



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 with accessories, Commissioning Spares and Mandatory Spares
Projects		Maitree 2 X 660 MW (1725&1726)
BHEL Tender No. & Date		1801800099 dated 09.02.2018
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 (BIFPCL) 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 project destination basis i.e. BHEL Trichy Stores / Tamilnadu state) as indicated below, inclusive of Packing, forwarding, Freight also to yours account. a. Transit Insurance is under BHEL scope @0.13%. b. All items to be dispatched to BHEL Trichy stores , Tamilnadu	
3(b)	Delivery term (Import): CFR Chennai/Bangladesh port The quote shall be on CFR Bangladesh port for main supply and commissioning spares. CFR Chennai Port for mandatory spares basis with freight break up. Port of loading should be indicated without fail.	
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 site 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, then 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 (a)	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 Tiruverumbur. BHEL TRICHY Unit GST NO : 33AAACB4146P2ZL.	
7 (b)	Kindly indicate the GST No of your Firm	
7 (c)	Kindly Indicate the HSN Code for all items	
7 (d)	Please indicate the applicable GST % (IGST)	
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: 24 weeks from the Documents approval from Customer /BHEL. Vendor requested to follow BHEL approved Standard QP. CV test report to be submitted for BHEL review and approval before final inspection.	
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: <u>Along with the offer:</u> 1. Filled in Commercial terms and conditions (this document) to be submitted. 2. Unpriced offer covering filled BHE data sheet of Valves, Vendor Data sheet, Valve Model Catalogue, Filled C & I data sheet for Smart Positioner, Pdf copy of unpriced bid covering Enquiry sl. No, Item Name, Unit of Measurement, Qty, offered Qty, for Mandatory spares items please indicate the offered model name of bought out items (BOI), set details for trim set, gaskets, seals, soft goods etc. 3. All documents are to be sign and sealed 4. Any query during enquiry stage shall be replied within three days failing which offer may be rejected as non-responsive. <u>After Purchase Order:</u> 1. Technical datasheets of valves along with valve drawing, hook-up diagram, Wiring Diagram, Cv curve are to be submitted for BHEL	

	approval within 15 days from the PO date. 2. If Cv tests have 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 review & 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 Total requirement will be considered as a package for evaluation and approval.	
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.	
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. <i>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).</i> 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. <i>Definitions of MSEs owned by SC/ST is under:</i> <i>In case of proprietorship firm, proprietor must be SC/ST.</i> <i>In case of partnership firm, the SC/ST partners must be holding at least 51% shares in the unit.</i> <i>In case of private limited companies, at least 51% share must be held by SC/ST promoters.</i> 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. <i>To avail the benefits of MSE under SC/ST category, the related documents as stated above should be submitted along with tender documents.</i>	
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 by end Customer (BIFPCL)	
19	Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GST registration number which should clearly have mentioned in the offer. If any specific exemption is available, a declaration with due supporting documents need to be furnished for considering the offer.	

20	Supplier shall mention their GSTN registration number in all their invoices and invoices shall be in the format as specified/prescribed under GST laws. Invoices shall necessarily contain Invoice number (in case of multiple numbering system is being followed for billing like SAP invoice no, commercial invoice no etc., then the Invoice No which is linked/uploaded in GSTN network shall be clearly indicated), item description as per PO, Quantity, Rate, Value, applicable taxes with nomenclature (like IGST, SGST, CGST & UTGST) separately, HSN/ SAC Code, etc.	
21	All invoices shall bear the HSN Code for each item separately (Harmonized System of Nomenclature)/ SAC code (Services Accounting Code).	
22	A declaration to the effect that all invoice particulars are/were uploaded in the GSTN network/ portal & all tax liability as per GST rules and regulations have been and will be discharged, shall be mentioned in the invoice. If not mentioned in the invoice, a separate declaration shall be submitted as per the requirement of BHEL	
23	All documents like Mill Test Certificate, LR copy, Guarantee/Warrantee certificate, work completion certificate, any other document mentioned in PO, shall be sent along with the vehicle/consignment. For all consignments received within the calendar month, input credit will be availed within that month in line with monthly returns filing cycle. In case of any discrepancy in the document or non-submission of documents mentioned in the PO, then BHEL will not be able to accept or account the material, in such case availing of tax credit will be deferred to next month or so	
24	In case of discrepancy in the data uploaded by supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note (details to be uploaded in GSTN portal) for the shortages or rejections in the suppliers, within the calendar month notified by BHEL.	
25	For any such delay in availing of tax credit for reasons attributable to supplier (as mentioned above), interest (calculated @ SBI Base Rate + 6%) along with penalty if any will be deducted for the delayed period i.e. from the month of receipt till the month tax credit is availed, from the running bills.	
26	Under GST regime, BHEL has to discharge GST liability on LD recovered from suppliers/contractors. Hence applicable GST shall also be recoverable from suppliers/contractors on LD amount. For this Debit note will be issued by BHEL indicating the respective supply invoice number	
27	Documents are to be submitted along with technical bid (Part-1) 01. Covering letter	

	02. Unpriced offer as per BHEL format 03. Filled technical specification 04. Filled BHEL Terms and condition sheet 05. Filled Pre-Qualification requirement (PQR) along with supporting documents 06. Catalogue's 07. MSME Documents (If applicable) 08. Vendor registration documents 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.	
28	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.	
29	Vendors / Firm / Subcontractor shall not be banned firm of EXIM Bank of India.	

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

Sl.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.



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	 16/9/15
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		
1	2	3	4	5	M	C/N	7	8	9	D*	M	C	N	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	V	@on Gr 91 materials only.	
		Surface quality*	B	Visual Examination	100%	100%	MSS SP 55	MSS SP 55	MTC	√	P	V	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	V	#RT as per ASME B16.34; UT for forgings of dia/ thick ≥50mm.	
		#Sub-Surface Soundness(MPI)	B	TC Verification	100%	100%	ASME Sec V/ ASTM E709	ASME B 16.34 Appendix II	MTC	√	P	V	V	#On accessible areas.	
1.2	Trim(Plug, Seat ring & Stem)	Chemical & Mechanical Properties, Hardness@	B	TC Verification	1/Heat	1/Heat	BHEL approved datasheet / ASTM Std	BHEL approved datasheet / ASTM Std	MTC	√	P	V	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	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	V		
1.4	Diaphragm/ Piston Cylinder, if applicable	Surface Quality, Strength & %Elg, Hardness, *, Endurance Life, Dimensions	B	Visual & Measurement	1/ Lot 100%	1/ Lot 100%	Manufacturer's Specification 10,000 Cycles	Manufacturer's Specification No damage	COC	√	P	V	V	*property change after heat aging.	
1.5	Springs, 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 10,000 Cycles	Manufacturer's Specification No damage	COC	√	P	V	V	*including stiffness ratio.	

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: 3 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	D*	M	C	N	11
1.6	Pressure Gauges, if applicable	Rating/Range, Performance	B	Visual, Calibration	100%	100%	Manufacturer's Specification	Manufacturer's Specification	IR/COC	√	P	V	V	
1.7	Accessories: Solenoid valve, limit switch, ALR, junction box, positioner & transmitters, etc.#	Make/rating/type; Degree of protection(as applicable)*	B	Verification	100%	100%	BHEL approved datasheet	BHEL approved datasheet	COC & Certificates *	√	P	V	V	#BHEL approved makes. *For electrical items, certificates by statutory bodies shall be furnished.
2.0	INPROCESS INSPECTION													
2.1	Welding Qualifications, if welding is involved	Procedure	B	Document Review	100%	100%	ASME Sec IX	ASME Sec IX	PQR & WPS	√	P	V	V	# ASME Sec IX for BHEL export boilers only
		Personnel #	B	Document Review	100%	100%	IBR/ ASME Sec IX#	IBR/ ASME Sec IX #	WPQ	√	P	V	V	
2.2	PWHT, if applicable	Time & Temp control	B	Review of HT Chart	100%	100%	WPS & IBR	WPS & IBR	HT Chart	√	P	V	V	
2.3	Hard faced Trims	Hardness	B	Measurement	On test samples only		BHEL approved datasheet / Mfg Std	BHEL approved datasheet / Mfg Std	Test Report	√	P	V	V	
2.4	Body, Bonnet, Plug, Seat Rings & Stems after machining	Surface quality, Dimensions including profile check	B	Visual & Measurement	100%	--	Manufacturer's Drawing	Manufacturer's Drawing	--	-	P	--	-	
2.5	Lapping*	M/c surface contact	B	Visual	1/Heat		---	Proper Physical contact	Test Report	-	P	-	-	*for rotating stem valves.
2.6	NDE on hard faced trims	Weld Soundness	B	LPI	100%	100%	ASME E165	ASME Sec VIII Div 1 Appd 8.4	Test Report	√	P	V	V	
2.7	NDE on butt weld joints	Weld Soundness	B	RT/UT	100%	100%	ASME Sec V	ASME Sec I	Test Report	√	P	V	V	*Film Review
2.8	NDE on butt weld ends	Soundness of edges after m/c	B	LPI	100%	100%	ASME Sec V	ASME Sec VIII Div 1 Appd 8.4	Test Report	√	P	V	V	
2.9	Body & Bonnet	Leak tightness & pressure resistance	A	Hydro Test	100%	-	ASME 16.34/ ISA 75.19	No Leak	Register/ Log	--	P	-	-	
2.10	Hardness on Gr 91 welds	Hardness	B	Measurement	100%	10%	Manufacturer's standard	186-300 BHN	Test Report	√	P	W	V	

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										M	C	N		
1	2	3	4	5	M	C/N	7	8	9	D*	**	10	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 (Cl 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, Sl 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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				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	D*	M	C	N	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	√	P	V	V	
4.2	Identification #	Marking /Name Plate & Tagging	B	Visual	100%	100%	BHEL Spec & PO	BHEL Spec & PO	Test Report	--	P	V	V	#with IBR stamp
4.3	Packing*	Cleanliness, Water-proof packing & Stability	B	Verification	100%	100%	Manufacturer's practice	Manufacturer's practice	Packing List	√	P	V	V	*with site storage & handling instructions.
4.4	Spare Parts	Parts, Type, Qty, Dimensions, etc.	B	Visual & Measurement	100%	100%	BHEL approved datasheet & PO	BHEL approved datasheet & PO	IR/COC	√	P	V	V	

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;
**** 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

BANK GUARANTEE FOR PERFORMANCE SECURITY

(Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s))

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

IFSC AND MICR CODE

Dear Sirs,

1. In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at _____¹ through its Unit at.....(name of the Unit) having awarded to (Name of the Vendor / Contractor / Supplier) (VENDOR CODE) with its registered office at _____² hereinafter referred to as the ' Vendor / Contractor / Supplier ', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No.....dated³ valued at Rs.....⁴ (Rupees -----)/FC.....(in words.....) for⁵ (hereinafter called the 'Contract') and the Vendor / Contractor / Supplier having agreed to provide a Contract Performance Bank Guarantee, equivalent to% (.... Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

2. we,, (hereinafter referred to as the Bank), having registered/Head office at and inter alia a branch at being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer any sum or sums upto a maximum amount of Rs -----⁶ (Rupees -----) without any demur, immediately on first demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand.

3. 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. _____.

4. We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Vendor / Contractor / Supplier in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

5. The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the Vendor / Contractor / Supplier shall have no claim against us for making such payment.

6. We thebank 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 Contract/satisfactory completion of the performance guarantee period as per the terms of the Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

7. We.....BANK further agree with the Employer that the Employer 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 Contract or to extend time of performance by the said Vendor / Contractor / Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Vendor / Contractor / Supplier and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Vendor / Contractor / Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Vendor / Contractor / Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

8. The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Vendor / Contractor / Supplier and notwithstanding any security or other guarantee that the Employer may have in relation to the Vendor / Contractor / Supplier's liabilities.

9. This Guarantee shall remain in force upto and including.....⁷ and shall be extended from time to time for such period as may be desired by Employer.

10. This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Vendor / Contractor / Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

11. Unless a demand or claim under this guarantee is made on us in writing on or before the⁸we shall be discharged from all liabilities under this guarantee thereafter.

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

13. We..... BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....⁶

- b) This Guarantee shall be valid up to⁷
- c) Unless the Bank is served a written claim or demand on or before (minimum 3 to 6 months from the expiry date ⁸ all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

14. We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

Dated.....

Place of Issue.....

BANK EMAIL ID:

BANK PHONE NO:

AUTHORISED SIGNATORIES CELL PHONE NO:

BANK FAX NO:

¹ NAME AND ADDRESS OF EMPLOYER I.e Bharat Heavy Electricals Limited

² NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.

³ DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE

⁴ CONTRACT VALUE

⁵ PROJECT/SUPPLY DETAILS

⁶ BG AMOUNT IN FIGURES AND WORDS

⁷ VALIDITY DATE

⁸ DATE OF EXPIRY OF CLAIM PERIOD

List of Consortium Banks *

Nationalised Banks		Nationalised Banks	
1	Allahabad bank	19	Vijaya Bank
2	Andhra bank		Public Sector Banks
3	Bank of Baroda	20	IDBI
4	Canara Bank		Foreign banks
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	J P Morgan
10	Punjab National Bank		
11	Punjab & Sindh Bank		Private banks
12	State Bank of India	26	Axis Bank
13	State Bank of Hyderabad	27	The Federal Bank Limited
14	Syndicate Bank	28	HDFC
15	State Bank of Travancore	29	Kotak Mahindra Bank
16	UCO Bank	30	ICICI
17	Union Bank of India	31	Indusind Bank
18	United Bank of India	32	Yes Bank

* wef 22.03.2016

SUPPLY OF STARTUP SYSTEM CONTROL VALVES TO MAITREE 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	SEPERATOR LEVEL CONTROL VALVE ASSEMBLY.	2 SET							
20	MINIMUM ECONOMISER FLOW CONTROL VALVE ASSY	1 SET							
30	COMMON ELECTRO HYDRAULIC CONTROL UNIT.	1 SET							
40	SPECIAL TOOLS	1 SET							
50	TUBINGS AND FITTINGS	1 SET							
60	FILLS OF HYDRAULIC FLUID	2 SET							
70	COMM SPARES FOR EACH VALVE	2 SET							
80	SEPERATOR LEVEL CONTROL VALVE ASSEMBLY.	2 SET							
90	MINIMUM ECONOMISER FLOW CONTROL VALVE ASSY	1 SET							
100	COMMON ELECTRO HYDRAULIC CONTROL UNIT.	1 SET							
110	SPECIAL TOOLS	1 SET							
120	TUBINGS AND FITTINGS	1 SET							
130	FILLS OF HYDRAULIC FLUID	2 SET							
	Cv Test Charges								
	TOTAL PRICE - FOB / Nearest Sea Port								
	TOTAL SEA FREIGHT CHARGES								
	TOTAL PRICE - CFR / BANGLADESH PORT								

[illegible]

Note :

1. Vendor shall quote freight 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.

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		SECTION: Boiler Mountings/PE (FB)	
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ENGINEERING SPECIFICATION

FOR

STARTUP CONTROL VALVES

SPECIFICATION NO: BM/SCV: 001

Prepared by:	Reviewed by:	Approved by:
A.JAIGANESH Sr.Engineer PE / FB (BM)	I.GOPALAN Manager PE / FB (BM)	K.PERIASAMY Dy.General Manager PE / FB (BM)

Revision Log					Template Form Revision No.: 00			
Revision No.	Date	Reason	Prepared		Reviewed		Approved	
			Name	Sign	Name	Sign	Name	Sign.
01	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.JaiGanesh		K.Sridharan	

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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:

- Bureau of Indian Standards (BIS)
- Indian Electricity Act
- Indian Electricity Rules
- Indian Explosives Act
- Indian Factories Act and State Factories Act
- Indian Boiler Regulations (IBR)
- Rules for Electrical installation by Tariff Advisory Committee (TAC).
- 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:

- American Petroleum Institute (API)
- International Organization for Standardization (ISO)
- Tubular Exchanger Manufacturer's Association (TEMA)
- American Welding Society (AWS)
- Expansion Joint Manufacturers Association (EJMA)
- Heat Exchange Institute (HEI)
- 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 Threo (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:

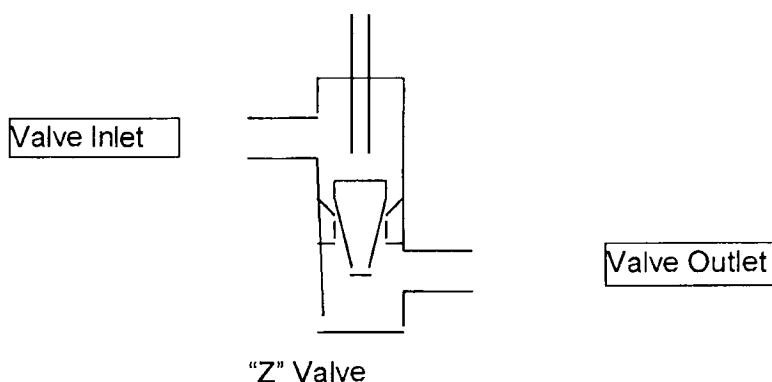
The Minimum Economizer Flow control valve (MEFCV) is used to control the economizer inlet flow during start-up and low load operation. Demand for this valve is established based on measured economizer inlet flow compared to a minimum boiler flow requirement.

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.

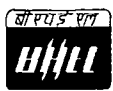
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- 9.11 Bidder shall furnish in his proposal detailed calculations to establish whether flashing or cavitation will occur or not under any operating condition for a particular application. These calculations shall be subject to Owner's review and approval 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.

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.

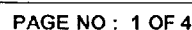
11.0 EXCEPTIONS TO THE SPECIFICATION

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

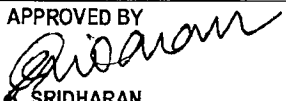


*- 2 Phase flow at valve outlet

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ACTUATOR SIZING PRESSURE : 307.6.kg/cm² (g)
 BODY DESIGN: PRESSURE / TEMPERATURE : 321.3 kg/cm² (g) / 374°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 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  PINISETTY RAVIRAJA	CHECKED BY  A.JAIGANESH	APPROVED BY  K. SRIDHARAN K. SRIDHARAN Dy. General Manager Boiler Mountings / PE (FB) BHEL, TRICHY - 620 014.	VENDOR SEAL SIGN.: NAME: DATE:

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Customer No: 1725 & 1726	Tag Nos.: 01HAG31AA301	Qty.: 1 No. / 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	2x660 MW Maitree STPP MEFCV OUTDOOR MODULATING D323.9 x 45 / D323.9 x 45 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) 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-CAVITATION TRIM	"Z" BUTT WELDED; STYLE-P, d1 = 245.15mm SA105 GRAFOIL FLOW TO CLOSE < 8 m/s 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 VALVE POSN. ON SIGNAL (4-20mA) FAILURE VALVE POSN. ON SUPPLY FAILURE	YES <12 Secs / <12 Secs STAY PUT STAY PUT	
PERFORMANCE OF VALVE	LINEARITY HYSTERESIS SENSITIVITY ACCURACY (OVERALL)	± 2% ± 1% ± 0.5% ± 2%	

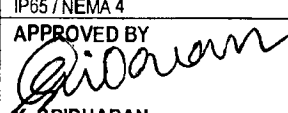
SERVICE CONDITIONS

Sl. No.	LOAD	FLOW kg/s	INLET PR. kg/cm ² (g)	OUTLET PR. kg/cm ² (g)	Pr. Drop kg/cm ²	INLET TEMP (°C)	Spec. gravity	Calc. Cv	Valve Lift %	Valve outlet velocity	Noise Level dBA
01.	Ambient	174.5	15.8	8.5	7.3	100					
02.	Warm Start -80 bar	174.5	91.7	87.7	4.0	295					
03.	Hot Start -140 bar	174.5	150.8	148.4	2.4	337					
04.	Hot Start -160 bar	174.5	170.4	168.7	1.7	347					

	SPECIFICATION FOR STARTUP CONTROL VALVES	SPECIFICATION NO.: BM/SCV:001/ANNX-I	
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ACTUATOR SIZING PRESSURE : 346.3 kg/cm² (g)
 BODY DESIGN: PRESSURE / TEMPERATURE : 346.3 kg/cm² (g) / 347°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 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		
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  PINISETTY RAVIRAJA	CHECKED BY  AJAIGANESH	APPROVED BY  K. SRIDHARAN Dy. General Manager	VENDOR SEAL SIGN.: NAME: DATE:

Boiler Mountings / PE (FB)
 BHEL, TRICHY - 620 014.

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

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