



An ISO 9001
Company

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

ANNEXURE-A –General Terms and Conditions (INDIGENOUS VENDOR)

ACCEPTANCE OF TECHNO - COMMERCIAL TERMS AND CONDITIONS BY THE BIDDERS
(To be Filled and submitted along with techno commercial offer for evaluation and to consider for Bid opening)

Description of the Equipment:		Startup Drain Control Valves along with commissioning Mandatory spares
Project		Neyveli (0683-0684)
BHEL Tender No. & Date		1801600114/14 dated 01.02.2016
Sl. No.	Terms and conditions	Vendor's confirmation
1	Technical: Supply shall be as per enclosed BHEL's Respective Specification.	
2	Firm Price: The quoted / finalised rates shall be Firm till execution of the supplies. Offer with PVC clause will not be considered.	
3	The tender will be operated on two part bid basis and you are requested to submit techno commercial bid and price bid in separate sealed cover put together in a single cover.	
4	FOR Basis: The quote shall be on FOR project / BHEL-Trichy destination basis as indicated in enquiry, inclusive of Packing, forwarding, Freight & Transit Insurance also to yours account. Please quote Lumpsum charge for freight and insurance. If vendor passing transit insurance under BHEL scope. Offer will be loaded 0.065% of (Basic material value + ED + Forwarding & Packing + Freight charge). Main Supply along with Commissioning spares – Neyveli Project site / Tamilnadu Mandatory Spares – BHEL Trichy / Tamilnadu	
5 (a)	Payment terms: 100% direct payment after 45 days against site acknowledgement LR copy along with 10%PBG valid for the Guarantee / Warranty period.	
5 (b)	Loading Criteria : Payment Terms: Any deviation in the BHEL payment terms will attract loading as per below.	

	<p>“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”.</p> <p>Payment through bank is not acceptable. If still demanded by vendor, loading will be 3% on the offered material value.</p> <p>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.</p> <p>LC will not be operated for Indigenous vendors. Offers with payment terms as LC from indigenous vendors will be rejected.</p>	
6 (a)	<p>Liquidated damages:</p> <p>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 ½% of the value of goods for each week of delay subject to a maximum of 10% of the Purchase Order value on part there off.</p>	
6 (b)	<p>Loading Criteria</p> <p>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.</p>	
7 (a)	<p>Guarantee / Warranty Period: Guarantee clause 24 months from the date of supply or 18 months from the date of actual put in use / Commissioning, whichever is earlier.</p>	
7 (b)	<p>Loading Criteria:</p> <p>Guarantee / Warranty Period: No Deviation is permitted. If still vendor offered any deviation on the Guarantee / warranty period it may leads to rejection of offer.</p>	
8	<p>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.</p>	
9	<p>Taxes & Duties:</p> <p>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.</p>	

10	<p>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.</p>	
11	<p>Delivery Period: 24 Weeks from the Data sheet , QP approval by BHEL / Customer</p>	
12	<p>Validity: 120 days minimum from techno commercial bid opening (Part-1)</p>	
13	Vendor shall quote as per attached Price and Unprice Schedule format only.	
14	Package: Total requirement will be considered as package for evaluation and ordering of project wise basis.	
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.(for each boiler)	
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	Vendors who are quoting other than the approved manufacturing locations will be treated as unsolicited offer and will not be considered for evaluation and lead to offer rejection.	
18	Neyveli 2 x 500 MW comes under Mega power project category. Excise Duty / customs Duty is exempted against the applicable documents for Main supply only.	
19	<p>MSME Clause : In case MSE vendor participating in the tender quotes within the price band of L1+15%, they will be allowed to supply the complete package requirement subject to acceptance of L1 price by MSE vendor.</p> <p>In case of more than one such MSE, the counter offering will be to the lowest quoted MSE vendor subject to fulfilment of Point No.1</p> <p>MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM II certificate having deemed validity (Two years from the date of issue of acknowledgement in EM II) or 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 limit 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</p>	

	<p>the last date of technical bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders and MSE status of such suppliers shall be shifted to Non MSE supplier till the supplier submits these documents</p>	
20	<p>Documents are to be submitted along with technical bid (Part-1)</p> <ol style="list-style-type: none"> 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 <p>Documents are to be submitted along with Price bid (Part-2)</p> <ol style="list-style-type: none"> 01. Priced offer as per BHEL format <p>Note: All the pages of documents are to be signed and stamped by authorized signatory of the company.</p>	
21	<p>Vendor who are not registered with BHEL –Trichy for supply of valves 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)</p> <p>Note :</p> <p>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.</p>	



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Company

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

ANNEXURE-A General Terms and Conditions (IMPORT VENDOR)

ACCEPTANCE OF TECHNO - COMMERCIAL TERMS AND CONDITIONS BY THE BIDDERS
(To be Filled and submitted along with techno commercial offer for evaluation and to consider for Bid opening)

Description of the Equipment:		Startup Drain Control Valves along with commissioning Mandatory spares
Project		Neyveli (0683-0684)
BHEL Tender No. & Date		1801600114/14 dated 01.02.2016
Sl. No.	Terms and conditions	Vendor's confirmation
1	Technical: Supply shall be as per enclosed BHEL's Respective Specification.	
2	Firm Price: The quoted / finalised rates shall be Firm till execution of the supplies. Offer with PVC clause will not be considered.	
3	The tender will be operated on two part bid basis and you are requested to submit techno commercial bid and price bid in separate sealed cover put together in a single cover.	
4	Delivery term: Offer shall be submitted on CFR Chennai Port / INDIA basis. It is requested to indicate the Freight amount separately as per Price / Unpriced format attached.	
5 (a)	Payment terms: BHEL Payment term is 100% payment on CAD basis after 45 days from the date of receipt of documents at BHEL bank along with 10% PBG valid for the Guarantee / Warranty Period. Respective bank charges to respective account. Along with	
5 (b)	Loading Criteria : Payment Terms: Any deviation in the BHEL payment terms will attract loading as per below. Any deviation in the above payment term 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. i) In the case of Usance LCs the loading will be considered @ 1.5% on the offered Value. ii) For LC at sight the loading will be considered @ 3.5% on the offered Value.	

	<p>iii) Normally CAD at sight and Confirmed LCs are liable for rejection</p> <p>BHEL will evaluate the offers and consider the ranking after the loading is applied as referred above wherever deviations are observed.</p>	
6 (a)	<p>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 ½% of the value of goods for each week of delay subject to a maximum of 10% of the total ordered Purchase Order value on part there off.</p>	
6 (b)	<p>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.</p>	
7 (a)	<p>Guarantee / Warranty Period: Guarantee clause 24 months from the date of supply or 18 months from the date of actual put in use / Commissioning, whichever is earlier.</p>	
7 (b)	<p>Loading Criteria: Guarantee / Warranty Period: No Deviation is permitted. If still vendor offered any deviation on the Guarantee / warranty period leads to rejection of offer.</p>	
8	<p>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.</p>	
9	<p>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.</p>	
10	<p>Delivery Period: 20 Weeks from the Data sheet approval by BHEL / Customer</p>	
11	<p>Validity: 120 days minimum from techno commercial bid opening (Part-1)</p>	
12	<p>Vendor shall quote as per attached Price and Unprice Schedule format only.</p>	

13	Package: Total requirement will be considered as package for evaluation and ordering of project wise basis.	
14	O & M manuals: BHEL require 1 sets of printed O & M manuals with 3 soft copies in CD-ROM at no cost to be sent to BHEL/ Trichy and 3 sets of printed O &M manuals to be sent along with valves directly to site.(for each boiler)	
15	Repair & replacements: The Purchaser at his option will be entitled to terminate the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or despatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitute therefor. The supplier shall be liable for any loss which the purchaser may sustain by reason of such risk purchases in addition to penalty as per LD clause.	
16	Please inform the Net , Gross weight , Size (L x B x H) of the consignment	
17	Inspection and testing requirements: Inspection and testing requirements are to be carried out as per the specification and BHEL /Customer approved QAP and all test certificates are to be submitted in complete set as indicated in our specification / QAP.	
18	For Evaluation, exchange rate (TT selling rate of SBI) as on scheduled date of tender opening (part –I bid in case of two part bid) shall be considered.	
19	Test certificate shall be submitted prior to despatch for our review and approval. Shipment shall be made only after obtaining despatch clearance from BHEL	
20	In case of order, Documents (Drawings, Data sheet & Quality plan in triplicate) shall be submitted within two weeks from the receipt of order	
21	Vendors who are quoting other than the approved manufacturing locations will be treated as unsolicited offer and will not be considered for evaluation and lead to offer rejection.	
22	Neyveli 2 x 500 MW comes under Mega power project category. Excise Duty / Customs Duty is exempted against the applicable documents for Main supply.	
19	MSME Clause : In case MSE vendor participating in the tender quotes within the price band of L1+15%, they will be allowed to supply the complete package requirement subject to acceptance of L1 price by MSE vendor. In case of more than one such MSE, the counter offering will be to the lowest quoted MSE vendor subject to fulfilment of Point No.1 MSE suppliers can avail the intended benefits only if they submit	

	<p>along with the offer, attested copies of either EM II certificate having deemed validity (Two years from the date of issue of acknowledgement in EM II) or 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 limit 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. Non submission of such documents will lead to consideration of their bids at par with other bidders and MSE status of such suppliers shall be shifted to Non MSE supplier till the supplier submits these documents</p>	
<p>20</p>	<p>Documents are to be submitted along with technical bid (Part-1)</p> <ol style="list-style-type: none"> 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 <p>Documents are to be submitted along with Price bid (Part-2)</p> <ol style="list-style-type: none"> 01. Priced offer as per BHEL format <p>Note: All the pages of documents are to be signed and stamped by authorized signatory of the company.</p>	
<p>21</p>	<p>Vendor who are not registered with BHEL –Trichy for supply of valves 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)</p> <p>Note :</p> <p>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</p>	

	<p>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.</p>	
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BHEL TRICHY

MM/BOI

Annexure – B ---Pre-Qualification requirements (PQR)

SI.NO	Description	Vendor Confirmation
1	The Bidder shall offer and supply equipment of the type and rating which they have supplied , commissioned in at least one plant of sub / super critical steam generating units with an operating pressure more than 177 kg / Sq.cm in similar applications and are in successful operation for a period of not less than 2 years as on the date of techno commercial bid opening (Part-1)	
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	Bidder shall furnish one performance / End user certificate for the supply of similar valves commissioned in Power Plants with an operating pressure more than 177kg/ sq.cm in English language	
4	In addition to technical and commercial conditions, you 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.	
5	The offers will be considered for Price Bid opening/Ordering subject to evaluation & approval as per above point 4.0 and also subject to approval by Customer / BHEL.	
6	Risk Purchase clause: “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”.	
7	Guarantee clause: 24 months from the date of supply or 18 months from the date of commissioning, whichever is earlier.	
8	BHEL may negotiate the L1 rate, if not meeting our budget/estimated cost.	
9	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 qualifying criteria.



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Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli-620 014, Tamil Nadu, India

Dept : PURCHASE-MATERIALS MANAGEMENT/BOI

ANNEXURE-C

Clause: Special provisions for Micro & Small Enterprises (MSE)

1. In case MSE vendor participating in the tender quotes within the price band of L1+15%, they will be allowed to supply the complete package requirement subject to acceptance of L1 price by MSE vendor.
2. In case of more than one such MSE, the counter offering will be to the lowest quoted MSE vendor subject to fulfilment of Point No.1
3. MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM II certificate having deemed validity (Two years from the date of issue of acknowledgement in EM II) or 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 limit 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. Non submission of such documents will lead to consideration of their bids at par with other bidders and MSE status of such suppliers shall be shifted to Non MSE supplier till the supplier submits these documents.

Certificate by Chartered Accountant on letter head

This is to Certify that M/S
(hereinafter referred to as 'company') having its registered office at
..... is registered under MSMED Act 2006, (Entrepreneur
Memorandum No (Part-II) dtd:.....,
Category: (Micro/Small)). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as on
date..... as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No.S.O.1722(E) dated October 5, 2006 :
Rs.....Lacs
2. **For Service Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the MSMED Act, 2006:
Rs.....Lacs

The above investment of Rs.....Lacs is within permissible limit of
Rs.....Lacs forMicro / Small (Strike off which is not applicable)
Category under MSMED Act 2006.

Date:

(Signature)

Name -

Membership number -

Seal of Chartered Accountant



(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 here by 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

PACKAGE --- SUPPLY OF STARTUP DRAIN CONTROL VALVES TO NEYVELI PROJECT (2 X 500 MW)									
PRICE / UNPRICE FROMAT FOR IMPORT VENDORS									
Enquiry Sl. No	Items Details / Description	Qty	Net Weight	Gross weight	size	Unit Rate	Total Material Cost	Sea Freight Charge	Total Value (CFR-Chennai)
			Kgs	Kgs	L x B x H	Currency -Type	Currency -Type	Currency -Type	Currency -Type
10									
20									
30									
40									
50									
60									
70									
80									
90									
100									
110									
120									
130									
140									
150									
160									
170									
180									
190									
200									
210									
**	TYPE TEST CHARGE FOR CONTROL VALVE	1	-	-	-			NOT APPLICABLE	
Note : Vendor shall quote See freight amount. Don't indicate freight are inclusive/ Zero Value.									
								TOTLA PRICE - FOB / Nearest Sea Port	
								TOTAL SEA FREIGHT CHAGES	
								TOTAL PRICE - CFR / CHENNAI PORT	

PACKAGE --- SUPPLY OF STARTUP DRAIN CONTROL VALVES TO NEYVELI PROJECT (2 X 500 MW)

PRICE / UNPRICE BID FOR INDIGENOUS VENDOR

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					Exempted			
20					Exempted			
30					Exempted			
40					Exempted			
50					Exempted			
60					Exempted			
70					Exempted			
80					12.50%			
90					12.50%			
100					12.50%			
110					12.50%			
120					12.50%			
130					12.50%			
140					12.50%			
150					12.50%			
160					12.50%			
170					12.50%			
180					12.50%			
190					12.50%			
200					12.50%			
210					12.50%			
220					12.50%			
**	TYPE TEST CHARGE FOR CONTROL VALVE		-	-	NA			

Note : Vendor shall quote freight and insurance amount. Don't indicate freight & Insurance are inclusive/ Zero Value.



**SPECIFICATION FOR STARTUP
CONTROL VALVES**

SPECIFICATION NO.: SCV_MAIN SPEC	
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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 Startup drain control valve upstream flash tank and one pair of startup drain gate valve upstream the above said Startup drain control valve with Common Hydraulic Unit and Electronic Control Unit for the positioning the above valves.

2.0 SCOPE OF WORK

- 2.1 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.
- 2.2 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.
- 2.3 All flanged connections shall be supplied in accordance with the requirements of ASME B16.5.
- 2.4 All materials shall be new and in accordance with applicable ASTM specifications or with other recognized standards such as SAE. No peening, caulking or filling shall be permitted in repairing cracks, pin-holes or blow-holes. Defects in fabricated steel shall be repaired by chipping out welds to bottom of vee and rewelding.
- 2.5 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.
- 2.6 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



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in proposed equipment or materials during design shall be approved by BHEL.

- 2.7 All quotations and attachments submitted to BHEL shall be in the English language.
- 2.8 All quotations and inquiries to BHEL shall be routed through Purchasing.
- 2.9 Parts subject to wear, corrosion, deterioration or requiring adjustment, inspection or repair shall be accessible and capable of reasonably convenient removal, replacement and repair.
- 2.10 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.
- 2.11 Optional equipment shall be priced separately.
- 2.12 Offers from Traders / Stockist shall not be considered. Offers only from valve manufacturer shall be considered.
- 2.13 The Supplier shall be governed by the following regulations, codes, and standards, including their latest respective addenda, amendments, and errata.

AFBMA	Antifriction Bearing Manufacturers' Association
AGMA	American Gear Manufacturers' Association
AHI	American Hydraulic Institute
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society Mechanical Engineers
ASTM	American Society Testing and Materials
AWS	American Welding Society
EIA	Electronics Industries Association
FCI	Fluid Controls Institute, Inc.
IEC	International Electro technical Commission
IEEE	Institute of Electrical and Electronics Engineers
IPCEA	International Power Cable Engineers Association



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ISA	Instrumentation Society of America
MSS	Manufacturers Standardization Society of the Valve & Fittings Industry
NEMA	National Electrical Manufacturers' Association
NEC	National Electrical Code
NFPA	National Fire Protection Association
OSHA	Occupational Safety Health Act
PFI	Pipe Fitting Institute
SAMA	Scientific Apparatus Makers Association
SSPC	Steel Structures Painting Council
UL	Underwriter's Laboratories

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

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

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

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

Other International/ National standards such as DIN, VDI, BS, GOST etc. shall also be accepted for only material codes and manufacturing standards, subject to the Employer's approval, for which the Supplier shall furnish, adequate information to justify that these standards are equivalent or superior to the standards mentioned above. In all such cases the Supplier shall furnish specifically the variations and deviations from the standards mentioned

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elsewhere in the specification together with the complete word for word translation of the standard that is normally not published in English.

3.0 APPLICABLE CODES & STANDARDS

- 3.1 The valves shall comply with the applicable requirements of the latest edition of ASME B31.1, Power Piping Code.
- 3.2 Valve design in accordance with ASME B16.34.
- 3.3 The valve sizing shall be in compliance with latest edition of ISA S75.01 Hand book on Control Valves considering measures to avoid choked flow.
- 3.4 All pressure retaining parts of the valve shall be made of materials, including specific limitations on various materials, that are in full compliance with PG.-5 of ASME Code Section 1.
- 3.5 Materials
 - 3.5.1 Only materials listed and rated in B16.34 are acceptable and materials offered shall be appropriate to the design conditions listed.
- 3.6 For valves of other than US standards, the Supplier shall specify (at the time of quotation) the Codes and Standards which will be used through the manufacturing and design processes. The Codes and Standards as specified will be subject to approval by **BHEL**.
- 3.7 Reference to the above Codes and Standards shall mean the latest revision, edition and addenda effective at the date of order unless specifically stated otherwise in this specification.
- 3.8 All welders and all welding procedures welders utilized shall be qualified in accordance with ASME Section IX. When welders and welding procedures are qualified in accordance with codes other than those specified, the Supplier must take exception at the time of quotation.
- 3.9 All materials shall be readily identifiable. Mill test reports shall be obtained for all pressure boundary parts. These test reports shall be available for review at the Vendor's shops. Copies of these are to be supplied to the Company, if requested, prior to ordering.
- 3.10 Valve Revisions



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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) START UP DRAIN CONTROL VALVES complete with hydraulic actuator and associated positioning controls as per this specification.

4.2 Two (2) START UP DRAIN GATE VALVES 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 (2) startup drain control valve and two (2) start up drain gate valve as per this specification.

4.4 The following equipment shall be offered.

One (1) stainless steel tubing and fittings to connect all necessary hydraulic lines between the common Hydraulic Unit and the four valves (Two control valves and two Gate valves) Each Valve location from the common hydraulic unit is furnished below.

- a) Start Up drain Control valve 1 to Hydraulic Unit - 8 m
- b) Start Up drain Control valve 2 to Hydraulic Unit - 12 m
- c) Start Up drain Gate valve 1 to Hydraulic Unit - 8 m
- d) Start Up drain Gate valve 2 to Hydraulic Unit - 20 m

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

One (1) lot of special tools required for maintenance of system components. Supplier shall furnish all special tools



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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.

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 DRAWINGS AND DATA BY SUPPLIER

6.1 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.

6.1.1 The following units are to be used:

- Temperature °C
- Pressure Kg / cm² (g) or Bar (g)
- Dimensions mm
- Flow kg/sec

6.2 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
- The valve weight should also be stated on the GA drawing. Also the orientation of the actuator and its support details according to arrangement to be shown on drawing.

6.3 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 (if required) 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.

6.4 Submitted During Contract

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



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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.

- ✓ 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).

7.0 PERFORMANCE DATA & TECHNICAL REQUIREMENTS

8.1 Component Design Criteria

8.1.1 Function

8.1.1.1 Start Up Drain control valves (Two Valves):

8.1.1.1.1 Start Up Drain control valves are used to control the water level in the levelling vessel during "wet" mode operation of a supercritical boiler. 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 Start Up Drain Gate valves (Two Valves):

8.1.1.2.1 Start Up Drain Gate valves are used to isolate the Start Up Drain control valves.

8.2 Qualification and proveness criteria requirement.

8.2.1 The bidder shall offer and supply equipment of the type and rating which they have supplied, commissioned in at least one plant of sub / super critical steam generating units with an



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operating pressure more than 177 kg/cm² in similar applications and are in successful operation for a period of not less than 2 years as on the date of techno-commercial bid opening.

8.2.2 The bidder can offer and supply such equipment for this project with collaboration or valid licensing agreement for design, engineering, manufacture, supply of such equipment in India provided the collaborator meets the above proveness criteria.

8.2.3 Bidder shall furnish Performance / End-user certificate for the supply of similar valves commissioned in power plants with an operating pressure more than 177 kg/cm² in English language.

9.0 DESIGN AND CONSTRUCTION FOR CONTROL VALVE .

- 9.1 In general, all valves and associated accessories shall meet the applicable requirements of accepted standards and attached customer specifications.
- 9.2 Design of the valves shall meet the latest edition of ASME B16.34.
- 9.3 The valve sizing shall be in compliance with latest edition of ISA S75.01 Hand book on Control Valves considering measures to avoid choked flow.
- 9.4 **The valve sizing shall be suitable for obtaining maximum flow conditions with valve opening at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 15% of total valve stem travel.** All the Control Valves shall be capable of handling at least 120% of the required maximum flow. Further the valve stem travel range from minimum flow condition to maximum flow condition shall not be less than 50% of the total valve stem travel.
- 9.5 The control valve size should not be smaller than connecting line size by more than 1 step.
- 9.6 Valve shall be angle type configuration.



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- 9.7 Valve shall be forged design.
- 9.8 Valve internals (seat, plug, cages, etc.) shall be replaceable without removing the valve hydraulic actuator from the valve body.
- 9.9 Plug shall be one-piece construction either cast, forged, or machined from solid bar stock. Plugs shall be screwed and pinned to valve stems or shall be integral with the valve stems.
- 9.10 All control valves shall have stems, guide bushings, plugs, seat rings, stem lock pins, stuffing box parts and other trim parts made of stainless steel alloys and suitably hardened. Valve guide posts and bushings shall be stellite faced. Stellite faced guide posts and bushings shall be differential hardened for applications involving high pressure drop as well as for flashing and cavitation applications. **Trim material shall be 17-4 PH SS / 440C depending upon the service conditions to ensure required degree of hard facing so as to avoid erosion. However, Bidder may offer valves with body and trim materials better than specified and in such cases, Bidder shall furnish the comparison of properties including cavitation resistance, hardness, tensile strength, strain energy, corrosion resistance and erosion resistance etc. of the offered material vis-a-vis the specified material for Owner's consideration and approval.**
- 9.11 The valve model proposed should be designed to prevent cavitation, wire drawing and flashing on the downstream side of the valve and piping for operation throughout the full range under the specified conditions. For cavitation service, the trim design shall be of multistage pressure drop type to prevent cavitation occurring downstream of trim / valve.
- 9.12 **Bidder shall furnish in his proposal detailed calculations to establish whether cavitation will occur or not under any operating condition for a particular application. These calculations shall be subject to Owner's review and approval and in case it is established at any stage of the contract that cavitation will occur, the Bidder shall provide anti-cavitation trim for the same at no extra price. Further the Bidder shall furnish in his proposal the detailed write up, technical literature, etc. clearly indicating as to how the occurrence of cavitation shall be prevented by the design of his offered anti-cavitation trim.**
- 9.13 Bidder to furnish calculation to check whether flashing or cavitation will occur for control valve services. Control Valves shall be provided with specially designed trims (such as cage guiding valves with holes in the



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cage to control the location of the Vena Contracts) which are suitable for withstanding high pressure drops and which minimize the adverse effects of flashing on Control Valve parts.

- 9.14 Valve sizing shall be in accordance with the latest edition of ISA Handbook on Control Valves with due consideration for the measures to avoid 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.
- 9.15 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 67.
- 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.
- 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.



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- 9.24 Valve's gland packing material shall be grafoil 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 for startup drain control valves is to be Class-V or better as per FCI 70.2.
- 9.28 Gate valve - Shut off valve specification is attached as (ANNEXURE -1)
- 9.29 Hydraulic Valve Actuators
- 9.29.1 The Startup drain control valve and gate valve 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.
- 9.29.2 The Hydraulic actuator shall be sized to operate against the process maximum differential pressure.
- 9.29.3 A mechanical position indicator shall be provided on the actuator.
- 9.29.4 The actuator shall be equipped with a hydraulic positioning valve to convert a 4 –20 mA DC signal from the DCS to a hydraulic signal.
- 9.29.5 The actuator shall be furnished with a 4 –20 mA DC valve position feedback signal.
- 9.29.6 The actuators for Start up drain control valve and gate valve shall be equipped with a safety quick closing system. The safety control system shall be activated by a signal (dry contact) from the DCS supplied by others. The safety control system shall be independent of other control device. The safety control system shall be capable of closing the valve with normal control system devices unavailable.



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9.30 (A) Hydraulic Unit and Electronic Control Unit

- 9.30.1 All valves shall be supplied with a Hydraulic Unit and Electronic Control Unit. The hydraulic power unit serves to supply the necessary pressurized hydraulic fluid to the Hydraulic actuators. A common hydraulic power unit may be used for multiple Hydraulic Valve Actuators. The hydraulic power unit shall be equipped with an accumulator to maintain adequate pressure during peak operating requirements. The hydraulic pumps shall be designed for the required pressure and mean oil consumption.
- 9.30.2 The hydraulic power unit shall be equipped with redundant motor-pump units with motor starters mounted in the Electronic Control Units. Each pump set shall be equipped with the necessary charging valve, check valves, filters, pressure reducing valves, pressure relief valves, and instrumentation required for operation of the hydraulic power unit.
- 9.30.3 The hydraulic power unit shall be equipped with an oil tank sized for the entire volume of oil. A tank air breather filter shall be furnished.
- 9.30.4 The hydraulic power unit shall be equipped with an accumulator sized to deliver the oil flow at required pressure for all conditions. The accumulator shall be equipped with a pressure gauge.
- 9.30.5 All necessary tubing run between various equipment supplied by the vendor, shall be in vendor's scope.
- 9.30.6 The Electronic Control Unit cabinet shall be a free standing IP 65 rated with front and rear access doors to be installed outdoors. The control cabinet shall contain processors or controllers and I/O necessary for valve positioning, hydraulic unit control and interface between the Hydraulic Unit / Electronic Control Unit and customer supplied DCS.



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9.30.7 The hydraulic unit should be capable to do at least two emergency lifts (0% to 100% or vice versa) in case of power loss.

9.30.8 C&I specification for hydraulic control unit is as described below:

1. 415 V, 3 Ø, AC Power supply feeder will be provided for the hydraulic power pack. 240 V, AC UPS 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. Vendor to indicate the power ratings of the above mentioned two electrical feeders considering all the requirements/ drives.

2. HYDRAULIC POWER /ELECTRONIC CONTROL UNIT:

Hydraulic power unit with Electronic controls is common to all the valves with the following signal exchange as minimum. In addition to the following signal exchanges, if additional signals are envisaged as per vendor's design to meet the system requirement, then the same have to be terminated inside the electronic control unit

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

3. CONTROL UNIT FOR VALVES :

All the valves shall be provided with independent control unit (housed nearby valve), with the following signal exchange as minimum. In addition to the following signal exchanges, if additional signals are envisaged as per vendor's design to meet the system requirement, then the same have to be terminated inside the control unit.

REGULATING DUTY (Tag nos: 01HAG15AA451, 01HAG15AA452)

Position Demand (from DCS)	4-20 mA DC
Valve Position feedback (to DCS)	4-20 mA DC
Positioner Failure (to DCS)	Dry Contact
Quick Close (from DCS)	Dry Contact
Valve Opened (to DCS)	Dry Contact
Valve Closed (to DCS)	Dry Contact



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ON/OFF DUTY (Tag nos: 01HAG15AA151, 01HAG15AA152)
Valve Open Command (from DCS) Dry Contact
Valve Close Command (from DCS) Dry Contact
Quick Close (from DCS) Dry Contact
Valve Opened (to DCS) Dry Contact
Valve Closed (to DCS) Dry Contact

4. Vendor to offer the latest version of control system/positioners with additional features.
5. The offered Hydraulic Power Unit and the Control system/panels shall be suitable for outdoor applications.
6. All Cables (Power cables/Control Cables/Instrumentation cables) run between various equipment supplied vendor, shall be in vendor's scope. Also vendor to supply Double compression, flame proof/weather proof, Brass with Nickel plated cable glands for the termination of cables.
7. **Test Certificates and Calibration Certifications shall be provided for all Instruments and Motors as applicable.**
8. **Operation and Maintenance Manual describing the operation of the entire system shall be supplied (both hard copies and soft copies).**
9. **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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9.30 (B) 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
- 9.30.4 The bidder has to submit calculated noise levels (dBA) for the operating conditions specified with valve untagged.

9.31 Test and Examinations

- 9.31.1 All valves shall be tested in accordance with the quality assurance program agreed between the Owner and the Contractor, which shall meet the requirements of IBR and other applicable codes. Bidder shall have minimum manufacturing and testing facilities to meet the BHEL requirement. In case of outsourcing, the same shall be indicated in the offer.
Bidder shall submit Manufacturing Quality Plan detailing Inspection and Test plan of raw material, in process and final inspection along with the offer. The tests shall include but not limited to the following
- 1) Non-destructive examination shall be performed as per ASME-B-16.34 (Steel Valves).
 - 2) 100% radio graphic test on casings of all valves having rating of 600 lbs or above; magnetic particles / dye penetrant examination on all internal and external machined surfaces and 100% ultra sonic



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testing of forgings and bars (of size 40 mm and above) of all valves with rating of 600 lbs or above shall be performed as per ASME B16.34.

- 3) Material, mechanical and chemical test shall be performed in a manner as specified in the relevant codes.
- 4) The material test certificates (correlated to melt number) shall be furnished by the vendor for identification and correlation.
- 5) The butt-welding end of all valves, dye-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.

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**



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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. This is to be performed specifically for this project even though Cv test reports of earlier projects are available.

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. The use of grease or oil other than light grade mineral oil for corrosion protection is prohibited.
6. Paint specifications are to be submitted for purchaser's review with bid.



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other than light grade mineral oil for corrosion protection is prohibited.

6. Paint specifications are to be submitted for purchaser's review with bid.
7. All exposed machined surfaces shall be coated with suitable rust preventative coating prior to shipment.(two coats of primer of thickness 35 microns)
8. The seller shall adequately crate, block, anchor and protect equipment as required to prevent damage during overseas shipment and outdoor storage for a period of one (1) year at the site.
9. All threaded connections, bores shall be plugged or capped with standard pipe plugs or caps.
10. List of commissioning spares shall be quoted if applicable.
11. List of recommended spares for 5 years trouble free operation of valves shall be quoted.
12. Recommended list of special tools and equipment (required for assembling, complete dismantling and maintenance of all equipment supplied) to be provided and also to be supplied along with valve.
13. One spare filter element each to be supplied for the SS filter provided in the Hydraulic Control Unit.
14. Drain valve for the oil tank, vent air breather, and isolation lines in the oil supply lines are to be necessarily provided.
15. Mechanical oil level indicator has to be extended through full height of the tank. (0 % to 100 %)
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.

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17. Oil tank internals surface should not be painted.
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.
19. Vendor to supply welding type socket fittings in the entire hydraulic pipes joint.
20. Vendor to provide a provision to indicate the accumulator pressure in local as well as in remote.

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.

9.34 TRAINING, ERECTION & COMMISSIONING SUPPORT

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) extending full support to site people in the initial operation of the valves (7 days for each units). All the expenses like to & fro charges, incidentals, boarding & lodging at site are to be borne by the valve vendor.

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).

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9.35 Guarantee / Warranty Period

In case of supply items, the guarantee / warranty period shall be 24 months from the date of supply or 18 months from the date of commissioning whichever is earlier.

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

10.30 Valve Data Sheets

10.30.1 Refer ANANEXURE -I

10.31 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 EXCEPTIONS TO THE SPECIFICATION

CUSTOMER NAME	
PROPOSAL NUMBER	
SUPPLIER NAME	

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

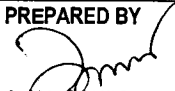


ANNEXURE – 1 (A)

FORM NO. PEM-6666-0

	DATA SHEET FOR CONTROL VALVES (WITH HYDRAULIC ACTUATOR)						SPECIFICATION NO.: START UP DRAIN CV										
							SECTION : Boiler Mountings/PE(FB)										
	REV. NO. 00			DATE : 29.10.15			SHEET 1			OF 2							
	Tag No. : 01HAG15 AA451 / AA452						Qty : 2 / BOILER						TOTAL : 4 / PROJECT				
DATA SHEET – A FOR CONTROL VALVE WITH HYDRAULIC ACTUATOR (TO BE FILLED UP BY PURCHASER)											DATA SHEET – B (TO BE FILLED UP BY BIDDER)						
GENERAL	PROJECT SERVICE LOCATION DUTY PIPE SIZE (inlet / outlet) PIPE MATERIAL (inlet / outlet) MEDIUM					NLC / NEYVELI TPP 2X500 MW Startup drain control valve Outdoor Modulating 219.1 X 25 / ID > 350 SA106Gr C / SA106Gr C Water											
BODY	MODEL No. TYPE OF BODY: GUIDING: No. OF PORTS BODY SIZE : PORT SIZE : DESIGN CV END CONNECTION & RATING (ANSI) BODY MATERIAL PACKING MATERIAL BONNET TYPE TRIM FORM TRIM MATERIAL: SEAT / PLUG // CAGE / STEM BALANCED / UNBALANCED FLOW REQUIRED LEAKAGE CLASS NOISE LEVEL in Dba FLOW DIRECTION ANTI CAVITATION TRIM VALVE LIFT in mm					ANGLE 200 NB BUTT WELD; INLET : Style P ,d1= 175.35 mm OUTLET: Style P ,d1= 350mm F11 GRAFOIL STD / EXTENDED / FINNED V LESS THAN 85 dBA HORIZONTAL											
ELECTRO HYDRAULIC ACTUATOR	MODEL No. & SIZE CLOSE AT : OPEN AT (Kg/cm ² (g)) SHUT OFF DIFFERENTIAL MANUAL OVERRIDE TRAVEL TIME FOR OPEN TO CLOSE, CLOSE TO OPEN, TRIP VALVE POSN. ON SIGNAL AIR FAILURE VALVE POSN. ON SUPPLY AIR FAILURE					YES <12.5 Secs / <12.5 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	FLOW Kg/s	INLET PR. Bar(a)	OUTLET PR. Bar(a)	PR. DROP Bar(a)	INLET TEMP (°C)	Sp. Gravity	Calc. Cv	Valve Lift %	Valve outlet velocity	Noise Level dBA						
1.	Cold Start	55.6	7.7	1	6.7	99											
2.	Warm / Hot Start	70.5	64.9	2.5	62.4	275											
3.	Hot restart after trip	83.3	163.1	3.8	159.3	347											
4.	Hot restart with min flow rate	11	165	1	164	347											

DESIGN PARAMETERS PR / TEMP : 219 bar (g) / 380 °C
 Max. Opening/closing Pressure difference : 210 bar (g)
 IBR FORM – III C : REQUIRED
 TOTAL WEIGHT (VALVE+ACTUATOR+ACCESSORIES) : Kgs.
 Valves should be directly weldable to connecting pipe without the use of Reducers.

ANNEXURE – 1 (A)

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 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. JAI GANESH 29.10.15	CHECKED BY  NORUL FAZIL 29.10.15	APPROVED BY  K. SRIDHARAN 29.10.15	VENDOR SEAL SIGN.: NAME: DATE:

ANNEXURE – 1 (B)

Start Up drain Control valve – Gate Valve with Hydraulic actuator.

Line size and Design conditions (pressure and temperature) are similar to start up drain control valve.

Design Pressure: 219 bar (G)

Design Temperature: 380 Deg C

This valve is in upstream side of start-up drain control valve.

Maximum DP is 210 bar.

Positioning Time – 10 sec.

This valve (two numbers) needs to be operated along with the corresponding start-up drain control valve (two numbers), hence it requires common hydraulic control unit.

Signal failure and supply failure requirement is Fail to close.


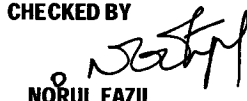

Scope of supply of Tubing & fittings from common hydraulic control unit to each hydraulic actuator of start-up drain gate valve is with the vendor.

GATE VALVE SPECIFICATION

TYPE : OUTSIDE SCREW & YOKE	DESIGN STANDARD : ASME16.34	
ENDS : BUTT WELDED TO B16.25	TESTING STANDARD : BS 6755(PART-1)/ ASME16.34	
DESCRIPTION	CONSTRUCTION	MATERIAL
BODY	FORGED	ASTM F11
BONNET	WELDED	ASTM F11
STEM	RISING	13% CR.STEEL (A182 Gr.F6a or Equivalent)
DISC	LOOSE PLUG TYPE / PROFILED FOR REG. VALVE	13% CR SS + STELLITE Gr. 6
BODY SEAT	INTEGRAL)	STELLITE Gr. 6
BACK SEAT		STELLITE Gr. 21
STEM PACKING	RENEWABLE WITH VALVE OPEN ON STREAM	COMPRESSED GRAPHITE MIDDLE RINGS AND INCONEL REINFORCED ANTI-EXTRUSION TOP & BOTTOM CARBON RINGS.

GLAND BUSH / GLAND FLANGE	TWO PIECE TYPE	CARBON STEEL
GLAND BOLT		ASTM A193 GR.B16
GLAND NUT		ASTM A194 GR.7
YOKE BUSH		ALUMINIUM BRONZE (IS 305 GR.AB1) / 13% Cr SS / Ni-RESIST
HAND WHEEL	RISING	MALLEABLE IRON / CARBON STEEL

TAG Nos : 01HAG15AA151, 01HAG15AA152

SIGN. :	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR SEAL
				
	NAME : A.JAI GANESH	NORUL FAZIL	K.SRIDHARAN	SIGN.:
	DATE : 29.10.15	29.10.15	29.10.15	NAME:
DATE :			DATE:	



GATE, GLOBE AND CHECK VALVES

SPECN No.: VALSPEC:IVP:GEN:001

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1.0 GENERAL

This specification covers design, material, construction features, manufacture, inspection, testing, painting and packing requirements of Gate, Globe and Non Return Valves at vendor's or / and his sub vendor's works and delivery to project site.

The offer shall be submitted along with all the documents required in this specification. Offer with out all supporting documents requested in this specification will not be considered.

2.0 CODES AND STANDARDS

2.1 The design, material, construction, manufacture, inspection and testing of valves shall conform to the latest applicable codes and standards.

2.2 The valves covered under this specification shall be governed by the following standards. However the valves conforming to other International Standards may be acceptable provided they are equivalent or superior to those listed below:

2.2.1	BS EN ISO 15761 Rev.4	For Forged Gate, Globe and Non-Return valves of sizes 50 mm and smaller.
2.2.2	API 600/ BS 1414 Rev.3	Gate valves of sizes 50 mm to 1050 mm. Rev.3
2.2.3	BS: 1873 Rev.3	Globe valves of sizes 50 mm to 400 mm. Rev.3
2.2.4	BS: 1868 Rev.3	Non-return valves of sizes 50 mm to 800 mm. Rev.3

2.3 In case of any discrepancy between the specification / data sheet and standards, the better one or most stringent is to be followed.

3.0 DESIGN REQUIREMENTS

3.1 These valves shall be used for services like steam, condensate water, feed water, D.M. Water, oil and gas unless otherwise specified in specific requirements.

3.2 The valves performing similar duties shall be interchangeable with one another unless otherwise approved.

3.3 Valves shall be designed according to guidelines mentioned in the applicable standards.

3.4 The valves coming under the purview of IBR shall satisfy all the requirements of IBR.

3.5 Materials

Material requirement is indicated in Valve Data Sheets enclosed with the enquiry. Commercial grade steels shall not be used. Materials shall be as per ASTM or IS or other National / International Standards. For materials other than ASTM, corresponding equivalent ASTM standard and nominal composition shall be indicated. Rev.3

3.6 Unless otherwise specified in specific requirements, all valves of sizes up to and including 50 mm Nb shall have a forged steel body & sizes 50 mm Nb & above shall have cast steel body.

4.0 CONSTRUCTION FEATURES

4.1 End Connections:

4.1.1 Socket details of valves with socket welding ends shall be as per ASME B16.11 and shall suit pipe size as indicated in specific requirements.

4.1.2 The edge profile for valves with butt welding ends shall be as per BHEL Plant Std. / ASME B16.25 Fig. 2a / 3a and shall suit the given matching pipe. Rev.4



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- 4.1.3 All valves with Flanged ends shall have raised face flanges and drilling details as per ASME B16.5. For rubber lined valves, face of flange shall be flat face. If specified, the flanged valves are to be supplied with matching slip on type flanges, bolts, nuts and spiral wound gaskets.
- 4.1.4 The over all length of valve shall be strictly as per ASME B 16.10 for flanged and butt welded valves. **Please note that for class 150 gate valves, the over all length is different for flanged end and butt welding end as per ASME B 16.10. (This implies flanged body casting cannot be used for butt weld end body casting).** Rev.3
- 4.2 Gate and Globe valves shall be of outside screw and yoke type with rising spindle and shall be capable of being closed against the rated pressure.
- 4.3 Gland & gland flange shall be in two pieces for uniform tightening of gland packing.
- 4.4 Gate valves shall be provided if necessary with bonnet pressure relieving pipe with check valve (to be connected to upstream / downstream) to avoid pressure built up when the valve is closed.
- 4.5 The yoke nut design for gate valves shall be provided with a ball bearing for 150 class valve for sizes 700mm & above, 300 class valves for sizes 600 mm & above & for 600 & above class valves for sizes 150mm & above (for globe valves also).
- 4.6 All Globe and check valves shall have an arrow indicating the direction of flow cast or embossed on the valve body. The direction of flow for globe valves shall be from under to over the disc.
- 4.7 Gate and globe valves shall have back seating arrangement for replacement of packing while working under full working pressure.
- 4.8 All globe valves shall have conical or spherical or flat seating.
- 4.9 For Globe valves, the disc shall be free to revolve on the spindle.
- 4.10 Globe valves for regulating duties shall be provided with profiled type disc / parabolic type disc and shall be capable of regulating the flow from zero flow to fully open. All regulating valves shall be designed to prevent erosion of the valve discs and seats when the valves are operated partially opened.
- 4.11 Differential hardness of 50 BHN shall be provided between seat and disc facings in case of 13% Cr. SS. Wherever specified, Stellite Gr. 6 facing shall be done (thickness shall be minimum 1.6 mm). Hardness of stellite surfaces shall be minimum 350 BHN. Differential hardness is not applicable for stellite seats. Rev.4
- 4.12 For severe service conditions, cushioned check valves are preferred to obviate valve clatter. In case of swing check valves, the body seat shall be inclined at such an angle from the vertical to facilitate closing and prevent valve clatter.
- 4.13 All the gate / globe valves intended for manual operation shall be equipped with gear box & thrust bearing, if considered necessary to enable easy operation i.e. the effort required to open / close the valve against the maximum differential pressure. However valves sizes 350 NB & above with Cl. 150, sizes 300 NB & above with Cl. 300, valve sizes 200 NB & above with Cl. 600 shall be provided with gear arrangement. The gearbox shall be totally enclosed, bevel gear type and capable of delivering required torque & thrust. All gear operated valves shall be necessarily provided with a position indicator to show the valve open / close position. Rev.3
- 4.14 All gate valves of 600 lbs and higher-pressure rating shall have flexible wedge.
- 4.15 All valves of pressure rating up to 600 lbs shall have bolted bonnet construction and 900 lbs and above shall have bonnet construction of pressure seal type. For pressure seal bonnet type valves, stainless steel inlay in the gasket area and silver-plated gaskets or other acceptable proven features shall be provided. Rev.2



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- 4.16 Eye bolts shall be provided to facilitate handling heavy valves or part of valves, where the weight is greater than 500 Kg.
- 4.17 All the gate and globe valves shall be required with integral bypass valve, if considered necessary, for ease of operation of main valves. The valves for which the integral bypass is envisaged, the size of the same shall conform to MSS-SP-45 as a minimum standard. Pipe of bypass shall be at least schedule 80, seamless and of a material of the same composition as that of the main valve.
- 4.18 All the gate and globe valves shall be closed by rotating the hand wheel in the clockwise direction when looking at the face of the hand wheel. Where valves are not of the rising pattern, the hand wheel shall also be rotated in clockwise direction to close the valve when viewed from the outer end of the spindle. In case where the hand wheel is not directly attached to the valve spindle, suitable gearing shall be introduced to reconcile the above condition. The face of each hand wheel shall be clearly marked "Open" and "Shut" with arrows indicating the direction of rotation to which they refer. Each valve shall be fitted with a tag plate of stainless steel indicating the valve Tag No., duty or service condition intended and the function of the valve. This is in addition to nameplates and labels being provided by the manufacturer as per MSS SP 25. Rev.3
- 4.19 Protective covers shall be provided for spindles of gate / globe valves exposed to weather.
- 4.20 All valves shall have full sized ports and shall be suitable for installation in horizontal as well as in vertical pipelines.
- 4.21 All Gate, globe and check valves shall be designed for reconditioning of seating surfaces and replacement of stem & disc without removing the valve body from pipeline.
- 4.22 Stop check valves shall have full floating and accurately guided discs.
- 4.23 The body seat for Swing check valves shall be inclined at such an angle to minimize chatter.
- 4.24 Check valves shall be provided with outside lever & counter weight as called in specific requirements for quick closing / balance the disc in case of low velocities so that with a minimum pressure, the disc to open & resistance to flow past the disc is minimized.
- 4.25 All valves shall be suitable for the service.i.e flow, temperature & pressure under which they are required to operate & those performing similar duties shall be interchangeable with one another unless otherwise approved.

5.0 SPECIAL FEATURES OF VALVES

5.1 Extension Spindle Arrangement:

- 5.1.1 Extension spindle / chain operation to the valves shall be provided where required as per specific requirement. The Universal joints shall be provided as being capable of accommodating valve movements, in all three directions due to thermal expansion.
- 5.1.2 Where required as per specific requirement, valve yoke / spindles shall be lengthened so that the hand wheel is at a height of approximately one meter above the level of the floor or platform from which the valve is to be operated and where necessary they shall be provided with head stocks and pedestals of rigid construction. All gears used for the valve extensions shall be of steel, machine cut and shall be of cast or forged.
- 5.1.3 Surface finish for spindle & hinge pin shall be 0.4 micron Ra or better. Gland packing for gate / globe valves shall be asbestos free middle rings and braided type end rings. Rev.3



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5.2 Locking arrangement

For valves that are to be kept locked in full "Open" and / or "Close" position, if called for, the locking arrangement shall be provided with a non-detachable locking arrangement. (Hook type) Rev.3

5.3 Valves for Vacuum Service:

5.3.1 Valves of size up to 40 NB and operating under vacuum shall be offered with suitable, proven gland packing material in order to avoid ingress of atmospheric air entry to the system through gland of the valves. Rev.3

5.3.2 All valves of size 50 NB and above and operating under vacuum conditions shall be provided with water sealed glands. Valves with sealed gland arrangement shall be required with 3/8" BSP (or as specified) connections duly plugged on both sides of the bonnet. Sealing water shall be supplied at 4 ata and 50°C, unless otherwise stated. Rev.3

5.4 Valve with Limit Switches:

Valves with limit switches, if called for, shall be required for indication or for interlocking with some other equipment. Valves for such provision shall be offered with required number of limit switches for open and / or close position of the valve. The limit switches for this application shall have one normally open and one normally closed contact. The limit switches shall be Cutler Hammer / Siemens / Honeywell make and limit switch housing shall be weather proof to IP 67. The limit switches shall also be wired to a terminal box.

LIMIT SWITCH FOR VALVES Rev.4

Name of the item: Limit switch with normal roller lever snap action type in oil tight die cast aluminum housing.

Type: Momentary contact type

Application: To indicate open or close position of a valve having a striker plate attached to the stem.

No. of NO/NC Contacts: 1 NO + 1 NC Contacts shall be provided.

Maximum frequency of operation: 60 Operations / hour.

Rating: Max. 240V AC 3 amps or 240V DC 0.1 amps

Ambient Temp.: 50 deg. C.

Actuation type: Normal Roller Snap action type.

Enclosure: IP 65 or better as per IS 2147 (latest)

Construction:

1. The construction shall be completely oil tight, watertight, dust proof and weather proof.
2. Contacts shall be silver-plated.
3. Position of the point of contacts of the limit switch to be maintained with an accuracy of 0.01 mm.
4. The NO / NC contacts of the limit switch shall provide quick make and quick break action and full contact pressure at all times.

Valve supplier shall submit along with the contract drawing, a copy of drawing / catalogue giving complete constructional and dimensional details of the limit switch offered.



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5.5 Motorized Valves

5.5.1 The Motorized valves shall be offered with the electric actuators of any of the following makes **unless otherwise specified elsewhere**: Rev.2

- i) Rotork, Chennai
- ii) Limitorque, Faridabad
- iii) Auma, Bangalore
- iv) Antrieb, Chennai

The actuator shall be designed for the **cold working pressure (room temperature working pressure as per ASME B 16.34) of the respective class rating**. The selected actuator's stall torque shall be minimum 1.3 times the rated torque. **Also it has to be established that the offered actuator will open / close within 60 seconds or as specified**. Sufficient length of stem protection tube is to be provided where the stem rises beyond the actuator top. Rev.2

5.5.2 Motor of actuators shall be provided with class "F" insulation for the temp rise limited to class "B" Insulation.

A particular make and type of actuator shall be selected based on the Technical specification ACTSPEC:IVP:001 of Valve Actuators. **Wiring Diagram shall be in line with any one of the following as specified elsewhere**: Rev.2

- Standard – With out Integral Starter (Wiring diagram 4-V-MISC-90271 R11),
- With Integral Starter (Wiring diagram 3-V-MISC-24227 R0 – Unified Terminal Plan).
- Actuator with Plug & Socket (Wiring diagram 3-V-MISC-24357 R0),
(or corresponding actuator vendor wiring diagrams enclosed)

Control connection types i.e., Standard (1 power cable gland & 3 control cable glands – cable glands shall be double compression, nickel plated brass) / 9 pin plug & socket (internally looped for limit & torque switches – 2 nos. per actuator) and type of actuator motor protection i.e., thermostat (with trip unit to be included for standard actuator for mounting in MCC & for integral starter type it will be a part of starter). Rev.4

For all motorized valves, valve-actuator data sheet is to be furnished strictly in the typical format enclosed after placement of order. **But the kilowatt rating of the actuator proposed by the valve supplier is to be furnished within a week after placement of LOI / PO**. Rev.4

5.5.4 **In case integral bypass is provided to the main valve which is motorized, the integral bypass valve shall also be motorized.**

5.5.5 The actuator shall be provided with hand wheel (gearing and disengaging) & the same shall be adequate to open and close the valve under full unbalanced design pressure and shall be completely assembled on the respective valve and shop tested before shipment. Connection between valve actuator shall be flanged. Welding is not acceptable.

5.5.6 All motor operated globe valve's actuator for regulating duties shall be suitable for inching operation - 150 starts per hour / S2-15 minutes.

5.5.7 If actuator and gearbox combination is used, the gearbox shall be totally enclosed, bevel gear type. The gearbox design / make shall be proven type. Rev.2

5.5.7 The final valve assembly with electric actuator or bevel gear box or combination of bevel gear box + electric actuator shall be self-locking. I.e. on removal of power in the middle of valve travel, the disc shall remain in its position. Rev.4

6.0 MANUFACTURE OF VALVES

6.1 Particular care shall be taken to ensure that all foundry sand and loose material is properly removed from castings by fettling before the valves manufacture is started.



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6.2 Valves shall be manufactured strictly in line with the purchase order specifications.

7.0 LUBRICATION:

7.1 Provision shall be made for suitable lubrication wherever necessary to ensure a smooth easy operation and freedom from undue wear.

7.2 Where oil filled gear boxes are used they shall be provided with filling and drain plugs, oil level gauges or dipsticks. Housing for ball and roller bearings shall be packed with grease at the time of assembly.

7.3 Choice of oil and grease for all motor drives shall be based on ambient temperature of 60°C.

7.4 Type of oil / grease to be used and its annual consumption (based on 100 operations per year) shall be indicated by the bidder.

8.0 SHOP INSPECTION AND TESTS

All quality and stage / final inspection requirement (minimum) shall be carried out as per the relevant BHEL approved Quality Plan. However if customer would like to associate for witnessing or verification, the same would be indicated in the QP before manufacturing of valves.

8.1 For body, bonnet and cover, the material test certificates (correlated to melt number) shall be furnished by the vendor for identification and correlation.

8.2 For components like spindle, body seat, disc / wedge seat stelling, back seat bushing, bonnet/ cover bolts and nuts etc. material test certificates (typical) shall be furnished for identification & correlation.

8.3 Minimum NDT requirements extent of check for Pressure retaining parts/components shall be as follows.

8.4.1 Steel Castings:

i) MPI on welds ends shall be carried out for rating up to 300 class (inclusive).

ii) RT on butt weld ends and MPI on change of section shall be carried out for rating of 600 and above.

8.4.2 Steel Forgings:

i) 100% MPI and 100% UT on all areas shall be carried out on all forgings for valves with rating 1500 and above. Also UT shall be carried where the thickness/ diameter is greater than 40mm.

8.5 Dye penetrate test as per ASTM E165 shall be performed on all machined surfaces of trims.

8.6 For butt-welding ends of all valves, dye-penetrant test as per ASTM E165 shall be carried out on 100% of the valves and the results shall show no defects.

8.7 Hardness testing shall be done on body seat, disc/wedge facing, spindle, backseat bushing, thrust plate etc. The Purchaser's representative shall also check hardness of random samples.

8.8 100% Blue matching of seats shall be carried out and records shall be maintained for verification by the purchaser.

8.9 Hydrostatic/Air Tests:

8.9.1 Manually operated valves: All valves shall be tested hydraulically for strength, tightness of seats and tightness, of back seating at the pressures as mentioned in IS 6157 / API 598.



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8.9.2 Motor operated Valves

- a) All the motor operated valves shall be tested hydraulically for seat / backseat with the motor actuator at rated power supply.
- b) Motorized valves shall also be tested hydraulically for body, seat and backseat at the pressures as mentioned in IS 6157 / API 598 with hand wheel on the actuator.

8.9.3 Gate and Globe valves seats shall also be tested on air at a pressure of 6 kg/cm².

8.9.4 Duration of Test:

The duration of test, leakage rate / acceptance criteria are as per relevant testing standard.

8.10 For motor operated valves, the type tests (including degree of protection) one for each type of actuator (type tested actuators shall not be supplied) and duplicate tests for job actuators as per the requirements of IS: 325 and technical specification shall be performed. Performance tests of the actuators such as operation of limit switches, smooth functioning, noise, vibration, opening and closing time, torque required, etc., shall also be done.

8.11 Dimensional and functional checks shall be carried out.

8.12 Valves coming under the purview of IBR shall be inspected by Independent Inspecting Authority approved by Indian Boiler Board and the test certificate in IBR form III-C duly countersigned by IBR approved authority shall be submitted.

9.0 CLEANING & PAINTING

9.1 As per relevant Project CQP.

10.0 CLEANING AND PROTECTION FOR DESPATCH:

10.1 As per relevant Project CQP.

10.2 Machined surfaces shall be suitably protected.

10.3 Flanged Valves: To prevent damage to ends & to avoid foreign material entering the valve while shipment & storage.

A thin sheet steel circular blanking plate of a diameter 6mm less than the bolt holes inner P.C.D. shall be firmly fixed to the flange faces by the application of adhesive after first ensuring that the flange faces have been thoroughly degreased. A thin coat of adhesive shall be applied to the flange face and the blanking plate and then allowed to dry for 15-20 minutes. The coated face of the blanking plate should then be offered up to the face of the flange taking care that the plate is concentric with the flange. Firm pressure shall be applied to ensure intimate contact between plate and flange. A wooden blank should then be bolted to the flange using a minimum of 4 bolts.

10.4 Valves with Screwed, Socket Welding and Butt-welding ends

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

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

10.6 Valve Tag nos. shall also be incorporated in all the dispatch documents.



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11.0 DATA / DOCUMENTS/DRGS TO BE FURNISHED AFTER THE AWARD OF CONTRACT:

11.1. Relevant drawings / leaflets for the offered valves showing following information.

- i) Complete cross sectional arrangement of the valve.
- ii) Binding dimensions, dismantling clearances & weights.
- iii) Bill of material incorporating all the materials of construction of various parts along with IS / ASTM / ASME Standards to which the materials conform.
- iv) Special features, if any, as called in the specific requirements.
- v) Cv calculations for Regulating Globe Valves
- vi) Cv test report i.e. lift versus flow for Regulating Globe Valves
- vii) Torque calculations for Motor Operated Valves actuator selection.

11.2 Relevant catalogue / leaflet of the actuators.

11.3 Storage, Operation and maintenance manual for valves and actuators (one copy of this shall be enclosed with the packing slip / wooden cases so that at receiving end care can be taken for proper storage & commissioning)

11.4 Quality Plan.

11.5 List of recommended spares for 3 years trouble free operation of valves (Stem, Wedge / Disc & Yoke bush / Drive bush) and actuators & gearboxes shall be quoted.

11.6 List of Commissioning spares (Stem packing & Gaskets) shall be quoted.

11.7 Drawings / documents submission schedule.

The mere approval of documents like drawings, data sheets, wiring diagrams, actuator sizing calculations, flow calculations, etc., will not however relieve the suppliers from meeting our specification requirements, relevant product and testing standard requirements and general accepted engineering principles. Ultimately the valves have to perform satisfactorily at the service conditions and at the end user place. Rev.4

11.8 DEVIATIONS

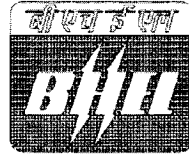
11.8.1 If the bid submitted has got any deviation from the technical stipulation in the tender document, the tenderer shall tabulate in the appropriate "schedule of deviation" furnishing full particular of such deviations. Deviations are to be furnished with specific mention to clause number. Only such deviations will be discussed and resolved. Reasons / explanation for such deviations shall be furnished. Any other notes / comments viz. "refer to forwarding letter" etc. is not acceptable.

Even if there is no deviation from the tender document, the tenderer shall submit the deviation form and indicate as "no deviations".

PREPARED: K.RAVI

APPROVED: K.ARUN

Employer's and Contractor's Information / Project Name



2x500 MW NEYVELI NEW THERMAL POWER PROJECT (NNTPP)

NEYVELI, TAMILNADU, INDIA

Space for Stamping (Review and Validation status - if needed)

Revision history

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1 Instructions to Supplier

- a. This guideline shall be part of the delivery order and thus binding on the Supplier in all points.
- b. The following rules on the execution shall be valid for all documents agreed on by contract.
- c. All documents to be prepared in connection with the delivery order shall pass over to the unrestricted property of the Customer after the completion of the order. The originals of these documents shall be handed over to the Customer without any further charges.
- d. All documents handed over to the Supplier shall remain property of the Customer. The passing on to third parties shall be subject to the approval of the Customer.
- e. The clarification of all design details and requirements for the execution of the contract shall be carried out on the premises of the Customers. In this respect, the Supplier shall provide for the necessary personnel. The charges for the visits, meetings and reports/certificates necessary for this purpose shall be included in the price and shall not be charged separately by the Supplier.
- f. The passing on of parts of the work to others may only be made with a written permission, and the Customer reserves the right to reject single persons or companies without giving a reason. The entire liability for the work shall remain with the Supplier.
- g. In case of any difficulties concerning the manufacturing Process the Customer shall be informed without delay.
- h. Materials and equipment must be new and of proven design. Alternative designs shall be subject to Customer's engineering approval
- i. Materials containing asbestos, RCF (refractory ceramic fibers), PCBs, mercury, lead-based paint or any other hazardous materials are not allowed.
- j. All documents submitted to Customer shall be in the English language using SI Metric units.
- k. Parts subject to wear, corrosion, deterioration or requiring adjustment, inspection or repair shall be accessible and capable of convenient removal, replacement, and repair.
- l. The Supplier shall be governed by the following regulations, codes, and standards, including their respective addenda, amendments, and errata, as applicable. The governing documents used shall be the latest at the boiler contract award date. The applicable codes are those in effect on with latest revision.

AFBMA	Antifriction Bearing Manufacturers' Association
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASME	American Society Mechanical Engineers
ASTM	American Society Testing and Materials
AWS	American Welding Society
DIN	Applicable German Standards
IBR	Indian Boiler Regulation
HI	(American) Hydraulic Institute
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrumentation, Systems and Automation Society
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
SSPC	The Society for Protective Coatings
BIS	Bureau of Indian Standards Institution

Notes:

The list of the specified standards, guidelines and regulations does not claim to be exhaustive.

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It shall not release the Supplier from his obligation to comply with any unmentioned standards, guidelines and regulations, which are to be considered for the manufacture of the structure / components or request any missing documents from the Customer.

2 Objective

One (01) Lot of SHUTOFF Valves shall be provided per boiler. There is ONE (01) contract with TWO (02) boilers per contract.

The details of the valve data per boiler are given in the corresponding valve list.

Motor Operated Valves shall be supplied with:

Electrical Motor Operator with integral reversing starter and position indicator switches Open / Close as integral part of the actuator.

- 2.1 **One (1) lot of special tools required for maintenance of system components**
The SUPPLIER shall furnish all special tools and wrenches (quoted separately) required for erection, calibration, and servicing including instructions for their use. Tools shall be new and of first-class quality.

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.

- 2.2 One (1) lot of commissioning spares per **SUPPLIER'S** specific recommendation.
- 2.3 One (1) priced list of recommended spares for Two (02) years of continuous operation per **SUPPLIER'S** specific recommendation.

3 Contract Specific Data

3.1 Site conditions

- Maximum ambient temperature: 42.8 °C
- Minimum ambient temperature: 27 °C
- Relative humidity: 71 %
- Altitude: 67 m above sea level

3.2 Power supply

- 415 V ± 10%, 3-phase, 50 Hz
- combined variation of voltage and frequency =10%
- 4-wire AC, 50 kA for 1 second, solidly earthed.

For details refer Electrical, Control & Instrumentation Specification see Appendix-A

4 Terminal Points

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4.1 Electrical Power

At the electrical terminals in suitable (IP-68) enclosures for motor actuators and starter enclosure.

At the electrical terminals in suitable (IP-68) electrical enclosures/termination boxes on all control equipment such as motors, sensors, control panel stations, and control cabinets.

4.2 Electrical Controls

At the input signal terminal strip in the junction box of all controlled systems and thermocouples.

4.3 Water / Steam

At the inlet connection of the valve
At the outlet connection of the valve
At the drain connection, if applicable

5 Design requirements

5.1 General requirements for valves and fittings

Valves for steam and pressurized water service shall have hard-faced seat and disc unless otherwise specified in the design conditions listed in the valve data sheet.

Needle bearing shall be used for valve stem/drawing rod or other bearings according to supplier's standards.

Internal and external seals of fittings, where operating temperature shall exceed 600°C, shall be made of materials, permitting operation under such conditions.

Internal diameter of sealing seat shall not be more than 10% smaller than internal diameter of connecting pipes.

Gland packing shall be "grafoil" or equivalent and corrosion inhibiting additives are required. Valve glands shall be designed to avoid the consequences of packing extrusion (typically by providing top and bottom anti-extrusion rings).

Globe valves may be either "Y" pattern or "Tee" pattern. Due to superior flow characteristics, the "Y" pattern style is preferred.

All valves shall be suitable for service conditions i.e. flow, temperature and pressure under which they are required. The valves shall be of standard pressure rating as per the relevant code/standard.

On steam service, bolted joints are allowed for service up to and included 600 lb class. For 900 lb class & above, pressure seal type bonnet construction valves are required. Pressure seal type bonnets are preferred to permit in line servicing.

Valves used in chemical service such as transport of aqueous ammonia, body and trim materials shall be stainless steel for corrosion resistance.

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Valves shall be capable of being shut-off against rated differential pressure by a hand wheel rim force of 100 lbf (445N) max., normal running shall be achieved with a rim force not exceeding 50 lbf (222 N). Valves requiring greater force to operate shall be provided with "impactor" operation or reduction gearing.

Valves 2-1/2" size and above shall be designed for butt weld end attachment unless specified otherwise. The SUPPLIER is required to prepare weld profiles to Alstom standards (see Alstom's weld profile drawing). These will be provided after award of contract.

Either Butterfly type or sluice/gate valves shall be used for isolation purposes in raw water, Clarified & Filtered water application. Butterfly valves shall be of double flanged or lugged wafer type of low leakage rate conforming to AWWAC- 504 class 150 or EN-593 Class 150.

Manually operated valves shall be provided with reduction gear unit for valves of size 200 NB and above. Valve provided with motorized or pneumatic actuator shall be provided with a hand wheel for manual operation.

All the valves shall be equipped with adjustable mechanical stop-limiting devices to prevent over travel of the valve disc in the open and closed positions. The valve operators (Hand wheel or Gear reduction unit or Motor actuator etc.) shall be designed as per relevant International Standard.

Ball valves or Globe Valves may also be provided for the application of Raw/ Clarified / Filtered water services for sizes 50 NB and below.

Butterfly valves or proven patented diaphragm valves shall be used for the services of demineralized water application for isolation purposes.

Sluice valve/knife edge type slide valves shall be used in the sludge and drain pipe line.

For Air services, globe valves or Ball valves may be used for sizes 50 NB and below. For sizes higher than 50 NB, either Butterfly valve or Ball valves shall be used.

Check valves for Raw / Clarified / Filtered water may be offered in Gun metal construction and with threaded ends for sizes 50 NB and below conforming to IS: 778 or Equivalent.

Motor operated valves:

Motor operated valves shall be fitted with both hand and motor operating gear and where a bypass valve is provided this also shall be provided with both hand and motor operating gear and interlocked to ensure that the bypass valve is opened before the main valve. Each valve gate has reached the 'full open' or 'full closed' position (with a minimum increase in the torque). The motor shall be placed in such a position relative to the valve that there is no possibility of leakage of liquid, steam or corrosive gas from valve joints on to the motor or control equipment.

The hand operating and motor operating mechanism shall be so interlocked that the hand operating mechanism is disconnected before the motor is started. Valves shall be provided with seating control and except where specifically approved by the Owner/Consultant for small valves, a slipping clutch or other torque-limiting device shall be incorporated in the motor drive. The operation of opening or closing the valve shall be controlled by means of push buttons labeled respectively 'Open' & 'Stop'. The control shall be so arranged that the motor can be stopped with the valve in any position by means of 'stop' push button and after having been stopped can be restarted either direction by the 'open' or 'close' push buttons.

Necessary positioning indicators for valves closely connected with the operation of main units and need continuous and repeated monitoring shall be provided in plant control room/control pulpits.

Valve stems / drawing rods (spindles) shall be made with drawing procedure to improve strength properties. Alternative would be forged and then machined stems.

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5.2 Requirements for shut-off valves:

See general requirements for valves and fittings.

Valve body design shall enable installation of manual or motor drive without major interventions in the body.

The body shall consist of two parts (in order to enable rehabilitation machining and surface welding of sealing surfaces) at HP systems.

Valve stem shall be made of corrosion resistant steel.

6 General guideline for supply and service

For the performance of supply and services the following shall apply in particular:

6.1 Design calculation and structural design

The shut-off devices are to be designed and manufactured in such a manner that they meet the specific functional requirements.

Following criteria are to be observed:

Grey cast iron valves are generally not acceptable.

The material of the valve body must be identical with material of connected pipes. Deviations from that stipulation are permissible only with acceptance of the Customer.

The shut off valves are arranged inside the boiler isolation valves and thus to be regarded as part of the steam boiler within the meaning of the Steam Boiler Code (IBR).

All valves must be suitable for operation with horizontal spindle position. The supplier must absolutely notify Customer in case of any deviations from above mentioned requirement.

Valves and fittings with horizontal spindle position shall not require an additional support and have to be designed accordingly. If deviations are necessary, Supplier shall inform Customer explicitly. Deviations have to be accepted by the Customer.

GMAW-weld seams on pressure parts are not permissible.

In order to avoid the spindle corrosion, corrosion resistant materials for spindles are to be selected (Cr-content > 13 %). Any exceptions shall be subject to the approval by the Customer.

All valve spindles and sealing elements are to be rust-free, particularly resistant and corrosion-proof.

Spindle and spindle nut must consist of different materials in order to avoid any material etching and ensure the emergency running properties.

For the avoidance of any penetration of foreign particles between spindle and packing the use of stripping rings is to be provided. These is valid only for HP shut-off devices.

Any screwed connections based on compression type fittings are not acceptable. .
Any kind of seals/packing's, which are installed on valves, must be asbestos-free. At design temperatures up to 200°C stuffing boxes made of Teflon roof-shaped packings or packings made from pure graphite are to be applied and at temperatures > 200°C made from pure graphite.

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The stuffing boxes of the valves are to be designed pre-compressed so that no rework becomes required even during start-up and shutdown or after the commissioning and the valves remain tight.

In order to avoid any dissimilar metal welds the welding ends are to be designed in the material of the connecting piping. The ends must be long enough in order to enable a post-weld thermal treatment without any exposure of the valve to excessive temperatures. This shall also apply to the connection to differing pipe materials and dimensions.

The testing capability (including any possible repeated inspections) of the welded joints is to be constructionally ensured.

The valves are to be constructionally designed in such a manner that no parts can be loosened independently during the operation.

The shut-off devices with hand wheel must be designed in such a manner that they are suitable for any later installation of electric drives.

For shut-off devices with hand wheel, the hand wheel must not be made from plastic or any material similar to plastic. The required hand force for the actuation of the hand wheel must not exceed 400N. Any deviations shall be subject to the Customer's approval. The hand wheels must be designed in such a manner that they close the shut-off device in a clockwise manner.

Shut-off gate valves shall be designed with external spindle thread and non-rising hand wheel. If required, spindle protective tubes are to be provided.

The valve housings are to be provided with an arrow, which shows the direction of flow.

The valves must have a high operational safety, availability and reliability with a minimum extent of wear as well as a minimum susceptibility to defects and an easy-to-maintain design.

Butt or Socket Weld End Details

Butt or Socket weld end details for valves shall be shown on the submitted drawings. Maximum working pressure of the valve corresponding to Alstom design temperature condition shall be shown on the drawing.

Materials and construction of the shut-off valves shall conform in all respects to the applicable requirements of ASME Boiler and Pressure Vessel Code, Section 1, Latest Edition.

Valves shall conform to the edition of the **ASME 16.34**, Latest Edition referenced in Section 1 of the ASME Boiler and Pressure Vessel Code.

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.

Construction

Valve body 2.5" and larger – casting/forging, butt weld ends (weld end detail drawing will be supplied at a later date).

Valve body 2.0" and smaller – forged, socket welded ends to be per **ASME B16.11** Code.

Seating surfaces - Stellite

Bonnet - pressure seal

Actuator – The sizing and operation of the valve actuator shall be such that the actuator shall not degrade or destroy any individual component of the valve due to excessive torque or limits of operation.

No part or component of any motor operated valve (MOV), such as stem, shall be damaged due to (actuator malfunction or improper torque switch setting) excessive torque or stress caused by the actuator.

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If Open / Close positions of an MOV is indicated to DCS through internal actuator controls limit switches (as opposed to external yoke mounted limit switches), those limit switches must correctly indicate the valve positions even when the power to the actuator is cut off.

Provide position indicator switches Open / Close on each MOV as integral part of the actuator.

Each piece of equipment where heat may be applied by preheating, welding or post heat treating shall be tagged by the Supplier giving all the necessary precautions to be observed to avoid damaging the component.

6.1.1 Sound guarantee

The basis of the below-mentioned values shall be ISO 3746 (sound pressure level at a distance of 1 m).

A mean A-rated sound pressure level of < 85 dB (A) shall be valid in the boiler house, which must not be exceeded.

These sound pressure levels shall be valid for all load conditions and without positive tolerance.

It shall be valid for individual tones that the A-rated one-third-octave band of an individual tone is at least 5 dB below the A-rated total sound pressure level.

The metrological proof of the sound power levels or sound pressure levels shall be provided by airborne sound and/or structure-borne sound measurements in accordance with DIN EN ISO 3744 or DIN EN ISO 3746, DIN 45635, DIN EN ISO 5136 or, whenever required, by a sound intensity measurement according to DIN EN ISO 9614-2 in the each valid version. The measuring uncertainties specified in the standards cannot be claimed by the Supplier.

If the above values are exceeded, repair measures are to be carried out until the guaranteed values are obtained.

Tests and Inspections

For each valve, the manufacturer shall furnish two (2) copies of a certification sheet containing the following information:

1. Manufacturer's name.
2. Manufacturer's serial number(s), same as marked on valve, for the valve body
3. ASME material specification used for pressure parts including valve body and other pressure retaining parts
4. Maximum allowable pressure, design pressure, in Kg/cm²g, and temperature, °C.
5. Hydrostatic shell test pressure meeting ASME B16.34 and IBR code requirements in Kg/cm²g with temperature in °C. Additional certification for valves manufactured to B16.34 Special Class.
6. Welding Certification: All welding on this valve has been performed using procedures and welders qualified in accordance with ASME Code Section IX.
7. Radiographs: Radiographic examination has been performed as required by ASME B16.34. One (1) set of the completed radiographs properly identified with the respective parts shall be retained and available for inspection for a period of five (5) years.
8. Surface examination of all castings has been performed by magnetic particle or liquid penetrant methods to the technique and acceptance standards of ASME B16.34.

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9. One (1) copy of each material manufacturer's certification
10. Authorized and dated signature

7 Drawings and Data by Supplier

7.1 Documents:- Bid Documentation

- Dimension sheets, cross sectional drawings
- Motor Datasheets, characteristics
- Inspection and test plan / Quality control plan (preliminary or sample)
- Hazardous analysis or list of rest remaining hazard
- List of references
- List of subcontractors of Supplier
- Certificate of QM system
- List of recommended spare parts for two years of operation and commissioning. (The spare and wear parts shall be listed and offered separately).

The documents contain amongst others the following data:

- KKS Number
- Main dimensions – valve and drive (overall length and height, dismantling height)
- Weight (total weight and individual weight for valve and drive)
- Admissible pressure and temperature
- Materials
- Parts list
- Connection sizes of all pipe nozzles

7.2 Documents:- Contract Documentation

The Supplier shall provide dimensional outline drawings of the assembled unit(s). The drawings shall show overall dimensions, mounting connections, clearances required for proper installation and maintenance, shall state lifting requirements, and the weights of all major components. Drawings should indicate for each component where heat may be applied for welding. Include necessary precautions to avoid damaging the component.

See applicable section in RFQ.

8 Scope of Supply

8.1 Valves & fittings

The Supplier shall take over the manufacture, fabrication, assembly and delivery of the shut-off valves as listed in the appropriate valve list. Opening/Closing pressure differences for motor operated actuators will be specified in the detail phase".

Scope of supply shall also include everything required for a proper function of the shut-off valves, including special tools.

For all flanged valves the Supplier has to deliver counter flanges incl. flange connection (bolts, nuts, sealings/gaskets).

(Note: this is also applicable for vacuum breakers)

The non-return flaps 06LAE05AA201 & 06LAE10AA201 shall be delivered incl. entire bypass (valve, piping, nozzles at non-return flap and installation).

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All required disassembling and assembling work due to pressure test and acid-cleaning or flushing of plant, are included in the scope of supply of the Supplier.

The scope of supply shall additionally include two (2) sets of gaskets and packings per different valve type.

For check valves & non-return flaps two (2) sets of gaskets and packings per valve/flap shall be delivered.

In addition one (1) set of gaskets and packings per different valve type, which shall be delivered near PAC, has to be offered optionally

For check valves & non-return flaps one (1) set of gaskets and packings per valve/flap, which shall be delivered near PAC, has to be offered optionally.

Spare and wear parts shall also be offered for 2 years operation, but they will be ordered separately from the main order.

Any spare and wear parts shall also be subject to the present technical specifications and acceptance conditions as the valves & fittings.

8.2 Actuators

Shut-off valves are to be equipped with actuators (Open/Close with intermediate position/inching type) according to valve lists. If any intermediate gears are necessary, they are to be provided by the Supplier.

8.3 Pressure relief protection devices

Slides in high pressure system (design pressure \geq PN63) shall be equipped with spring-loaded pressure relief protection devices incl. rupture disc.

If there are slides with self-sealing cover in addition to above mentioned slides, they must be delivered by Supplier incl. pressure relief protection, too.

The body overpressure protection fittings must be structurally designed in such a manner that no inadmissibly high pressure may occur in case of any alternate pressure application in the shut-off gate valves.

Spring-loaded pressure relief devices (KSB pressure relief device or a equivalent technical solution) shall be used.

8.4 Lubricants and oils, control oils and hydraulic liquids

The Initial filling with lubricants/ oils, control oils shall be included in the scope of supply of the Supplier. The Supplier shall ensure that the substances used by him are first refined products of highest purity, unloaded of any chloride or PCB compounds and are in conformity with applicable environmental regulations. The Supplier shall submit an analysis of the batches of lubricants/ oils, control oils used by him as a proof of the purity and properties.

In the course of the project, the Customer will prepare a list of the lubricants and oils, control oils to be used by him. The Customer will submit the list to the Supplier. The Supplier shall be obliged to use the lubricants/ oils, control oils specified by the Customer, unless any important technical details speak against the use of these substances. The reasons must be explained by the Supplier to the Customer in detail in writing. If the Supplier uses any lubricant/ oil, control oil or hydraulic liquid, which have not been specified by the Customer, the delivery of this substance shall be part of the scope of supply of the Supplier until 5 years after the provisional operational acceptance, and the Supplier cannot assert any extra costs. The use of a lubricant/ oil, control oil from the list specified by the Customer shall not limit the guarantee of the Supplier.

The Supplier shall be responsible to perform the analysis of the quality of the used lubricants/oils, control oils as well as hydraulic liquids after 2,000 and after 14,000 hours of operation, but no

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later than two (2) months after the expiry of the warranty period. In particular, the color, impurities, cause of any impurities, moisture content, acid number, kinematics viscosity at 40 °C, tightness at 15 °C, air separation characteristics at 25 °C and 50 °C, foam test and inhibitor test are to be analyzed. The analysis is to be submitted to the Customer. In view of any major ageing of the lubricants/ oils, control oils as well as hydraulic liquids these substances are to be replaced at the Supplier's cost. The relevant substances are to be replaced in particular, if the difference of the acid value of 0.5 mg KOH/g oil is exceeded and if an oil-water emulsion was formed, which cannot be separated by the use of separators and a separation process

8.5 Corrosion protection

Refer Annexure-A for "Specification Corrosion Protection"

Unless otherwise specified, the top coat can be made according to manufacturer's standard.

All parts are packed, protected against corrosion and preserved in such a manner that they do not suffer any damage until the commissioning.

Any necessary preservation of plant components for the overland transport, storage on site and erection until commissioning shall be included in the Supplier's scope of services and agreed with the Customer. This shall also include the provision of any required substances used and auxiliary equipment as well as any de-inhibition and the disposal thereof.

8.6 Labeling

All valves are to be provided with a nameplate, which shows the following technical data:

- Name of manufacturer
- Manufacturer's type number
- KKS number
- Nominal width and nominal pressure
- Design data
- Order number of the manufacturer
- Material
- Year of construction

If not allowed by the available space, a tag may also be used. The markup language on the nameplate or tag is English.

The nameplate or tag is to be made from non-rusting material and ensure an indelible lettering. The surface is to be mat or silky matt in order to avoid any blinding by reflecting light. Warning boards should have red letters on a white ground.

The nameplates are to be arranged and dimensioned in such a manner that they can be easily read from normal access roads. The nameplates must be arranged with an indelible marking. On electrical and switchgear cabinets the nameplate are to be arranged on the rear and front side of the cabinets.

APPENDIX A – SPECIFIC REQUIREMENTS

All documents in the following Tables are to be considered as part of this Specification whether included below as part of this specification or provided separately.

REFERENCED ALSTOM'S DRAWINGS, SPECIFICATIONS, & DATA SHEETS (Provided Separately)

DOCUMENT NUMBER	TITLE
148760_12_011_7020	C&I Specification for Power Plant Equipment
148760_12_011_7033	Specification for LV Motors
1.48760_00_196_7010	Quality Requirements of Special Design Bought-in Items
148760_00150_7002	Supplier documentation requirements

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1.48760-00780-7001	Corrosion Protection
1.48760/00 196-7020	End of manufacturing report requirements
1.48760/00 196-7001	Guideline for specifications of semi - finished products for Pressure Parts (SA-335 Grade 91)
1.48760/00 196-7002	Guideline for specifications of semi - finished products for Pressure Parts
1.48760/00 196-7004	Guideline for fabrication (especially welding) of Pressure Parts
1.48760/00 196-7005	Guideline for Non-Destructive Testing of Pressure Parts
1.48760/00 196-7008	Guideline for specifications of semi - finished products tubes SA 213 T91 for Pressure Parts
1.48760/00 196-7009	Guideline for specifications of semi - finished products for forgings for Pressure Parts
1.48760/00 196-7010	Guideline for specifications of semi - finished products for Pressure Parts Austenitic Material SA-213 TP347H
	Valve list
	Pressure differences for motor operated valves

CUSTOMER SPECIFICATIONS (Provided Separately)

DOCUMENT NUMBER	TITLE

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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 S. PANNNEER SELVAM	 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
					M	C				N	M	C	
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	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	1/ Lot	Manufacturer's Specification	Manufacturer's Specification	COC	√	P	V	V	*property change after heat aging.
					100%	100%	10,000 Cycles	No damage						
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	Manufacturer's Specification	COC	√	P	V	V	*including stiffness ratio.
							10,000 Cycles	No damage						

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; (I)/(Ts): Type test, COC: Certificate of compliance



MANUFACTURER'S
NAME & ADDRESS:
BHEL TIRUCHIRAPPALLI
APPROVED SUPPLIERS

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)

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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	
1.6	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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SUB-SYSTEM :Steam Generator Package

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					M	C				N	M	C	
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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QWI NO:SQP:SD:06
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SUB-SYSTEM :Steam Generator Package

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					M	C				N	M	C	
1	2	3	4	5	M	C/N	7	8	9	D*	**	10	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.

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