



An ISO 9001
Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant)
Tiruchirappalli-620 014, Tamil Nadu, India
Dept: MATERIALS MANAGEMENT/BOI

Annexure – A- Terms and Conditions

ACCEPTANCE OF TECHNO - COMMERCIAL TERMS AND CONDITIONS BY THE BIDDERS

Description of the Equipment:		Start-up System Control Valves, Commissioning Spares and Mandatory Spares
Projects		Ennore SEZ 2 X 660 MW (1723-1724) Uppur 2 X 800 MW (1818) North Chennai 2 X 800 MW (1821-1822)
BHEL Tender No. & Date		1801700627 dated 11.05.2017
Sl. No.	Terms and conditions	Vendor's confirmation
1 (a)	Technical: Supply of Start-up System Control Valves, Commissioning Spares and Mandatory Spares shall be as per Data Sheet and Specification attached with the enquiry.	
1 (b)	Inspection by Customer (TNGEDCO) and BHEL	
2	Firm Price: The quoted / finalised rates shall be Firm till execution of the supplies. Offer with PVC clause will not be considered.	
3 (a)	Delivery term (Indigenous): The quote shall be on FOR respective project destination basis as indicated below, inclusive of Packing, forwarding, Freight & Transit Insurance also to yours account. Main and Commissioning Spares: To be despatched to Respective Project Site Mandatory Spares: To be despatched to BHEL Stores, Trichy Please quote explicitly the freight and insurance value either in % or Lumpsum. If vendor passing transit insurance under BHEL scope. Offer will be loaded 0.1064% of (Basic material value + ED + Forwarding & Packing + Freight charge).	
3(b)	Delivery term (Import): CFR Chennai port The quote shall be on CFR Chennai Port basis with freight break up details and Place of delivery – INTVT6 – CONCOR ICD PORT OF LOADING SHOULD BE INDICATED WITHOUT FAIL. PORT OF DISCHARGE should be CHENNAI and PLACE OF DELIVERY – INTVT6 – CONCOR ICD	

4 (a)	Payment terms (Indigenous): 100% direct payment after 45 days from the date of dispatch against site acknowledgement LR copy with 10% PBG. Payment terms (Imports): BHEL Payment term is 100% payment on CAD basis after 45 days from the date of receipt of documents, specified in PO, at BHEL bank. Respective bank charges to respective account with 10% PBG.	
4 (b)	Loading Criteria (Indigenous) Payment Terms: Any deviation in the BHEL payment terms will attract loading as per below. “Base rate of SBI (As applicable on the date of bid opening. Techno-commercial bid opening in case of two part bids) + 6% shall be considered for loading for the period of relaxation sought by bidders”. If the Payment term is 90% direct payment after 45 days from the date of dispatch against submission of dispatch documents and balance 10% against site acknowledgement. For this option a loading of 2% on the 90% of the offered materials value shall be made. Payment through bank is not acceptable. If still demanded by vendor, loading will be 5% on the offered material value. LC will not be operated for Indigenous vendors. Offers with payment terms as LC from indigenous vendors will be rejected.	
4(c)	Loading Criteria (Imports) : Any deviation in the above payment term (as per 4(a)) will attract loading as mentioned below. “Base rate of SBI (as applicable on the date of bid opening. Techno-commercial bid opening in case of two part bids) + 6% shall be considered for loading for the period of relaxation sought by bidders. • In the case of Usance LCs the loading will be considered @ 1.5% on the offered Value. • For LC at sight the loading will be considered @ 3.5% on the offered Value. Normally CAD at sight and Confirmed LCs are liable for rejection.	
4 (d)	Performance Bank Guarantee: BHEL require a performance Bank Guarantee to a value of 10% of supply value covering the guarantee period. The PBG shall be in BHEL format (Format attached) which is to be opened in any one of the first class India banks. All banks charges shall be to vendor account only. If still vendor offered any deviation on PBG leads to rejection of offer	
5 (a)	Liquidated damages: Delivery of the goods specified in the purchase order should be made within the time prescribed. Failure to dispatch the materials in the time as per the delivery quoted in our Purchase Order would make the supplier liable to an un-conditional LD at the rate of 0.5% of the undelivered order value per week of the delay or part thereof subject to a maximum of 10% of the total order value.	

5 (b)	Loading Criteria: LD / Penalty: Any deviation on BHEL LD / Penalty clause, loading (Basic material Value) will be applied to the extent to which it is not agreed by the bidder. If vendor agree for LD clause for Under delivered portion, than loading will be 10% on basis material cost.	
6 (a)	Guarantee / Warranty Period: Guarantee clause 24 months from the date of supply or 18 months from the date of actual put in use, whichever is earlier.	
6 (b)	Loading Criteria: Guarantee / Warranty Period: No Deviation is permitted. If still vendor offered any deviation on the Guarantee / warranty period, it may lead to rejection of offer.	
7	Taxes & Duties: All Taxes, Duties, Service Taxes etc. payable as extra to the quoted price should be specifically stated in offers along with CST & TIN No / Tariff No. etc., failing which the purchaser will not be liable for payment of such Taxes and Duties. Our TIN No. 33243560005, TNGST No. 3560005, CST. No. 239383 Dt. 11-06-1991 & BHEL ECC No. AAACB4146PXM012, Assessment circle Tiruverambur.	
8	Risk purchase: If the supplier fails to deliver the goods within the delivery specified in the Purchase Order, BHEL 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 delivery period mentioned in the Purchase Order.	
9	Delivery Period: 16 weeks from the Documents approval from Customer /BHEL	
10	(Indigenous Vendor) -LR date will be considered for LD calculation. (Import Vendor)- Bill of lading date will be considered for LD Calculation	
11	Document Submission: Along with the offer: 1. Filled in Commercial terms and conditions to be submitted. 2. Unpriced offer shall be submitted along with details of all line items, filled data sheets, etc. 3. Any query during enquiry stage shall be replied within three days failing which offer may be rejected as non-responsive. After Purchase Order: 1. Technical datasheets & QP to be submitted for BHEL approval within 15 days from the PO date. 2. If type tests has to be conducted by vendor as per specification/QP requirements, then the same has to be conducted (at NABL accredited facility, witnessed by BHEL inspection agency) and report to be submitted for BHEL / Customer for approval.	

	3. Any comment in the documents by BHEL to be replied / revised (as applicable) within three days. 4. Any document submitted with deviations from enquiry/PO requirements will not be treated as document submission for LD calculation purposes.	
12	Evaluation method Each Project requirement will be considered as package basis for evaluation and ordering. Package No :01 (Ennore 2 x 660 MW project) Enquiry Sl. No : 10 to 70 , 220 to 430 Package No: 02 (North Chennai 1 x 800 MW) Enquiry Sl. No: 80 to 140 , 440 to 870 Package No: 03 (Uppur 2 x 800 MW) Enquiry Sl. No: 150 to 210 , 880 to 1290	
13	Vendor shall quote as per attached price and Unpriced Schedule format only.	
14	Validity: 120 days minimum from techno commercial bid opening (Part-1)	
15	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.	
16	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.	
17	MSE VENDOR: <i>i. If L1 vendor is an MSE vendor entire project package will be ordered on L1 vendor.</i> <i>ii. If a Non MSE vendor is coming as L1, then L1 prices will be counteroffered on MSE vendor who is quoting price within the price band L1+15% and if they are agreeing purchase order will be awarded for full/complete supply of total tendered value to MSE.</i> <i>iii. If more than one MSE vendors are available in the L1+15% price band then lowest of the MSE vendor will be selected for counteroffering. If lowest MSE vendor is not accepting it will be counteroffered to the next MSE vendor in the price band and so on.</i> <i>iv. Finally if none of the MSE vendor in the price band is not accepting it will be ordered on L1 non MSE vendor.</i>	

MSE suppliers can avail the intended benefits only if they submit along with the offer, attested/notarized copies of either

1. EM II certificate having deemed validity (five years from the date of issue of acknowledgement in EM II) **or**
2. Valid NSIC certificate or EM II certificate along with CA certificate (Format enclosed) applicable for the year, certifying quantum of investment in plant and machinery within the permissible limits as per the act for relevant status (MICRO or SMALL) where the deemed validity of EM II is over.

Date to be reckoned for determining the deemed validity will be the last date of technical bid submission (Part 1 in case of two part bid).

Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry, in case of any deficiency in the above required documents or in case the documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal even if submitted earlier.

Documents should be notarized or attested by a Gazetted officer.

Definitions of MSEs owned by SC/ST is under:

- ***In case of proprietorship firm, proprietor must be SC/ST.***
- ***In case of partnership firm, the SC/ST partners must be holding at least 51% shares in the unit.***
- ***In case of private limited companies, at least 51% share must be held by SC/ST promoters.***

Authorised Offices to Issue SC/ST certificate.

The caste/Tribe/Community certificate issued by the following authorities in the prescribed form for SCs/STs can be considered.

- District Magistrate / Additional District Magistrate / Collector / Deputy Commissioner / Additional Deputy Commissioner / Deputy Collector / 1st class stipendiary magistrate / Sub divisional Magistrate / Taulka Magistrate / Executive magistrate / Extra Assistant commissioner.
- Chief Presidency magistrate / Additional chief presidency magistrate/Presidency magistrate.
- Revenue Officer not below the rank of thasildar.
- Sub-Divisional officer of the area where the individual and / or his family normally resides.

To avail the benefits of MSE under SC/ST category, the related documents as stated above should be submitted along with tender documents.

18	Price Bids of the vendor will be opened subject to approval of Vendor / Firm for Supply of Start-up System Control Valves, Commissioning Spares and Mandatory Spares (High Press Control valve) by end Customer (TNGEDCO)	
19	Documents are to be submitted along with technical bid (Part-1) 01. Covering letter 02. Unpriced offer as per BHEL format 03. Filed technical specification 04. Filed BHEL Terms and condition sheet 05. Filed Pre-Qualification requirement (PQR) along with supporting documents 06. Catalogue's 07. MSME Documents (If applicable) 08. Vendor registration documents 09. Integrity pact Documents are to be submitted along with Price bid (Part-2) 01. Priced offer as per BHEL format Note: All the pages of documents are to be signed and stamped by authorized signatory of the company.	
20	Vendor who are not registered with BHEL –Trichy for supply of Startup System control valves under item code: 24SCV as a permanent vendor, those vendors are requested to submit the vendor registration through online and submit the registration application number along all the necessary documents. (available in http://www.bheltry.co.in/- Online Vendor Registration- Material Management) Note : Vendor have to submit all the documents duly filled in “Supplier Registration Forms” through online (available in http://www.bheltry.co.in/- Online Vendor Registration- Material Management). Duly filled-in Supplier Registration Forms, along with all credentials and supporting documents, Certificate of Rating from D&B (Dun & Brad) sheet or equivalent agencies (For Foreign vendors), Financial Performance / Profit & Loss Account / Balance sheet for last three years etc. (With Techno-Commercial Bid). Availability of minimum manufacturing, handling, testing and measuring facilities, to be detailed are to be mentioned clearly. All the documents to be uploaded. Apart from Qualifying the Techno- Commercial requirements of the enquiry, BHEL has the right for spot assessment of the facilities for evaluation, approval and for registration.	

BHEL TRICHY
MM/BOI
ANNEXURE – B
Pre-Qualification requirements (PQR)

SI.NO	Description	Vendor Confirmation
1	The bidder should have supplied control valves of Z type and of 20 inch valve size or higher with the required valve material (F11 or superior material) and rating as per this specification requirement and the same valves should have been commissioned in at least one plant of sub / super critical steam generating units with an operating pressure more than 255 kg/cm2 in similar applications mentioned in our specification and are in successful operation for a period of not less than 1 year as on the date of techno-commercial bid opening	
2	The bidder can offer and supply such equipment for this project with collaboration or valid licensing agreement for design, engineering, manufacture, supply of such equipment in India provided the collaborator meets the above proven ness criteria..	
3	The supplier has to submit either of following supporting documents meeting above mentioned pre-qualifying requirement Copy of minimum one(1) performance certificate in English from end user along with copy of related purchase order(PO) or letter of intent(LOI) or letter of award(LOA) or work order(WO) specifying that the product / equipment is running successfully for one(1) year from date of commissioning meeting pre-qualifying requirement. OR Minimum two PO/LOI/LOA/WO placed with a minimum gap of one (1) year from same purchaser meeting the minimum pre-qualifying requirement. OR Minimum one PO/LOI/LOA/WO after commissioning of first order from the same purchaser meeting the minimum pre-qualifying requirement. OR Minimum three customer's/ third party's inspection reports/ test certificates/ commissioning certificates meeting the minimum pre-qualifying requirement.	
4	BHEL may negotiate the L1 rate, if not meeting our budget/estimated cost.	
5	BHEL may re-float the tender opened, if L1 price is not the acceptable price to BHEL.	

Offers are liable for rejection, if not satisfying above pre-qualifying criteria.

SUPPLY OF STARTUP SYSTEM CONTROL VALVES TO ENNORE 2 x 660 MW								
Enquiry Sl. No	Items Details	Qty	Unit Rate	Total Material Cost	Excise Duty	Sales Tax	Freight & Insurance Charge	Total Value (FOR)
			Rs	Rs	%	%	Rs	Rs
10								
20								
30								
.								
.								
60								
70								
220								
230								
.								
.								
420								
430								
	CV Test Charges							

Note :

1. Vendor shall quote freight and insurance amount. Don't indicate freight & Insurance are inclusive/ Zero Value.
2. Mandatory Spares : It is requested to provide the set details for each line item of mandatory spares like Item description , Qty, Make/model , etc.
3. For NOT APPLICABLE mandatory spares for offered Model of valves , Vendors shall provide details technical explanation for not applicability.

SUPPLY OF STARTUP SYSTEM CONTROL VALVES TO UPPUR 2 x 800 MW								
Enquiry Sl. No	Items Details	Qty	Unit Rate	Total Material Cost	Excise Duty	Sales Tax	Freight & Insurance Charge	Total Value (FOR)
			Rs	Rs	%	%	Rs	Rs
150								
160								
170								
.								
.								
200								
210								
880								
890								
.								
.								
1280								
1,290								
	CV Test Charges							

Note :

1. Vendor shall quote freight and insurance amount. Don't indicate freight & Insurance are inclusive/ Zero Value.
2. Mandatory Spares : It is requested to provide the set details for each line item of mandatory spares like Item description , Qty, Make/model , etc.
3. For NOT APPLICABLE mandatory spares for offered Model of valves , Vendors shall provide details technical explanation for not applicability.

SUPPLY OF STARTUP SYSTEM CONTROL VALVES TO ENNORE 2 x 660 MW									
Enquiry Sl. No	Items Details / Description	Qty	Net Weight	Gross weight	size	Unit Rate	Total Material Cost	Sea Freight Charge	Total Value (CFR)
			Kgs	Kgs	L x B x H	Currency -Type	Currency -Type	Currency -Type	Currency -Type
10									
20									
30									
40									
50									
60									
70									
220									
230									
240									
420									
430									
	Cv Test Charges								
Note :									
1. Vendor shall quote freight and insurance amount. Don't indicate freight & Insurance are inclusive/ Zero Value.									
2. Mandatory Spares : It is requested to provide the set details for each line item of mandatory spares like Item description , Qty, Make/model , etc.									
3. For NOT APPLICABLE mandatory spares for offered Model of valves , Vendors shall provide details technical explanation for not applicability.									
	TOTLA PRICE - FOB / Nearest Sea Port								
	TOTAL SEA FREIGHT CHAGES								
	TOTAL PRICE - CFR / CHENNAI PORT								

SUPPLY OF STARTUP SYSTEM CONTROL VALVES TO NORTH CHENNAI 1 x 800 MW									
Enquiry Sl. No	Items Details / Description	Qty	Net Weight	Gross weight	size	Unit Rate	Total Material Cost	Sea Freight Charge	Total Value (CFR)
			Kgs	Kgs	L x B x H	Currency -Type	Currency -Type	Currency -Type	Currency -Type
80									
90									
100									
.									
.									
130									
140									
440									
450									
460									
.									
.									
860									
870									
	CV Test Charges								
Note : 1. Vendor shall quote freight and insurance amount. Don't indicate freight & Insurance are inclusive/ Zero Value. 2. Mandatory Spares : It is requested to provide the set details for each line item of mandatory spares like Item description , Qty, Make/model , etc. 3. For NOT APPLICABLE mandatory spares for offered Model of valves , Vendors shall provide details technical explanation for not applicability.									
	TOTAL PRICE - FOB / Nearest Sea Port								
	TOTAL SEA FREIGHT CHAGES								
	TOTAL PRICE - CFR / CHENNAI PORT								

SUPPLY OF STARTUP SYSTEM CONTROL VALVES TO UPPUR 2 x 800 MW									
Enquiry Sl. No	Items Details / Description	Qty	Net Weight	Gross weight	size	Unit Rate	Total Material Cost	Sea Freight Charge	Total Value (CFR)
			Kgs	Kgs	L x B x H	Currency -Type	Currency -Type	Currency -Type	Currency -Type
150									
160									
170									
.									
.									
200									
210									
880									
890									
.									
.									
.									
1,280									
1,290									
	CV Test Charges								
Note : 1. Vendor shall quote freight and insurance amount. Don't indicate freight & Insurance are inclusive/ Zero Value. 2. Mandatory Spares : It is requested to provide the set details for each line item of mandatory spares like Item description , Qty, Make/model , etc. 3. For NOT APPLICABLE mandatory spares for offered Model of valves , Vendors shall provide details technical explanation for not applicability.									
	TOTAL PRICE - FOB / Nearest Sea Port								
	TOTAL SEA FREIGHT CHAGES								
	TOTAL PRICE - CFR / CHENNAI PORT								

(TO BE STAMPED IN ACCORDANCE WITH STAMP ACT AND THE EXPIRY DATE OF BG MUST BE AFTER 60 DAYS FROM THE DATE OF COMPLETION OF WARRANTY PERIOD)

PERFORMANCE BANK GUARANTEE

In accordance of M/s. Bharat Heavy Electricals Limited (A Government of India undertaking, a company incorporated under the Companies Act 1956 having its Registered Office at "BHEL House", SIRI Fort, New Delhi 110 049) through its High Pressure Boiler Plant Division located at Tiruverumbur, Tiruchirapalli- 620 014 (hereinafter called 'the Company') having entered into a contract withhereinafter called 'the said contractor' which term includes 'suppliers' for the purpose of this Bond and under the terms and conditions of the contract No..... Dt Between BHEL, Trichy and as per the contract, the contractor / supplier is to furnish a performance Bank guarantee for Rs. for the due performance of the equipment to be supplied under the above referred contract and for the fulfillment of all the terms and conditions of the contract, We(indicate the name of the bank) (herein after referred to as the bank) at the request of (Contractor(s)) do hereby undertake to pay the company an amount not exceeding Rs.....against any loss or damage caused to or suffered or would be caused to or suffered by the company by reason of any breach by the said contractor (s) of any of the terms and conditions contained in the said agreement.

2. We(indicate the name of the bank with full address), do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company by reason of breach by the said Contractor(s) of any of the terms and conditions contained in the said Agreement or by the reason of the contractor(s) 'failure to perform' the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs._____.

3. We undertake to pay unconditionally to the Company any money so demanded notwithstanding any dispute(s) raised by the Contractor in any suit, or proceedings pending before any Court or Tribunal or Arbitration or before any other authority relating thereto our liability under this present being absolute and unequivocal. The payment under this guarantee would not wait till the disputes have been decided by any Court or Tribunal or in the arbitration proceedings or by any other authority. The payment so made by us under this Bond shall be a valid discharge of liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We.....(indicate the name of Bank), further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till _____Office / Department/ Division of the Company certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

5. (I) Unless a demand or claim under this guarantee is made on us in writing on or before the _____ we shall be discharged from all the liability under this guarantee thereafter. But where such claim or demand has been preferred by the Company with the Bank before the expiry of the said date, the claim shall be enforceable notwithstanding the fact that the said enforcement is effected after the said date.

(ii) For the purpose of this clause, any letter making demand on the Bank by M/s. BHEL dispatched by Registered Post with Ack.Due or by Telegram or by any Electronic media addressed to the above mentioned address of the Bank shall be deemed to be the claim / demand in writing referred to above irrespective of the fact as to whether and when the said letter reaches the Bank, as also any letter containing the said demand or claim is lodged with the bank personally.

6. We(indicate the name of Bank), further agree with the company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said Contractor(s) or for any forbearance, act or omission on the part of the company or any indulgence by the company to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating would, but for this provision, have effect of not so relieving us.

7. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

8. It shall not be necessary for the company to proceed against the contractor before proceeding against the guarantor-bank and the guarantee herein contained shall be enforceable against them notwithstanding any security, which the company may have obtained or obtain from the Contractor shall, at the time when proceedings are taken against the guarantor hereunder be outstanding or unrealised.

9. Any claim or dispute arising under the terms of this document shall only be enforced or settled in the Courts at Tiruchirapalli.

10. The guarantor hereby declare that it has power to execute this guarantee and the executant has full powers to do so on its behalf under the proper authorities granted to him/them by the guarantor.

11. We(indicate the name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the company in writing.

In witness whereof we....., (indicate the name of Bank) have hereunto setout Bank Seal the _____ day _____ month 200

BANK E-MAIL ID:

BANK PHONE NO.

BANK FAX NO:

List of Consortium Bank			
	Nationalised Bank		Nationalised Bank
1	Allahabad bank	19	Vijaya Bank
2	Andhra bank		Public Sector Banks
3	Bank of Baroda	20	IDBI
4	Canara Bank		Foreign bank
5	Corporation bank	21	CITI Bank N.A
6	Central bank	22	Deutsche Bank AG
7	Indian Bank	23	The Hongkong and Shanghai Banking Corporation Limited
8	Indian Oversea Bank	24	Standard Chartered Bank
9	Oriental bank of Commerce	25	The Royal Bank of Scotland N.V.
10	Punjab National Bank	26	J P Morgan
11	Punjab & Sindh Bank		Private bank
12	State Bank of India	27	Axis Bank
13	State Bank of Hyderabad	28	The Federal Bank Limited
14	Syndicate Bank	29	HDFC
15	State Bank of Travancore	30	Kotak Mahindra Bank
16	UCO Bank	31	ICICI
17	Union Bank of India	32	Indusind Bank
18	United Bank of India	33	Yes Bank

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi – 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

- 1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-
 - 1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
 - 1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - 1.1.3 The Principal will exclude from the process all known prejudiced persons.
- 1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 – Commitments of the Bidder(s)/ Contractor(s)

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
 - 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved

in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 – Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

- 6.1 The Bidder(s)/ Contractor(s) undertake(s) to obtain from all subcontractors a commitment consistent with this Integrity Pact and report Compliance to the Principal. This commitment shall be taken only from those sub-contractors whose contract value is more than 20 % of Bidder's/ Contractor's contract value with the Principal. The Bidder(s)/ Contractor(s) shall continue to remain responsible for any default by his Sub-contractor(s).
- 6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.
- 6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 – Criminal Charges against violating Bidders/ Contractors /Sub-contractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 –Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.
- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
- 8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.
- 8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.
- 8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the

Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

9.1 This Pact begins and shall be binding on and from the submission of bid(s) by bidder(s). It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

For & On behalf of the Principal

(Office Seal)

For & On behalf of the Bidder/ Contractor

(Office Seal)

Place-----

Date-----

Witness: _____

(Name & Address) _____

Witness: _____

(Name & Address) _____



BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014, INDIA.
QUALITY ASSURANCE DEPARTMENT

STANDARD QUALITY PLAN FOR CONTROL VALVES (STEAM & WATER APPLICATIONS)

SQP:SD:06 Rev 00

Page: 1 of 5

Prepared By
Quality Assurance

VENKANNA RUPANI

R. Venkanna
14/09/2015

Reviewed by	Signature
Quality Assurance G. PANNAGER SELVAN	 14/09/15
Engineering K. SRIDHARAN	 16/09/15
Materials Management/BOI K. UDAYA KUMAR	 16/09/15
Quality Control R. DHARMAR	 15/09/15

Rev No	Date	Approved by	Signature
00	14/09/2015	AGM / QA & BE	

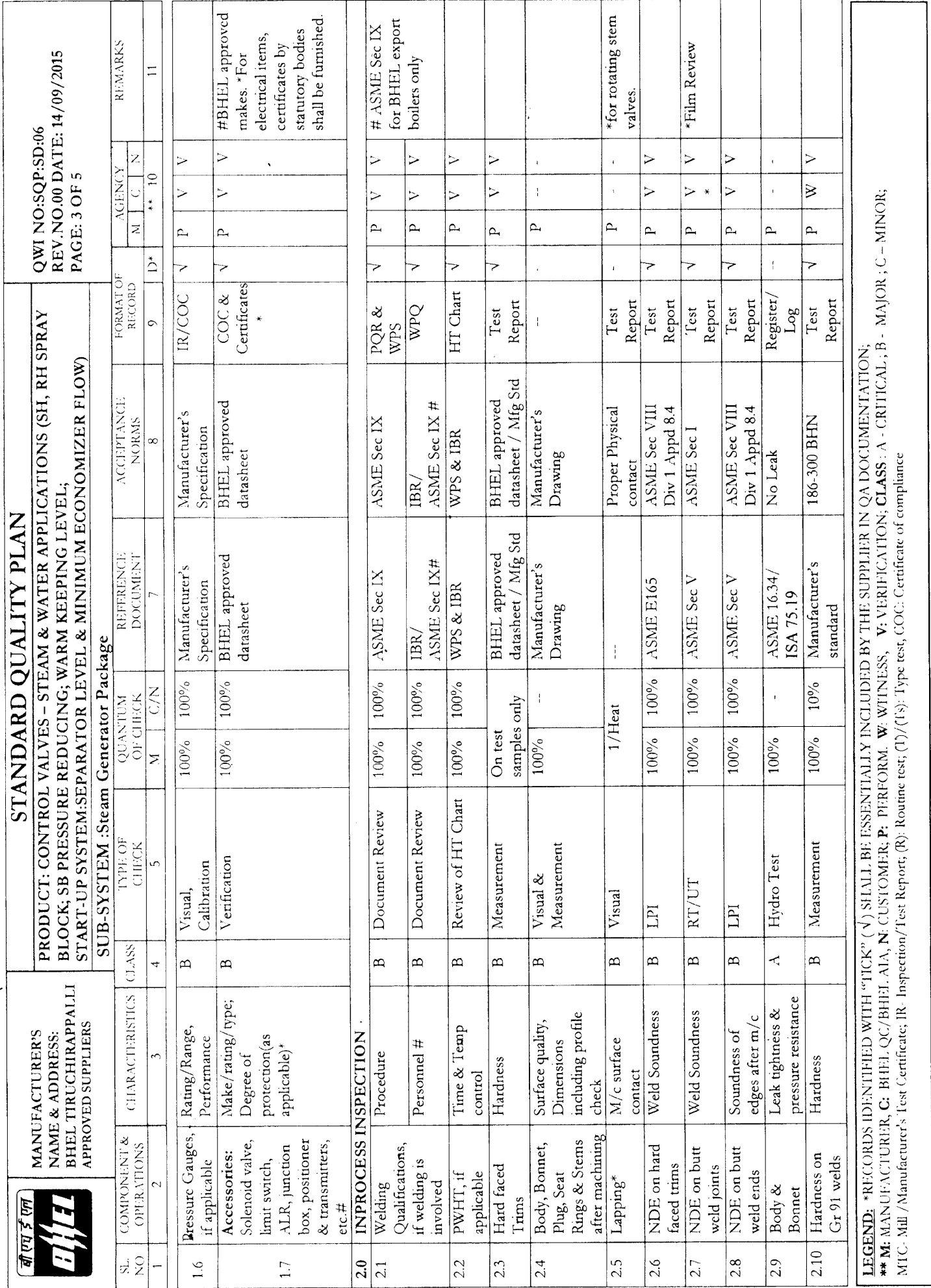
Record of Revisions

Rev No	Details of Revision	Remarks
00	Fresh Issue	

		MANUFACTURER'S NAME & ADDRESS: BHEL TIRUCHIRAPPALLI APPROVED SUPPLIERS		STANDARD QUALITY PLAN										QWI NO:SQP:SD:06 REV.NO.00 DATE: 14/09/2015 PAGE: 2 OF 5			
				PRODUCT: CONTROL VALVES – STEAM & WATER APPLICATIONS (SH, RH SPRAY BLOCK; SB PRESSURE REDUCING; WARM KEEPING LEVEL; START-UP SYSTEM;SEPARATOR LEVEL & MINIMUM ECONOMIZER FLOW)										SUB-SYSTEM :Steam Generator Package			
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS			
					M	C/N					M	C	N				
1	2	3	4	5	M	C/N	7	8	9	D*	**	10		11			

1.0 RAW MATERIALS & BOUGHT OUT ITEMS													
1.1	Body, Bonnet, inlet & outlet nozzles (if applicable)	Chemical & Mech Properties, Heat treatment, Hardness@	B	TC Verification	1/Heat	1/Heat	BHEL approved datasheet/ ASTM Std	BHEL approved datasheet / ASTM Std	MTC	✓	P	V	@on Gr 91 materials only.
		Surface quality*	B	Visual Examination	100%	100%	MSS SP 55	MSS SP 55	MTC	✓	P	V	*on castings.
		Internal Soundness for class rating ≥ 900 (RT/UT#)	B	TC Verification	100%	100%	ASME Sec V	RT: ASME B16.34 Appendix I/ UT: ASME B16.34 Appendix IV	MTC	✓	P	V	#RT as per ASME B16.34; UT for forgings of dia/thick ≥50mm.
1.2	Trim(Plug, Seat ring & Stem)	#Sub-Surface Soundness(MPI)	B	TC Verification	100%	100%	ASME Sec V/ ASTM E709	ASME B 16.34 Appendix II	MTC	✓	P	V	#On accessible areas.
		Chemical & Mechanical Properties, Hardness@	B	TC Verification	1/Heat	1/Heat	BHEL approved datasheet / ASTM Std	BHEL approved datasheet / ASTM Std	MTC	✓	P	V	@on Gr 91 materials only.
		Stem Internal Soundness(UT#)	B	TC Verification	100%	100%	ASME Sec V/ ASTM A 388	ASME B 16.34 Appendix IV	MTC	✓	P	V	#UT for dia/ thick ≥50mm
1.3	Pressure retaining fasteners	Chemical, Mechanical Prop & Dimensions	B	TC Verification	1/Heat	1/Heat	BHEL approved datasheet / ASTM Std	BHEL approved datasheet / ASTM Std	MTC/ COC	✓	P	V	
		Surface Quality, Strength & %Elg, Hardness, *, Endurance Life, Dimensions	B	Visual & Measurement	1/ Lot	100%	Manufacturer's Specification	Manufacturer's Specification	COC	✓	P	V	*property change after heat aging.
1.4	Diaphragm/ Piston Cylinder, if applicable	Chemistry, Strength, Hardness, Endurance*, Scragging, Linearity & Dimensions	B	Chemical Analysis, Compression & Load test, Measurement, Cyclic Test, Measurement	1/ Lot	1/ Lot	Manufacturer's Specification	Manufacturer's Specification	COC	✓	P	V	*including stiffness ratio.
		Spring, if applicable	B	Chemical Analysis, Compression & Load test, Measurement, Cyclic Test, Measurement	1/ Lot	1/ Lot	Manufacturer's Specification	Manufacturer's Specification	COC	✓	P	V	

LEGEND: *RECORDS IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY THE SUPPLIER IN QA DOCUMENTATION;
****M:** MANUFACTURER, **C:** BHEL QC/BHEL AIA, **N:** CUSTOMER, **P:** PERFORM, **W:** WITNESS, **V:** VERIFICATION; **CLASS:** A - CRITICAL; B - MAJOR; C - MINOR;
MTC: Mill /Manufacturer's Test Certificate; **IR:** Inspection / Test Report; **(R):** Routine test; **(T)/(Ts):** Type test, **COC:** Certificate of compliance



		MANUFACTURER'S NAME & ADDRESS: BHEL TIRUCHIRAPPALLI APPROVED SUPPLIERS		STANDARD QUALITY PLAN										QWI NO:SQP:SD:06 REV.NO.00 DATE: 14/09/2015 PAGE: 4 OF 5	
PRODUCT: CONTROL VALVES – STEAM & WATER APPLICATIONS (SH, RH SPRAY BLOCK; SB PRESSURE REDUCING; WARM KEEPING LEVEL; START-UP SYSTEM;SEPARATOR LEVEL & MINIMUM ECONOMIZER FLOW)				SUB-SYSTEM :Steam Generator Package											
SL NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS			
1	2	3	4	5	M	C/N	7	8	9	M	C	N	11		

3.0 FINAL INSPECTION & TESTING														
3.1	Performance Test on assembled valves fitted with all accessories	Leak tightness & pressure resistance of Body & Bonnet joint	A	Hydro Test	100%	10%	ASME 16.34/ISA 75.19	No Leak	Test Report	✓	P	W	V	IBR Form III C shall be submitted
3.2		Leak through seat	A	Seat Leak Test (Air/Hydro test)	100%	10%	FCI 70.2 /BHEL approved datasheet	FCI 70.2 /BHEL approved datasheet	Test Report	✓	P	W	V	
3.3		Travel, linearity, hysteresis, valve opening & closing time, fail safe feature, functioning of all accessories.	A	Performance/ Calibration Test	100%	10%	IEC 60534-4/ BHEL approved datasheet	BHEL approved datasheet	Test Report	✓	P	W	V	
3.4		Packing Tightness*	A	Packing Leak Test	100%	10%	ASME B16.34/ BHEL approved datasheet	ASME B16.34/ BHEL approved datasheet	Test Report	✓	P	W	V	*can be done during hydro test (CI 3.1)
3.5		Control valve flow Capacity# (Discharge Vs Opening)	A	Capacity Test (Cv test)	1/Type	1/Type	BHEL approved datasheet /ISA 75.02	ISA 75.11	Test Report#	✓	P	V #	V	#Type test witnessed by BHEL or done at FCRI shall be submitted for review & clearance by BHEL Engg (certificate valid for 5 years).
3.6		Actuator chamber- Strength & leakage	B	Air Leak Test	100%	10%	Manufacturer's std	No leak when tested @ 1.5 times supply press or 60 psi max.	Test Report	✓	P	W	V	
3.7	Actuator & Positioner	Model, SI No, Qty, Rating	B	Visual & Document Review	100%	10%	BHEL approved datasheet	BHEL approved datasheet	Test Report/ COC	✓	P	W	V	
3.8	Final Inspection	Overall Dimensions*	B	Measurement	100%	10%	BHEL approved GA Drawing	BHEL approved GA Drawing	Test Report	✓	P	W	V	*including OD, d1, thickness, etc.

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****M:** MANUFACTURER, **C:** BHEL, **QC:** BHEL, **AIA:** N: CUSTOMER, **P:** PERFORM, **W:** WITNESS, **V:** VERIFICATION; **CLASS:** A - CRITICAL ; B - MAJOR ; C - MINOR;
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		STANDARD QUALITY PLAN			PRODUCT: CONTROL VALVES – STEAM & WATER APPLICATIONS (SH, RH SPRAY BLOCK; SB PRESSURE REDUCING; WARM KEEPING LEVEL; START-UP SYSTEM:SEPARATOR LEVEL & MINIMUM ECONOMIZER FLOW)			QWI NO:SQP:SD:06 REV.NO.00 DATE: 14/09/2015 PAGE: 5 OF 5		
MANUFACTURER'S NAME & ADDRESS: BHEL TIRUCHIRAPPALLI APPROVED SUPPLIERS		SUB-SYSTEM :Steam Generator Package			ACCEPTANCE NORMS			FORMAT OF RECORD		
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	8	9	10	11
1	2	3	4	5	M	C/N	7	8	9	11
4.0	PAINTING, PRESERVATION & PACKING									
4.1	Painting	Surface Prep, Primer & finish coats & Shade, DFT	B	Visual & Measurement	100%	100%	BHEL approved painting Scheme	BHEL approved painting Scheme	Test Report	
4.2	Identification #	Marking /Name Plate & Tagging	B	Visual	100%	100%	BHEL Spec & PO	BHEL Spec & PO	Test Report	
4.3	Packing*	Cleanliness, Water-proof packing & Stability	B	Verification	100%	100%	Manufacturer's practice	Manufacturer's practice	Packing List	
4.4	Spare Parts	Parts, Type, Qty, Dimensions, etc.	B	Visual & Measurement	100%	100%	BHEL approved datasheet & PO	BHEL approved datasheet & PO	IR/COC	

Note: 1. Customer verification stages specified above shall be followed. Any witness stages shall be as specified/indicated in BHEL PO.

LEGEND: *RECORDS IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY THE SUPPLIER IN QA DOCUMENTATION;
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SPECIFICATION FOR STARTUP CONTROL VALVES

SPECIFICATION NO.: BM/SCV :001

SECTION: Boiler Mountings/PE (FB)

REV. NO.: 02

DATE: 01.07.15

PAGE NO : 1 OF 30

ENGINEERING SPECIFICATION FOR STARTUP CONTROL VALVES

SPECIFICATION NO : BM/SCV :001

ENNORE 2x 660MW PROJECT.

Prepared by: A. Jai Ganesh Sr Product Engineer PE / FB (BM)	Reviewed by: V. Gunasekaran Manager PE / FB (BM)	Approved by: K. Sridharan Sr Manager PE / FB (BM)
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Revision Log					Template Form Revision No.: 00			
Revision No.	Date	Reason	Prepared		Reviewed		Approved	
			Name	Sign	Name	Sign	Name	Sign.
01	19.01.13	C&I comments	A. Jai Ganesh		Gopalan. I		K. Perisamy	
02	07.03.14	Standardization	A. Jai Ganesh		K. Sridharan		K. Perisamy	

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: BM/SCV :001	
		SECTION: Boiler Mountings/PE (FB)	
		REV. NO.: 02	DATE: 01.07.15
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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.

	SPECIFICATION FOR STARTUP CONTROL VALVES		SPECIFICATION NO.: BM/SCV :001
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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

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	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: BM/SCV :001	
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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.: BM/SCV :001	
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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.

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: BM/SCV :001	
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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



SPECIFICATION FOR STARTUP CONTROL VALVES

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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 location from the common hydraulic unit shall be referred from the project specific data sheet (Annexure I).

- a) HWL1 to Hydraulic Unit - refer Annexure I
- b) HWL2 to Hydraulic Unit - refer Annexure I
- c) MEFCV to Hydraulic Unit - refer Annexure I

☒ 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-II for Facility Site Specific Data (if applicable) and Annexure-III for Surface Preparations and Coatings requirements(if applicable).

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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
- Hydraulic Circuit diagram.
- Certificates as per QR and PTR requirements (applicable to Non-PMD vendor).

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.

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- 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 / 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

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of the completed radiographs, properly identified with the respective parts, will be retained and available for inspection for a period of five (5) years.

- ✓ IBR from III C.
- ✓ 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.

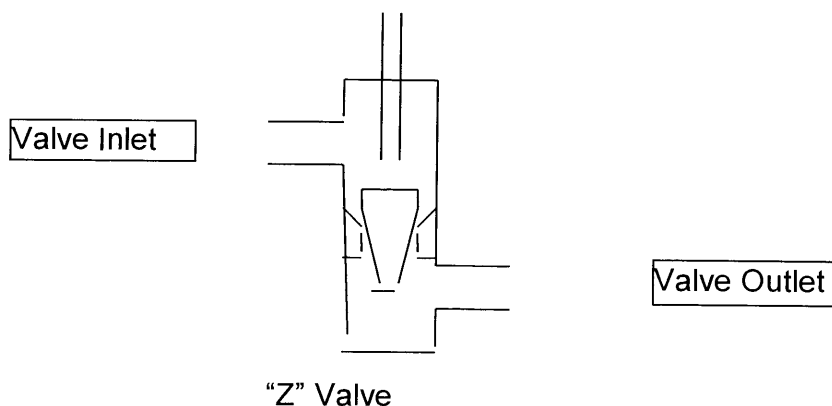
8.1.1.2 Minimum Economizer Flow Control (MEFCV) Valve:

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.

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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 **The valve sizing shall be suitable for obtaining maximum flow conditions with valve opening at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 10% of total valve stem travel.** All the 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.



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- 9.7 Valve shall be forged design.
- 9.8 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.
- 9.9 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.**
- 9.10 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.
- 9.11 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.
- 9.12 Bidder to furnish calculation to check whether flashing or cavitation will occur for control valve services. Control Valves shall be provided with

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pecially 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.

- 9.13 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.
- 9.14 Valve outlet shall have a 5 degree downward slope to ensure proper drainage of valve outlet.
- 9.15 Valve inlet and outlet cages shall be provided if required by the indicated process conditions.
- 9.16 For valves with butt weld ends, the supplier is required to prepare weld profiles to BHEL supplied information.
- 9.17 Both the valves and their accessories shall be designed for the process and local installation environment.
- 9.18 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.
- 9.19 The Supplier shall provide all necessary converters, positioners, position transmitters, etc. mounted on the control valve.
- 9.20 The direction of flow shall be clearly marked on each valve.
- 9.21 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.
- 9.22 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.

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- 9.23 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.
- 9.24 Valve's gland packing material shall be grafoil or graphite for all the valves.
- 9.25 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**
- 9.26 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.
- 9.27 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.
- 9.28 Hydraulic Valve Actuators
- 9.28.1 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.
- 9.28.2 The Hydraulic actuator shall be sized to operate against the process maximum differential pressure.
- 9.28.3 A mechanical position indicator shall be provided on the actuator.
- 9.28.4 The actuator shall be equipped with a hydraulic positioning valve to convert a 4 –20 mADC signal from the DCS to a hydraulic signal.

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9.28.5 The actuator shall be furnished with a 4 –20 mADC valve position feedback signal.

9.28.6 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.

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

9.29.1 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.

9.29.2 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.

9.29.3 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.

9.29.4 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.

9.29.5 The Electronic Control Unit cabinet shall be a free standing IP 65 rated with front and rear access doors to be installed

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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.

- 9.29.6 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

- 9.29.7 415 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.

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- 9.29.8 Vendor to offer the latest version of control system/positioners with additional features.
- 9.29.9 The offered Hydraulic Power Unit and the Control system/panels shall be suitable for outdoor applications.
- 9.29.10 All Cables (Power cables/Control Cables/Instrumentation cables) run between various equipment supplied vendor, shall be in vendor's scope.
- 9.29.11 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.
- 9.29.12 Vendor to provide suitable cable glands for all interfacing cables from/to DCS. Cable sizes will be indicated during engineering stage.
- 9.29.13 Test Certificates and Calibration Certifications shall be provided for all Instruments and Motors as applicable.

9.30 Valve Selection Criteria

- 9.30.1 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.
- 9.30.2 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.
- 9.30.3 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

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9.30.4 The bidder has to submit calculated noise levels (dBA) for the operating conditions specified in the datasheet.

9.31 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. The BHEL Approved Quality Plan is to be followed. The tests shall include but not limited to the following bidder shall submit a manufacturing quality plan along with the offer for BHEL / QA review and approval.

- 1) Material, mechanical and chemical test shall be performed in a manner as specified in the relevant codes.
- 2) Non-destructive examination shall be performed as per ASME-B-16.34 (Steel Valves).
- 3) 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.
- 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-penetrant 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.

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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 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 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.

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9.32 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.

9.33

The vendors to quote for ERECTION & COMMISSIONING SUPPORT (optional)for Supervision of erection and

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commissioning of this valves , the seller should depute one commissioning engineer to the site and he shall stay there for a maximum of 7 days (for each unit ie per customer number) extending full support to site people in the initial operation of the valves .All the expenses like to & fro charges, incidentals, boarding & lodging at site are to be borne by the valve vendor

The Vendors to submit an Optional price for providing training to our personnel at the works of Valve manufacturer for 2 man month period .

Our personnel will make their own Travel / Lodging / Boarding arrangements . Depending upon the actual duration of training man months availed, the payment will be proportionately reduced on the vendor quoted amount (if period is lesser than 2 man months).

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.

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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. The operating conditions furnished for MEFCV is preliminary only. Final operating conditions can be informed only after the boiler recirculation pump operating conditions are finalized, which can happen even after the placement of this PO. This may/may not affect the selected Cv for MEFCV. The vendor to accommodate these changes in the operating conditions and offer the valve which meets all the specification requirements without any price implication to BHEL.

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 confirmed to Sections 1.0 through 10.0 and Appendix A except as specifically noted as follows:

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12.0 APPENDIX A, CONTRACT SPECIFIC REQUIREMENTS

Please refer to attached specifications Annexure I - Valve Datasheets ,Annexure II for Facility Site Specific Data (If applicable) and Annexure III for Surface Preparations and Coatings Requirements (If applicable).



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ANNEXURE-I

Customer No: 1723 & 1724

Tag Nos.: HAG15AA301/302

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 SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet) MEDIUM	ENNORE (2X660 MW) HWL 1 & 2 OUTDOOR MODULATING D 508 x 65/ D508 X 65 SA106 Gr.C/ SA106 Gr.C FEED WATER	
BODY	MODEL No. TYPE OF BODY : GUIDING : No. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV BODY RATING (ASME) END CONNECTION BODY MATERIAL PACKING MATERIAL BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT / PLUG : CAGE / STEM BALANCED / UNBALANCED FLOW VALVE OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) VALVE LIFT mm ANTI FLASHING TRIM	Z type INLET :BUTT WELD; STYLE-P, d1 = 394.25 mm OUTLET: BUTT WELD; STYLE-P, d1 = 384.5mm F11 GRAFOIL/GRAPHITE FLOW TO CLOSE < 50% Sonic Velocity V OR BETTER LESS THAN 85 dBA	
ELECTRO HYDRAULIC ACTUATOR	MODEL No. & SIZE CLOSE AT: OPEN AT (Kg/cm ² (g)) SHUT OFF DIFFERENTIAL STEM OREINTATION MANUAL OVERRIDE TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN, TRIP VALVE POSN. ON SIGNAL (4-20mA) FAILURE VALVE POSN. ON FLUID SUPPLY FAILURE	YES <12 Secs / <12 Secs / < 3 secs FAIL TO CLOSE FAIL TO CLOSE	
PERFORMANCE OF VALVE	LINEARITY HYSTERISIS SENSITIVITY ACCURACY (OVERALL)	± 2% ± 1% ± 0.5% ± 2%	

SERVICE CONDITIONS

Sl. No.	LOAD	No of valve Operating	FLOW PER VALVE 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 Start Min water	1	28.3	6.0	0.0	38					
02.	Cold start Min OT flow	1	214.1	5.7	0.0	38					
03.	Cold Start Swell flow	2	163.6	5.0	0.0	100					
04.	Hot start 130 bar Min OT flow	1	214.1	134.8	0.0	331					
05.	Hot start 130 bar swell flow	2	163.6	134.0	0.0	331					
06.	Hot Start 160 bar Min water flow	1	28.3	165.7	0.0	348					



SPECIFICATION FOR STARTUP CONTROL VALVES

SPECIFICATION NO.: BM/SCV :001

SECTION: Boiler Mountings/PE (FB)

REV. NO.: 02

DATE: 01.07.15

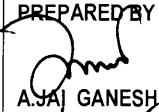
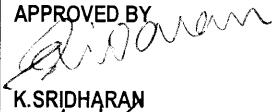
PAGE NO : 27 OF 30

ACTUATOR SIZING PRESSURE : 299.9 kg/cm² (g)
BODY DESIGN: PRESSURE / TEMPERATURE : 299.9 kg/cm² (g) / 374°C
TEST PRESSURE : 2 x Design Pressure

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. 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 PUMP 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		
HAND PUMP	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		
SIGN. : NAME : DATE :	PREPARED BY  A. JA GANESH 02/07/15	CHECKED BY  V. GUNASEKARAN 02/07/15	APPROVED BY  K. SRIDHARAN 02/07/15	VENDOR SEAL SIGN.: NAME: DATE:

SPECIFICATION NO.: BM/SCV :001

SECTION: Boiler Mountings/PE (FB)

REV. NO.: 02

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Customer No:1723 &1724

Tag Nos.: HAG 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
SERVICE
LOCATION
DUTY
PIPE SIZE (inlet / outlet)
PIPE MATERIAL (inlet / outlet)
MEDIUM

ENNORE (2X660 MW)
MEFCV
OUTDOOR
MODULATING
D323.90x45 / D323.9x45
SA106 Gr.C/ SA106 Gr.C
FEED WATER

BODY

MODEL No.
TYPE OF BODY : GUIDING : No. OF PORTS
BODY SIZE: PORT SIZE: DESIGN CV
BODY RATING (ASME)
END CONNECTION & RATING (ASME)

“7”

INLET: BUTTWELD; STYLE-P, d1=245.15mm
OUTLET: BUTTWELD; STYLE-P, d1=245.15mm

SA105
GRAFOIL

FLOW TO CLOSE
< 8 m/s
V OR BETTER
LESS THAN 85 dBA

ELECTRO HYDRAULIC
ACTUATOR

MODEL No. & SIZE
CLOSE AT: OPEN AT (Kg/cm² (g))
SHUT OFF DIFFERENTIAL
STEM ORIENTATION
MANUAL OVERRIDE
TRAVEL TIME FOR
OPEN TO CLOSE, CLOSE TO OPEN, TRIP
VALVE POSN. ON SIGNAL (4-20mA) FAILURE
VALVE POSN. ON SUPPLY FAILURE

YES

<12 Secs / <12 Secs / < 3 secs
STAYPUT
STAYPUT

PERFORMANCE OF VALVE

LINEARITY
HYSTERESIS
SENSITIVITY
ACCURACY (OVERALL)

± 2%
± 1%
± 0.5%
± 2%

SERVICE CONDITIONS

[illegible]

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: BM/SCV :001	
		SECTION: Boiler Mountings/PE (FB)	
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ACTUATOR SIZING PRESSURE : 319.9 kg/cm² (g)
 BODY DESIGN: PRESSURE / TEMPERATURE : 319.9 kg/cm² (g) / 348°C
 TEST PRESSURE : 2 x Design Pressure

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)	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	
SIGN. : NAME : DATE :	PREPARED BY A. JAI GANESH 02/07/15	CHECKED BY V. GUNASEKARAN 02/07/15	APPROVED BY K. SRIDHARAN 02/07/15
			VENDOR SEAL SIGN.: NAME: DATE:

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: SCV_MAIN SPEC	
		SECTION: Boiler Mountings/PE (FB)	
		REV. NO.: 00	DATE: 01.07.15
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Project Specific Data :

One (1) stainless steel tubing and fittings to connect all necessary hydraulic line 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 as follows which are preliminary, exact values will be informed during technical evaluation.

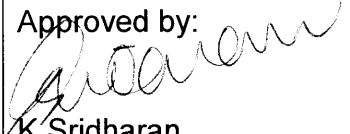
- a) HWL1 to Hydraulic Unit - 50 in m.
- b) HWL2 to Hydraulic Unit - 50 in m.
- c) MEFCV to Hydraulic Unit - 55 in m.

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: BM/SCV:001	
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ENGINEERING SPECIFICATION
FOR
STARTUP CONTROL VALVES

SPECIFICATION NO: BM/SCV: 001

UPPER 2x 800 MW.

Prepared by:  A. Jai Ganesh Sr Product Engineer PE / FB (BM)	Reviewed by: V. Gunasekaran Manager PE / FB (BM)	Approved by:  K. Sridharan Dy. General Manager PE / FB (BM)
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Revision Log					Template Form Revision No.: 00			
Revision No.	Date	Reason	Prepared		Reviewed		Approved	
			Name	Sign	Name	Sign	Name	Sign.
01	19.01.13	C&I comments	A. Jai Ganesh		Gopalan. I		K. Perisamy	
02	07.03.14	Standardization	A. Jai Ganesh		K. Sridharan		K. Perisamy	
03	30.01.17	Site Feedbacks	A. Jai Ganesh		V. Gunasekaran		K. Sridharan	
04	30.03.17	Update	Saji. P. J		A. Jai Ganesh		K. Sridharan	

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: BM/SCV:001	
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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 connections 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 re-welding.

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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 Purchase department- Materials Management/BOI.
- 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

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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)
- g) Rules for Electrical installation by Tariff Advisory Committee (TAC).
- h) 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.

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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 75.01 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- 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 manufactured other than standards listed above, 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

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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 at supplier end

Supplier shall fabricate the valves based on the drawings approved by BHEL. 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, fittings and necessary supports to connect all necessary hydraulic lines between the SUPPLIER supplied Common Hydraulic Unit and the SUPPLIER supplied two BOILER SEPARATOR LEVEL CONTROL VALVES (HWL-1, HWL-2 VALVES) and one Minimum Economizer Flow Control Valve (MEFCV) hydraulic actuators. Each Valve location from the common hydraulic unit shall be referred from the project specific data sheet (Annexure I).

- i. Hydraulic Unit to HWL1 - refer Annexure II
- ii. Hydraulic Unit to HWL2 - refer Annexure II
- iii. Hydraulic Unit to MEFCV - refer Annexure II

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- ☒ 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.
- ☒ Following special tools are must.
 - a) Flushing kit for valves.
 - b) Flushing kit for Hydraulic system including the flushing device. Flushing filter, Flushing Filter elements, hose pipes & valves to be supplied as spares along with the flushing kit.
 - c) N2 filling kit – Used for charging of accumulators with N2 as well as pressure checking and adjustment
- ☒ 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)~~

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.

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: BM/SCV:001	
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6.0 FACILITY SITE SPECIFIC DATA

Please refer to attached specifications Annexure-II for Facility Site Specific Data (if applicable) and Annexure-III for Surface Preparations and Coatings requirements (if applicable).

7.0 DRAWINGS AND DATA BY SUPPLIER

7.1 Detailed Calculations to demonstrate the suitability of the selected valve for the application.

- 7.1.1 Cavitation in case the valve is for liquid application.
- 7.1.2 Noise and Vibration.
- 7.1.3 Flashing in case the valve is for saturated liquid application.
- 7.1.4 Valve sizing calculations.(Cv, valve outlet velocity)
- 7.1.5 Actuator sizing calculations

7.2 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.

7.2.1 The following units are to be used for main parameters:

- Temperature °C
- Pressure kg /ocm² (g)
- Dimensions mm
- Flow kg/sec

7.3 Documents to be submitted with Quotation

- Valve Performance Data and curves.
- 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. In addition to the sectional drawing, supplier has to provide isometric drawing of HWL valve body for heat tracing requirement.
- GA drawing of actuator.
- Actuator sizing calculations.
- GA drawing and circuit diagram of Common Hydraulic control Unit.
- Electrical Circuit diagram.
- Control panel arrangement.

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: BM/SCV:001	
		SECTION: Boiler Mountings/PE (FB)	
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- 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
- Certificates as per QR and PTR requirements (applicable to Non-PMD vendor).

7.4 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.

7.5 Documents to be 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
- O&M manuals – 1 set of Hard copy to be sent to site along with equipment.
- Data sheets & drawings for approval.

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: BM/SCV:001	
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- O&M manual in soft copy – One copy of O&M manuals in soft copy is to be submitted in CD-ROM (Compact disc). The O&M manuals should be furnished within three months from the date of placement of order.
- 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) and design temperature, °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 available for inspection for a period of five (5) years.
 - ✓ IBR from III C.
 - ✓ 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-Function

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

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

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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.

8.1.2 Minimum Economizer Flow Control (MEFCV) Valve:

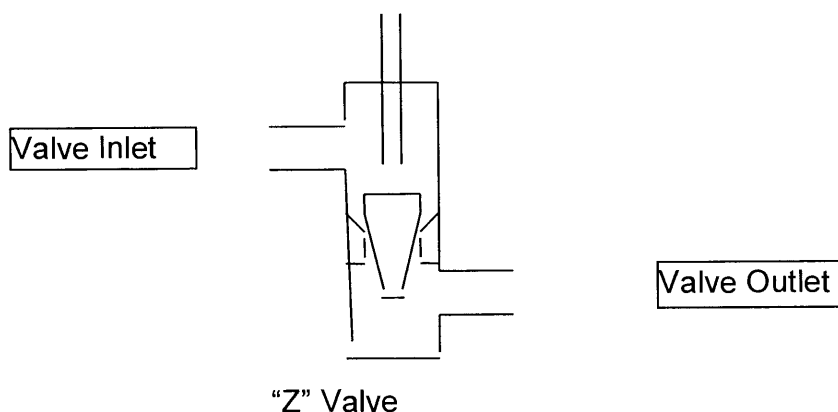
The Minimum Economizer Flow control valve (MEFCV) is used to control the economizer inlet flow during start-up and low load operation. Demand for this valve is established based on measured economizer inlet flow compared to a minimum boiler flow requirement.

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 10% 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.

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



- 9.7 Valve shall be forged design.
- 9.8 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.
- 9.9 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.**
- 9.10 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.



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- 9.11 Bidder shall furnish in his proposal detailed calculations to establish whether flashing or 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 specially designed anti-cavitation trim (such as cage guiding valves or multi stack/multi path disc valves) 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.
- 9.12 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.
- 9.13 Valve outlet shall have a 5 degree downward slope to ensure proper drainage of valve outlet.
- 9.14 Valve inlet and outlet cages shall be provided if required by the indicated process conditions.
- 9.15 For valves with butt weld ends, the supplier is required to prepare weld profiles to BHEL supplied information.
- 9.16 Both the valves and their accessories shall be designed for the process and local installation environment.
- 9.17 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.
- 9.18 The Supplier shall provide all necessary converters, positioners, position transmitters, etc. mounted on the control valve.
- 9.19 The direction of flow shall be clearly marked on each valve.
- 9.20 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

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equal or exceed the process design conditions on control valve data sheet.

- 9.21 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.
- 9.22 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.
- 9.23 Valve's gland packing material shall be grafoil or graphite for all the valves.
- 9.24 The end for all the Control Valves shall be matched to the corresponding details for the piping on which the valve is installed.
- 9.25 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.
- 9.26 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** as per FCI 70.2.
- 9.27 Hydraulic Valve Actuators
 - 9.27.1 The separator level control valves (HWL-1 & HWL-2) shall be supplied with a 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.
 - 9.27.2 The Hydraulic actuator shall be sized to operate against the process maximum differential pressure.
 - 9.27.3 A mechanical position indicator shall be provided on the actuator.
 - 9.27.4 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.

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

9.27.6 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.

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

9.28.1 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.

9.28.2 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.

9.28.3 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.

9.28.4 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.

9.28.5 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

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controllers and I/O necessary for valve positioning, hydraulic unit control and interface between the Hydraulic Unit / Electronic Control Unit and customer supplied DCS.

- 9.28.6 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

- 9.28.7 415 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.

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

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- 9.28.9 The offered Hydraulic Power Unit and the Control system/panels shall be suitable for outdoor applications.
- 9.28.10 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.
- 9.28.11 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.
- 9.28.12 Vendor to provide suitable cable glands for all interfacing cables from/to DCS. Cable sizes will be indicated during engineering stage.
- 9.28.13 Test Certificates and Calibration Certifications shall be provided for all Instruments and Motors as applicable.

9.29 Valve Selection Criteria

- 9.29.1 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.
- 9.29.2 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.
- 9.29.3 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.
- 9.29.4 The bidder has to submit calculated noise levels (dBA) for the operating conditions specified in the datasheet.

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9.30 Test and Examinations

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 bidder shall submit a manufacturing quality plan along with the offer for BHEL / QA review and approval.

- 9.30.1 Material, mechanical and chemical test shall be performed in a manner as specified in the relevant codes.
- 9.30.2 Non-destructive examination shall be performed as per ASME-B-16.34 (Steel Valves).
- 9.30.3 100% 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.
- 9.30.4 The material test certificates (correlated to melt number) shall be furnished by the vendor for identification and correlation.
- 9.30.5 The butt-welding end of all valves, dye-penetrant test as per ASTM E165 shall be carried out on 100% of the valves and the result shall show no defects.
- 9.30.6 100% MPI shall be done on base/body casing with pressure rating 1500 class and above in line with ASME B16.34.
- 9.30.7 **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



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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.

9.30.8 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.

9.30.9 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 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 to close on signal failure etc. in line with the specification requirements. Performance tests such as Linearity, Hysteresis, Sensitivity and Accuracy are to be checked as per specification.

9.30.10 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.

9.31 Additional requirements

9.31.1. Machined surfaces shall be suitably protected.

9.31.2. 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.

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

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



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- 9.31.5. 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.
- 9.31.6. Paint specifications are to be submitted for purchaser's review with bid.
- 9.31.7. All exposed machined surfaces shall be coated with suitable rust preventative coating prior to shipment.
- 9.31.8. 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.
- 9.31.9. All threaded connections shall be plugged or capped with standard pipe plugs or caps.
- 9.31.10. List of commissioning spares shall be quoted if applicable.
- 9.31.11. List of recommended spares for 5 years trouble free operation of valves shall be quoted.
- 9.31.12. 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.
- 9.31.13. One spare filter element each to be supplied for the SS filter provided in the Hydraulic Control Unit.
- 9.31.14. Drain valve for the oil tank, vent air breather, and isolation lines in the oil supply lines are to be necessarily provided.
- 9.31.15. Mechanical oil level indicator has to be extended through full height of the tank. (0 % to 100 %)
- 9.31.16. Man hole to be provided in the Oil tank in order to provide means to access the internals of the oil tank and for maintenance.
- 9.31.17. Oil tank internals surface should not be painted.
- 9.31.18. Vendor to provide isolation valves in the pressure and return lines (oil lines) to carry out maintenance activities in the oil line and also in the fail safe manifold & control manifold.
- 9.31.19. Vendor to supply welding type socket fittings in the entire hydraulic pipes joint.

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9.31.20. Vendor to provide a provision to indicate the accumulator pressure in local as well as in remote.

9.31.21. Hydraulic fluid /oil cooler is to be provided

9.32 Support and Services

9.32.1 The vendors to quote for ERECTION & COMMISSIONING SUPPORT (optional)for Supervision of erection and commissioning of this valves , the seller should depute one commissioning engineer to the site and he shall stay there for a maximum of 7 days (for each unit ie per customer number) extending full support to site people in the initial operation of the valves .All the expenses like to & fro charges, incidentals, boarding & lodging at site are to be borne by the valve vendor

The Vendors to submit an Optional price for providing training to our personnel at the works of Valve manufacturer for 2 man month period .

Our personnel will make their own Travel / Lodging / Boarding arrangements. Depending upon the actual duration of training man months availed, the payment will be proportionately reduced on the vendor quoted amount (if period is lesser than 2 man months).

9.33 Evaluations

9.33.1 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.

9.33.2 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.

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

10.1 Valve Data Sheets

- 10.2 All data to be in Metric units. The Supplier shall fill in the valve data sheets for each valve. The operating conditions furnished for MEFCV is preliminary only. Final operating conditions can be informed only after the boiler recirculation pump operating conditions are finalized, which can happen even after the placement of this PO. This may/may not affect the selected Cv for MEFCV. The vendor to accommodate these changes in the operating conditions and offer the valve which meets all the specification requirements without any price implication to BHEL.

10.3 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 confirmed 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 the attached, Annexure I - Valve Datasheets and project specific data sheets, Annexure II - for Facility Site Specific Data



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ACTUATOR SIZING PRESSURE : 333.6 kg/cm² (g)
 BODY DESIGN: PRESSURE / TEMPERATURE : 333.6 kg/cm² (g) / 375°C
 TEST PRESSURE : 2 x Design Pressure
 IBR FORM – III C : REQUIRED
 TOTAL WEIGHT (VALVE+ ACTUATOR+ ACCESSORIES) : kg

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 PUMP 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	
HAND WHEEL	ORIENTATION	SIDE MOUNTED	
JUNCTION BOX	No. OF WAYS SIZE CABLE GLANDS: (SIZE / QTY) 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	
SIGN.: NAME: DATE:	PREPARED BY SAJIP.P.J	CHECKED BY V. GUNASEKARAN	APPROVED BY K. SRIDHARAN
			VENDOR SEAL SIGN.: NAME: DATE:

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ACTUATOR SIZING PRESSURE : 357.5 kg/cm² (g)
 BODY DESIGN: PRESSURE / TEMPERATURE : 357.5 kg/cm² (g) / 348°C
 TEST PRESSURE : 2 x Design Pressure
 IBR FORM – III C : REQUIRED
 TOTAL WEIGHT (VALVE+ ACTUATOR+ ACCESSORIES) : kg.

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	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.	IP-65 4 - 20 mA TO SUIT ACTUATOR TO OPEN / TO CLOSE		
	ENCLOSURE CLASS			
	INPUT SIGNAL			
	OUTPUT SIGNAL			
	INCREASE IN SIGNAL			
LIMIT SWITCH	MANUFACTURER & MODEL No.	1 No. FOR OPEN & 1 No. FOR CLOSE DPDT 2 NO + 2 NC 5A 240V, AC and 0.2A, 220V, DC IP65 / NEMA 4		
	OPEN: INT: CLOSE			
	CONTACT TYPE			
	RATING (AC/DC)			
	ENCLOSURE CLASS			
POSITION TRANSMITTER	MANUFACTURER & MODEL No.	LVDT 2 WIRE TYPE 24V DC 4 – 20 mA / 0-100 Ohms +/- 1% FS IP65 / NEMA 4		
	TYPE			
	SUPPLY			
	OUTPUT RATING			
	ACCURACY			
	ENCLOSURE CLASS			
HAND WHEEL	ORIENTATION	SIDE MOUNTED		
JUNCTION BOX	No. OF WAYS	THIRTY SIX REQUIRED REQUIRED IP65 / NEMA 4		
	SIZE			
	CABLE GLANDS: (SIZE / QTY)			
	ENCLOSURE CLASS			
E/H CONVERTER	INPUT SIGNAL : POWER SUPPLY	4 – 20mA, DC / 24V, DC YES / NO // YES / NO IP65 / NEMA 4		
	SPLIT RANGE			
	ENCLOSURE CLASS			
SIGN. : NAME : DATE :	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR SEAL
	SAJI.P.J	V. GUNASEKARAN	K. SRIDHARAN	

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Annexure-II

1. Project Specific Data :

One (1) stainless steel tubing, fittings and necessary supports to connect all necessary hydraulic line 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 as follows.

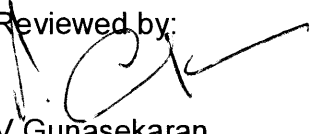
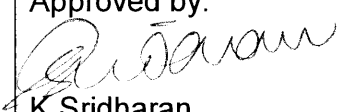
- iv. Hydraulic Unit to HWL1 - 50m.
- v. Hydraulic Unit to HWL2 - 50m.
- ii. Hydraulic Unit to MEFCV - 60m.

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ENGINEERING SPECIFICATION
FOR
STARTUP CONTROL VALVES

SPECIFICATION NO: BM/SCV: 001

NORTH CHENNAI 1X800MW

Prepared by:  A. Jai Ganesh Sr Product Engineer PE / FB (BM)	Reviewed by:  V. Gunasekaran Manager PE / FB (BM)	Approved by:  K. Sridharan Dy. General Manager PE / FB (BM)
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Revision No.	Date	Reason	Prepared		Reviewed		Approved	
			Name	Sign	Name	Sign	Name	Sign.
01	19.01.13	C&I comments	A. Jai Ganesh		Gopalan. I		K. Perisamy	
02	07.03.14	Standardization	A. Jai Ganesh		K. Sridharan		K. Perisamy	
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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 connections 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 re-welding.

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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 Purchase department- Materials Management/BOI.
- 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

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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)
- g) Rules for Electrical installation by Tariff Advisory Committee (TAC).
- h) 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.

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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 75.01 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- 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 manufactured other than standards listed above, 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

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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 at supplier end

Supplier shall fabricate the valves based on the drawings approved by BHEL. 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, fittings and necessary supports to connect all necessary hydraulic lines between the SUPPLIER supplied Common Hydraulic Unit and the SUPPLIER supplied two BOILER SEPARATOR LEVEL CONTROL VALVES (HWL-1, HWL-2 VALVES) and one Minimum Economizer Flow Control Valve (MEFCV) hydraulic actuators. Each Valve location from the common hydraulic unit shall be referred from the project specific data sheet (Annexure I).

- i. Hydraulic Unit to HWL1 - refer Annexure II
- ii. Hydraulic Unit to HWL2 - refer Annexure II
- iii. Hydraulic Unit to MEFCV - refer Annexure II



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- ☒ 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.
- ☒ Following special tools are must.
 - a) Flushing kit for valves.
 - b) Flushing kit for Hydraulic system including the flushing device. Flushing filter, Flushing Filter elements, hose pipes & valves to be supplied as spares along with the flushing kit.
 - c) N2 filling kit – Used for charging of accumulators with N2 as well as pressure checking and adjustment
- ☒ 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)~~

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.

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6.0 FACILITY SITE SPECIFIC DATA

Please refer to attached specifications Annexure-II for Facility Site Specific Data (if applicable) and Annexure-III for Surface Preparations and Coatings requirements (if applicable).

7.0 DRAWINGS AND DATA BY SUPPLIER

7.1 Detailed Calculations to demonstrate the suitability of the selected valve for the application.

- 7.1.1 Cavitation in case the valve is for liquid application.
- 7.1.2 Noise and Vibration.
- 7.1.3 Flashing in case the valve is for saturated liquid application.
- 7.1.4 Valve sizing calculations. (Cv, valve outlet velocity)
- 7.1.5 Actuator sizing calculations

7.2 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.

7.2.1 The following units are to be used for main parameters:

- Temperature °C
- Pressure kg /ocm² (g)
- Dimensions mm
- Flow kg/sec

7.3 Documents to be submitted with Quotation

- Valve Performance Data and curves.
- 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. In addition to the sectional drawing, supplier has to provide isometric drawing of HWL valve body for heat tracing requirement.
- GA drawing of actuator.
- Actuator sizing calculations.
- GA drawing and circuit diagram of Common Hydraulic control Unit.
- Electrical Circuit diagram.
- Control panel arrangement.

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- 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
- Certificates as per QR and PTR requirements (applicable to Non-PMD vendor).

7.4 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.

7.5 Documents to be 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
- O&M manuals – 1 set of Hard copy to be sent to site along with equipment.
- Data sheets & drawings for approval.

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- O&M manual in soft copy – One copy of O&M manuals in soft copy is to be submitted in CD-ROM (Compact disc). The O&M manuals should be furnished within three months from the date of placement of order.
- 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) and design temperature, °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 available for inspection for a period of five (5) years.
 - ✓ IBR from III C.
 - ✓ 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-Function

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

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

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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.

8.1.2 Minimum Economizer Flow Control (MEFCV) Valve:

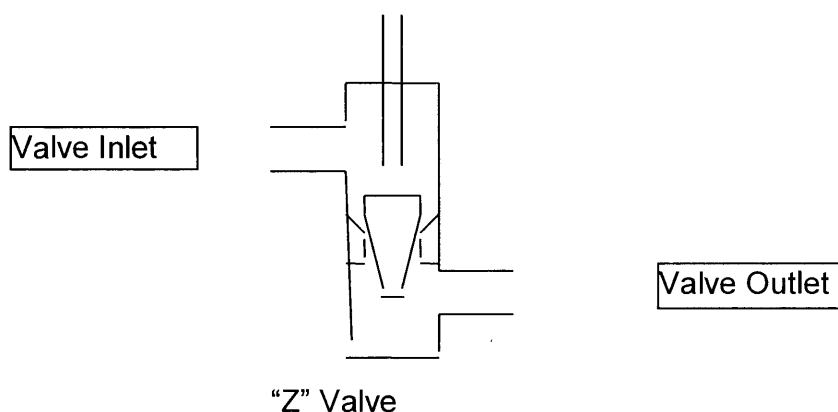
The Minimum Economizer Flow control valve (MEFCV) is used to control the economizer inlet flow during start-up and low load operation. Demand for this valve is established based on measured economizer inlet flow compared to a minimum boiler flow requirement.

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 10% 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.

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



- 9.7 Valve shall be forged design.
- 9.8 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.
- 9.9 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.**
- 9.10 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.



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- 9.11 Bidder shall furnish in his proposal detailed calculations to establish whether flashing or 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 specially designed anti-cavitation trim (such as cage guiding valves or multi stack/multi path disc valves) 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.
- 9.12 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.
- 9.13 Valve outlet shall have a 5 degree downward slope to ensure proper drainage of valve outlet.
- 9.14 Valve inlet and outlet cages shall be provided if required by the indicated process conditions.
- 9.15 For valves with butt weld ends, the supplier is required to prepare weld profiles to BHEL supplied information.
- 9.16 Both the valves and their accessories shall be designed for the process and local installation environment.
- 9.17 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.
- 9.18 The Supplier shall provide all necessary converters, positioners, position transmitters, etc. mounted on the control valve.
- 9.19 The direction of flow shall be clearly marked on each valve.
- 9.20 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

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equal or exceed the process design conditions on control valve data sheet.

- 9.21 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.
- 9.22 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.
- 9.23 Valve's gland packing material shall be grafoil or graphite for all the valves.
- 9.24 The end for all the Control Valves shall be matched to the corresponding details for the piping on which the valve is installed.
- 9.25 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.
- 9.26 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** as per FCI 70.2.
- 9.27 Hydraulic Valve Actuators
 - 9.27.1 The separator level control valves (HWL-1 & HWL-2) shall be supplied with a 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.
 - 9.27.2 The Hydraulic actuator shall be sized to operate against the process maximum differential pressure.
 - 9.27.3 A mechanical position indicator shall be provided on the actuator.
 - 9.27.4 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.

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

9.27.6 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.

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

9.28.1 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.

9.28.2 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.

9.28.3 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.

9.28.4 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.



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- 9.28.5 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.
- 9.28.6 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 |
- 9.28.7 415 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.

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- 9.28.8 Vendor to offer the latest version of control system/positioners with additional features.
- 9.28.9 The offered Hydraulic Power Unit and the Control system/panels shall be suitable for outdoor applications.
- 9.28.10 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.
- 9.28.11 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.
- 9.28.12 Vendor to provide suitable cable glands for all interfacing cables from/to DCS. Cable sizes will be indicated during engineering stage.
- 9.28.13 Test Certificates and Calibration Certifications shall be provided for all Instruments and Motors as applicable.

9.29 Valve Selection Criteria

- 9.29.1 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.
- 9.29.2 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.
- 9.29.3 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.

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9.29.4 The bidder has to submit calculated noise levels (dBA) for the operating conditions specified in the datasheet.

9.30 Test and Examinations

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 bidder shall submit a manufacturing quality plan along with the offer for BHEL / QA review and approval.

- 9.30.1 Material, mechanical and chemical test shall be performed in a manner as specified in the relevant codes.
- 9.30.2 Non-destructive examination shall be performed as per ASME-B-16.34 (Steel Valves).
- 9.30.3 100% 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.
- 9.30.4 The material test certificates (correlated to melt number) shall be furnished by the vendor for identification and correlation.
- 9.30.5 The butt-welding end of all valves, dye-penetrant test as per ASTM E165 shall be carried out on 100% of the valves and the result shall show no defects.
- 9.30.6 100% MPI shall be done on base/body casing with pressure rating 1500 class and above in line with ASME B16.34.
- 9.30.7 **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.

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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.

9.30.8 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.

9.30.9 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 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 to close on signal failure etc. in line with the specification requirements. Performance tests such as Linearity, Hysteresis, Sensitivity and Accuracy are to be checked as per specification.

9.30.10 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.

9.31 Additional requirements

9.31.1. Machined surfaces shall be suitably protected.

9.31.2. 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.

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

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

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- 9.31.5. 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.
- 9.31.6. Paint specifications are to be submitted for purchaser's review with bid.
- 9.31.7. All exposed machined surfaces shall be coated with suitable rust preventative coating prior to shipment.
- 9.31.8. 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.
- 9.31.9. All threaded connections shall be plugged or capped with standard pipe plugs or caps.
- 9.31.10. List of commissioning spares shall be quoted if applicable.
- 9.31.11. List of recommended spares for 5 years trouble free operation of valves shall be quoted.
- 9.31.12. 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.
- 9.31.13. One spare filter element each to be supplied for the SS filter provided in the Hydraulic Control Unit.
- 9.31.14. Drain valve for the oil tank, vent air breather, and isolation lines in the oil supply lines are to be necessarily provided.
- 9.31.15. Mechanical oil level indicator has to be extended through full height of the tank. (0 % to 100 %)
- 9.31.16. Man hole to be provided in the Oil tank in order to provide means to access the internals of the oil tank and for maintenance.
- 9.31.17. Oil tank internals surface should not be painted.
- 9.31.18. Vendor to provide isolation valves in the pressure and return lines (oil lines) to carry out maintenance activities in the oil line and also in the fail safe manifold & control manifold.
- 9.31.19. Vendor to supply welding type socket fittings in the entire hydraulic pipes joint.

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9.31.20. Vendor to provide a provision to indicate the accumulator pressure in local as well as in remote.

9.31.21. Hydraulic fluid /oil cooler is to be provided

9.32 Support and Services

9.32.1 The vendors to quote for ERECTION & COMMISSIONING SUPPORT (optional)for Supervision of erection and commissioning of this valves , the seller should depute one commissioning engineer to the site and he shall stay there for a maximum of 7 days (for each unit ie per customer number) extending full support to site people in the initial operation of the valves .All the expenses like to & fro charges, incidentals, boarding & lodging at site are to be borne by the valve vendor

The Vendors to submit an Optional price for providing training to our personnel at the works of Valve manufacturer for 2 man month period .

Our personnel will make their own Travel / Lodging / Boarding arrangements. Depending upon the actual duration of training man months availed, the payment will be proportionately reduced on the vendor quoted amount (if period is lesser than 2 man months).

9.33 Evaluations

9.33.1 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.

9.33.2 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.

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

10.1 Valve Data Sheets

- 10.2 All data to be in Metric units. The Supplier shall fill in the valve data sheets for each valve. The operating conditions furnished for MEFCV is preliminary only. Final operating conditions can be informed only after the boiler recirculation pump operating conditions are finalized, which can happen even after the placement of this PO. This may/may not affect the selected Cv for MEFCV. The vendor to accommodate these changes in the operating conditions and offer the valve which meets all the specification requirements without any price implication to BHEL.

10.3 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 confirmed 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 the attached, Annexure I - Valve Datasheets and project specific data sheets, Annexure II - for Facility Site Specific Data



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ANNEXURE-I

Customer No: 1818

Tag Nos.: 10HAG15AA301, 10HAG15AA302

Qty.: 2 Nos. / BOILER

SEPARATOR LEVEL CONTROL (HWL-1 & HWL-2) VALVE DATA SHEET

PART – A

(TO BE FILLED UP BY PURCHASER)

PART – B

(TO BE FILLED UP BY
BIDDER)

GENERAL	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet) MEDIUM	NORTH CHENNAI TPP ST III, 800 MW HWL-1 & HWL-2 OUTDOOR MODULATING D508 x 75 / D508 x 75 SA106 Gr.C/ SA106 Gr.C FEED WATER	
BODY	MODEL No. TYPE OF BODY: GUIDING: No. OF PORTS BODY SIZE: PORT SIZE: DESIGN CV BODY RATING (ASME) END CONNECTION BODY MATERIAL PACKING MATERIAL BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT / PLUG : CAGE / STEM BALANCED / UNBALANCED FLOW VALVE OUTLET VELOCITY REQUIRED LEAKAGE CLASS NOISE LEVEL (dBA) VALVE LIFT mm ANTI FLASHING TRIM	Z type Inlet: Butt Welded; Style-P, d1 = 376.8 mm Outlet: Butt Welded; Style-P, d1 = 384.5 mm F11 GRAFOIL/GRAPHITE FLOW TO CLOSE < 50% Sonic Velocity V LESS THAN 85 dBA	
ELECTRO HYDRAULIC ACTUATOR	MODEL No. & SIZE CLOSE AT: OPEN AT (kg/cm ² (g)) SHUT OFF DIFFERENTIAL STEM ORIENTATION MANUAL OVERRIDE TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN, TRIP VALVE POSN. ON SIGNAL (4-20mA) FAILURE VALVE POSN. ON FLUID SUPPLY FAILURE	YES <12 Secs / <12 Secs / < 3 secs FAIL TO CLOSE FAIL TO CLOSE	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)	± 2% ± 1% ± 0.5% ± 2%	

SERVICE CONDITIONS

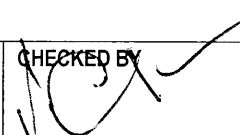
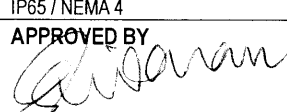
Sl. No.	LOAD	No of valves Operating	FLOW/ Valve kg/s	INLET PR. kg/cm ² (g)	OUTLET PR. kg/cm ² (g)	INLET TEMP (°C)	Sp. Gravity	Calc. Cv	Valve Lift %	Valve outlet velocity	Noise Level dBA
01.	Cold Start 1 bar(a) Min Water flow	1	33.1	5.4	0.0	38					
02.	Cold Start 1 bar(a) Min OT flow	1	244.3	4.9	0.0	38					
03.	Cold Start 1 bar(a) Swell flow*	2	188.4	3.9	0.0	100					
04.	Hot Start 140 bar(a) Min OT flow*	1	244.3	144.3	0.0	337					
05.	Hot Start 140 bar(a) Swell flow*	2	188.4	143.1	0.0	337					
06.	Hot Start 160 bar(a) Min Water flow*	1	33.1	165.4	0.0	347					

* - 2 Phase flow at valve outlet

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ACTUATOR SIZING PRESSURE : 333.6 kg/cm² (g)
 BODY DESIGN: PRESSURE / TEMPERATURE : 333.6 kg/cm² (g) / 375°C
 TEST PRESSURE : 2 x Design Pressure
 IBR FORM – III C : REQUIRED
 TOTAL WEIGHT (VALVE + ACTUATOR + ACCESSORIES) : Kgs.

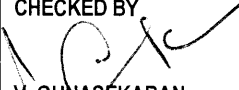
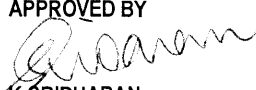
Valves should be directly weld able to connecting pipe without the use of reducers. ONLY GLOBE “Z” VALVES ACCEPTABLE.

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 PUMP 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 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		
HAND WHEEL	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		
SIGN. : NAME : DATE :	PREPARED BY  SAJI.P.J	CHECKED BY  V. GUNASEKARAN	APPROVED BY  K.SRIDHARAN	VENDOR SEAL SIGN.: NAME: DATE:

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ACTUATOR SIZING PRESSURE : 357.5 kg/cm² (g)
 BODY DESIGN: PRESSURE / TEMPERATURE : 357.5 kg/cm² (g) / 348°C
 TEST PRESSURE : 2 x Design Pressure
 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	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.	IP-65 4 - 20 mA TO SUIT ACTUATOR TO OPEN / TO CLOSE		
	ENCLOSURE CLASS			
	INPUT SIGNAL			
	OUTPUT SIGNAL			
	INCREASE IN SIGNAL			
LIMIT SWITCH	MANUFACTURER & MODEL No.	1 No. FOR OPEN & 1 No. FOR CLOSE DPDT 2 NO + 2 NC 5A 240V, AC and 0.2A, 220V, DC IP65 / NEMA 4		
	OPEN: INT: CLOSE			
	CONTACT TYPE			
	RATING (AC/DC)			
	ENCLOSURE CLASS			
POSITION TRANSMITTER	MANUFACTURER & MODEL No.	LVDT 2 WIRE TYPE 24V DC 4 – 20 mA / 0-100 Ohms +/- 1% FS IP65 / NEMA 4		
	TYPE			
	SUPPLY			
	OUTPUT RATING			
	ACCURACY			
	ENCLOSURE CLASS			
HAND WHEEL	ORIENTATION	SIDE MOUNTED		
JUNCTION BOX	No. OF WAYS	THIRTY SIX REQUIRED REQUIRED IP65 / NEMA 4		
	SIZE			
	CABLE GLANDS: (SIZE / QTY)			
	ENCLOSURE CLASS			
E/H CONVERTER	INPUT SIGNAL : POWER SUPPLY	4 – 20mA, DC / 24V, DC YES / NO // YES / NO IP65 / NEMA 4		
	SPLIT RANGE			
	ENCLOSURE CLASS			
SIGN. : NAME : DATE :	PREPARED BY  SAJI.P.J	CHECKED BY  V. GUNASEKARAN	APPROVED BY  K. SRIDHARAN	VENDOR SEAL SIGN.: NAME: DATE:

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Annexure-II

1. Project Specific Data :

One (1) stainless steel tubing, fittings and necessary supports to connect all necessary hydraulic line 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 as follows.

- iv. Hydraulic Unit to HWL1 - 50m.
- v. Hydraulic Unit to HWL2 - 50m.
- ii. Hydraulic Unit to MEFCV - 60m.