaces – One coat rust inhibitor
Internal Surfaces:	None Required	No Paint on Internal Surfaces
4b) INSULATED PIPING		
External Surfaces:	Prepared per SSPC-SP-6 (Sa 2.0)	Prime Coat: Red Oxide Primer or Quaker Chemical Ferrocote PCL -1, or equal (60 micron) DFT
Internal Surfaces:	None Required	No Paint on Internal Surfaces
5) MISCELLANEOUS STEEL		
SKIN CASING	Prepared per SSPC-SP-2 or SP-3	Two Coats Red Oxide Primer
CARBON STEEL TANKS requiring field insulation	Prepared per SSPC-SP-6 (Sa 2.0)	Two Coats Red Oxide Primer
CORTEN STEEL SURFACES requiring field insulation	None Required	No Paint Required
6) MECHANICAL EQUIPMENT		



Surface Preparation and Coating Requirements

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TABLE A SURFACE PREPARATION AND COATING

COMPONENT	BHEL - STANDARD PREPARATION	BHEL - COATING
BWCP(s), BWCP(S) COOLERS, VALVES – MISC, SOOTBLOWERS, FANS MOTORS STEAM COIL AIR HEATER, FEEDERS -COAL HOISTS/ TROLLEY(S), MOTOR CTRL CABINET(s), EXTERIOR EXPOSED ELECTRICAL EQUIPMENT; (including panels switchgear, secondary unit substations, motor control centers, transformers and other similar equipment)	Per Seller's standard.	Finish Painted to Seller Standards for Outdoor Service and Component Life. See paragraph 1.1.
7) ACCESS DOORS		
ACCESS DOORS REQUIRING FIELD PAINTING	Prepared per SSPC-SP-6 (Sa 2.0)	Two coats Aluminum Heat Resistant Paint Rated for 315°C (600°F) Service



Surface Preparation and Coating Requirements

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ATTACHMENTS

ATTACHMENT 1: PANEL TUBE END PROTECTION DRAWING

REV.	1	ADDED NOTE 3 11-7-66 TKC	ADDED REF. LIST 1-18-67 EPSH/W.F.	2	REDRAWN & UPDATED 2-5-70 AP	3	REF. DWGS. UPDATED.NOTE 1; 18 GA. WAS 16 GA. AND
CONT	3	NOTE 4, A-569 COMM QUAL. WAS A-576, GR. 1015. PDL 7-11-72	AP	4	"STANDARD" WAS "ALTERNATE" AND VICA VERSA, REV. REF. DWG. LIST RS 8-10-83	AP	
5	5/9/00	REVISED NOTE 2	SAG	6	8/9/00	Revised title block and logo.	SAG TFM TFM

"A" = TUBE DIA. +.06"

ALTERNATE

"A" = TUBE DIA. +.06"

FOR TUBES THRU
1.25" O.D.

FOR TUBES OVER 1.25" O.D.
THRU 2.00" O.D.

FOR TUBES OVER 2.00"
O.D. THRU 2.50" O.D.

STANDARD (ALL ANGLES 1/4" x 1 3/4" x 1/8")

REFERENCE DWG. LIST			
REF. NO.	DESCRIPTION	DWG. NO.	INDEX NO.
1	PAINTS, COATINGS & SURFACE PREP	C-985-0668	11.5.1
	SHOP STANDARD	" " -0669	
		" " -0670	
		" " -0671	
		B-985-0308	

NOTES

- 1 USE CROP ENDS 12 GA. TO 18 GA. INCL.
- 2 TACK WELD TO TUBES PER ASME CODE SECTION I Std. No. 29-94, Index 17.2.
- 3 SHALL NOT BE USED FOR TUBE ENDS THAT REQUIRE ROLLING.
- 4 **MATERIAL:**
BENT PLATE - CARBON ST'L. A-569
 COMM QUAL. PER PUR INSTR PIGI
 MAT'L. ITEM NO. 61 PER STD.NO.17-64
 INDEX NO.14.2.
ANGLES - CARBON ST'L, A-575
 M-1015 PER PUR. INSTR.
 PIGI H.R. MAT'L. ITEM NO. 93
 PER STD.NO.17-64; INDEX NO.14.2.

INDEX NO. 11.5.8 Std. No. 246-76

CHANNEL TYPE

FOR
PANELED TUBE END PROTECTION
STANDARD
FOR BUTT WELDED TUBE ENDS ONLY

SCALE NONE DATE 2-5-70
DRAWN BY PROTEAU CHECKED BY [Signature]
TRACED BY APPROVED

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