BUYER SPECIFIC - ADDITIONAL TERMS & CONDITIONS (ATC)		
NOTE: Bidder to confirm in affirmative by typing "YES" or "Applicable Data" in the response column		
Sl.no	Detailed Terms & Conditions	Bidder Response
1.	**GENERAL INSTRUCTIONS:**	
A	The quotation should be neatly typed and free from over writing/ erasures. Any correction or addition must be authenticated. The offer including annexures and brochures should be submitted in English. All Pages of Techno Commercial Bids (Main Pages), ATC should be signed and Stamped. Prices shall be quoted both in figures and words. In case of any discrepancy in value, the prices quoted in words shall be considered for evaluation and establishing L1 Status.	
B	Bidders to please note that the Terms & conditions contained in this document and ATC are to be read fully before submission of quotations.	
C	Bidders are advised to comply with ATC &SCC, should there be any deviations (where deviations are permitted), it shall be entered in the deviation column. BHEL reserves the right to reject such offers.	
2.	**Documentation for Payment**	
A	**Indigenous Purchase** Following documents shall be submitted immediately on dispatch of material to BHEL HPEP Site a. Original Tax Invoice (Refer ITB clause no 11 for Tax Compliance) b. Packing List - clearly showing number of packages, gross weight and net weight. c. Test/Warranty/Guarantee certificates, O&M Manual (If specified in ANNEXURE) d. Insurance intimation/declaration certificate e. Pre-dispatch Inspection report /Third Party Inspection Certificates. f. Consignee copy of LR signed & stamped by Customer/Site representative for DD Items g. e-waybill. h. Inspection Release Note (IRN) – In case of Joint Inspection cases i. MOM & Job Completion Certificate for Service/Commissioning Requirements	
3.	**Payment Terms: Following shall be the terms of Payment.** **Indigenous:** a. Micro & Small Enterprises (MSEs) - 100% Direct EFT payment within 45 days b. Medium Enterprises - 100% Direct EFT payment within 60 days c. Non MSME Bidders - 100% direct EFT Payment within 90 Days Note A. Above due date is reckoned from the date of Receipt of material or 15 days from the date of submission of complete set of documents as per PO whichever is later. Payment will be made on acceptance of Material. B. MSEs (covered under MSME Act) need to register and renew periodically and update the same with BHEL C. The taxes that are reimbursed are limited to applicable taxes as on the Purchase Order delivery date or the amount actually paid whichever is less. D. Adherence to the above time schedule of payment is contingent upon Bidder complying with GST provisions and availment of Input Tax Credit by BHEL before the date of payment. E. In case of packaged items, 10% of supply value will be retained till completion of total supplies.	
4.	**Excess materials** supplied beyond tolerance limit as specified in PO will not be paid and bidder may raise credit note for the excess/unaccepted material as per GST law.	
5.	**Rejected materials**, if any, shall be collected by the bidder within 90 days of such communication to the bidder. Beyond this period the bidder forfeits their right to the materials.	
6.	**PERFORMANCE BANK GUARANTEE (PBG) (Applicable in case mentioned in Annexure G)**	

	In case enquiry specifically spells out PBG requirement, PBG is to be submitted by Bidder in requisite format as per Annexure VII. Further detailing on PBG as specified in Annexure G. The PBG shall be for the performance of the goods and shall remain binding not withstanding such variations, alterations or extensions of item as may be made, give, conceded or agreed to between the Bidder and BHEL under these Terms and conditions or otherwise.	
7.	Procurement directly from the manufacturers/ suppliers shall be preferred. However, no agent shall be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer / supplier could bid directly but not both. In case bids are received from both from the manufacturer/ supplier and the agent, bid received from the agent shall be ignored.	
8.	**RIGHT OF REJECTION /NON- PLACEMENT OF PO:** BHEL reserves the right to accept or reject any or all bid/s in full or part without assigning any reason whatsoever.	
9.	**INTEGRITY PACT** Bidders shall have to enter into Integrity Pact with BHEL as per Annexure VI - for Tender value of rupees two crores and above and shall be signed by the authorized signatory along with the offer, failing which Bidder's offer will be rejected.	
10.	BHEL HPEP is registered with RXIL (TReDS) platform. MSME bidders are requested to get registered with RXIL (TReDS) platform to avail the facility as per the GOI guidelines.	
11.	Inspection Measuring and Test Equipment (IMTE) used by the Bidder/ Contractor or sub-contractor shall be calibrated, maintained and controlled. Calibration shall be valid and IMTE maintained in sound condition during usage.	
12.	ISO-9001, ISO14001 and OHSAS 18001 shall be complied	
13.	**Risk Purchase clause:** In case bidder fails/delays to supply whole or part of the ordered items or supplies defective items or fails to fulfil any other terms and conditions given in Purchase Order/Contract, BHEL has the right to terminate the order/contract or withdraw balance scope of work/supply and make the purchase of such material / services from elsewhere at the risk and cost of the defaulted bidder. The bidder is liable for the additional expenditure / difference in Cost, if any, including consequential losses which BHEL may sustain by reason of risk purchase in addition to the applicable LD as per the order/contract. Non-performance of contract attracts penal provisions in line with BHEL guidelines for Suspension of Business Dealings (SBD).	
14.	Any other terms and conditions of the bidder attached / referred against the tender enquiry will not be considered.	
15.	All drawings, patterns and tools supplied by BHEL or made at BHEL's expense are BHEL's property. These cannot be used or referred to any other party and must be used only in the execution of BHEL's orders.	
16.	Any amount payable by the bidder under any of the conditions of this contract shall be liable to be adjusted against any amount payable to the bidder under any other work / contract awarded by BHEL HPEP or any other BHEL Units. This is without prejudice to any other action as may be deemed fit by BHEL.	
17.	The bids of the bidders who are on the banned list and also the bids of the bidders, who engage the services of the banned firms, will be rejected. The list of firms banned by BHEL is available on BHEL web site: www.bhel.com	
18.	**Execution** The whole contract is to be executed in the most workman like manner, substantial and approved as per the contracted terms.	
19.	**Progress Report** The bidder shall render such report as to the progress of work and in such form as may be called for by the Buyer from time to time. The submission and acceptance of such reports shall not prejudice the rights of the buyer in any manner. Bidder shall communicate to BHEL immediately, the change of address, ownership, contact person(s), the mobile numbers and e-mail of the dealing person concerned. Milestones shall be periodically updated by bidder through PRADAN Portal **(https://web.bhelhyd.co.in/mm/).** Non updation will adversely affect service rating of bidder performance.	

20.	**Non-disclosure Obligations** Drawings, technical documents or other technical information received by one party shall not without the consent of the other party, be used for any other purpose than that for which they were provided. They may not, without the consent of the submitting party, otherwise be used or copied, reproduced, transmitted or communicated to third parties. All information and data contained in general product documentation, whether in electronic or any other form, are confidential and binding only to the extent that they are by reference expressly included in the contract. The bidder shall, as per agreed date/s but not later than the date of delivery, provide free of charge any information and/or drawings which are necessary to permit the Buyer to erect, commission, operate and maintain the product. Such information and drawings shall be supplied as specified in technical specification. All intellectual properties, including designs, drawings and product information etc. exchanged during the formation and execution of the contract shall continue to be the property of the submitting party. The bidder shall provide Buyer with all information pertaining to the delivery in so far as it could be of importance to Buyer. The bidder shall not reveal confidential information to its own employees not involved with the tender/contract and its execution and delivery or to third parties, unless Buyer has agreed to this in writing beforehand. The bidder shall not be entitled to use the Buyer's name in advertisements and other commercial publications including website without prior written permission from Buyer. In the event of violation of the confidentiality as agreed, BHEL will take legal action as deemed fit. Non-disclosure agreement to be entered as per **Annexure- II** wherever applicable.
21.	**Inspection and Testing** The goods and stores shall be manufactured by approved quality system and each part/component may be inspected and tested by the Buyer prior to shipment and shall comply with relevant requirements. Buyer has the right to inspect at any stage during manufacture/ delivery.
	Buyer or his authorized representative shall be entitled at all reasonable times during execution to inspect, examine and test at the bidder's premises the material and workmanship of all stores to be supplied under the contract, and if the part of the stores are being manufactured at other premises, the bidder shall obtain for buyer or his authorized representative permission to inspect, examine and test as if the said stores are being manufactured at the bidder's premises. Such inspection, examination and testing, if made shall not release the bidder from any obligation under the contract. For indigenous bidders all costs related to first inspection request shall be borne by the buyer and the cost of subsequent inspections due to non-readiness of material/rework/ rejections shall be borne by the bidder. In case of imports all inspection charges including third party inspections if any shall be borne by the bidder. The cost of inspection staff/third party specified by the Buyer shall be borne by bidder unless otherwise specifically agreed. If the contract provides for tests on the premises of the bidder or any of his sub-contractor/s, bidder shall be responsible to provide such assistance, labor, materials, electricity, fuels, stores, apparatus, instruments as may be required and as may be reasonably demanded to carry out such tests efficiently. Cost of any type test or such other special tests shall be borne by the bidder unless otherwise specifically agreed in the contract. The Bidder shall give the authorized representative of the buyer reasonable notice in writing of the date on and the place at which any stores will be ready for inspection/ testing as provided in the Contract. Annexure – I, may strictly be complied with for the time lines. Any delay in submission of the documents by the bidder will not alter the delivery date.
22.	**Quality and Condition of the Deliverables** The bidder shall be responsible for compliance with applicable technical, safety, quality, environmental requirements and other regulations in relation to products, packaging and raw and ancillary materials.
23.	**Packaging and Dispatch** The bidder shall package the deliverables safely and carefully and pack them suitably in all respects considering the peculiarity of the material for normal safe transport by sea/air/rail/road to its destination suitably protected against loss, damage, corrosion in transit and the effect or tropical salt laden atmosphere. The packages shall be provided with fixtures/hooks and sling marks as may be required for easy and safe handling by mechanical means. Special packaging conditions/ environmental conditions as defined in the NIT shall be fully complied. Each package must be marked with consignee name, address, P.O. number, Package Number, gross weight & net weight, dimensions (Lx B x H) and bidder's name. The packing shall allow for easy removal

	and checking of goods on receipt and comply with carrier's conditions of packing or established trade practices. Packing list for goods inside each package with P.O. item No. & quantity must also be fixed securely outside the box to indicate the contents. If any consignment needs special handling instruction, the same shall be clearly marked with standard symbols/instructions. Hazardous material should be notified as such and their packing, transportation and other protection must conform to relevant regulations.
24.	**Rejected/Short shipments/ warranty/guarantee replacements** In case of any short shipment during initial supply which is subsequently dispatched by the bidder or any guarantee / warranty replacements shall be dispatched on "DDP-Delivered duty paid BHEL stores" basis for imported items and "FOR-BHEL Stores/designated destination" basis for indigenous items.
25.	**Non-waiver of Defaults** If any individual provision of the contract is invalid, the other provisions shall not be affected.
26.	**Settlement of Disputes** Except as otherwise specifically provided in the contract, all disputes concerning questions of the facts arising under the contract, shall be decided by the Buyer, subject to written appeal by the bidder to the buyer, whose decision shall be final. Any disputes of differences shall to the extent possible be settled amicably between the parties thereto, failing which the disputed issues shall be settled through arbitration. The bidder shall continue to perform the contract, pending settlement of disputes(s).
27.	**Conciliation clause** CONCILIATION CLAUSE FOR CONDUCTING CONCILIATION PROCEEDINGS UNDER THE BHEL CONCILIATION SCHEME, 2018: The Parties agree that if at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the agreement, contract or the Memorandum of Understanding, penalty deduction, time extension), which the Parties are unable to settle mutually, arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in Procedure in http://www.bhel.com/index.php/story_details?story=2454 . The Procedure together with its Formats will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in this ITB
28.	**ARBITRATION (WITH SOLE ARBITRATOR)** **ARBITRATION FOR CONTRACT WITH PUBLIC SECTOR ENTERPRISE (PSE) OR A GOVERNMENT DEPARTMENT** In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD as mentioned in DPE 0M No 4(1)/2013DPE(GM/FTS 1835 dated 22-05-2018.
29.	**Applicable Laws and jurisdiction of Courts** This agreement shall be construed and interpreted in accordance with the laws of India and shall have exclusive jurisdiction of Sangareddy/Hyderabad courts, Telangana, India.
30.	**BHEL-Fraud prevention policy shall be adhered to.** The Bidder along with its associate/ Collaborators/ Sub-contractors/ sub-bidders/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention policy displayed on BHEL Website http://www.bhel.com and shall immediately bring to the notice of BHEL management about any fraud or suspected fraud as soon as it comes to their notice. List of nodal officers is hosted on BHEL Hyderabad website https://hpep.bhel.com/.

31.	**Suspected Cartel Formation** The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case , the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies / guidelines Except as provided elsewhere in this Contract, in case amicable settlement is not reached between the Parties, in respect of any dispute or difference; arising out of the formation, breach, termination, penalty deduction, validity or execution of the Contract; time extension, or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or, in any manner touching upon the Contract, then, either Party may, by a notice in writing to the other Party refer such dispute or difference to the sole arbitration . Sole arbitrator to be appointed by Head of the Unit - BHEL , HPEP . The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the Parties. Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be Sangareddy / Hyderabad, Telangana. The language of arbitration shall be English and the documents shall be submitted in English. The cost of arbitration shall initially be borne equally by the Parties subject to the final apportionment of the cost of the arbitration in the award of the Arbitrator. Subject to the arbitration in terms of clause 45, the courts at Sangareddy, Telangana State shall have exclusive jurisdiction over any matter arising out of or in connection with this contract. Notwithstanding the existence or any dispute or differences and/or reference for the arbitration, the Contractor shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and expedition in a professional manner except where the Contract has been terminated by either Party in terms of this Contract.

Note: Purchase officer has to fill Annexure-I while sending enquiry.

Vendors Sign & Stamp

SPECIAL CONTRACT CONDITIONS			
Sl.no	Clause	Vendor Response Yes/No	Comments

1	**Penalty Clause:** As per GeM General Terms & Conditions. **<u>For Material:</u>** However, C Note (In case of destination of goods is BHEL, Hyderabad) and MRC date (In case the destination of goods is Direct Dis patch to Site) shall be considered as a delivery date for Penalty Calculation. Note: Absence of enclosed Annexure 1 (Duly signed and stamped) will entail non processing of delivery extension cases in case of delay in supplies of goods owing to reason attributable to BHEL.		**Non Deviatable Clause**
2	**Guarantee / Warranty Period : (Deviation to this clause is not acceptable.)** Wherever required, and so provided in the specifications/Purchase Order, the seller shall guarantee that the goods supplied shall comply with the specifications laid down, for materials, workmanship and performance. If within the guarantee period, the delivery is found to be non-complaint, the seller shall on his own account, replace repair, or re-execute the delivery at Purchaser's discretion on the purchaser's first request or within the mutually agreed period, without prejudice to Purchaser's other legal rights. If the seller continues to default on their obligations, purchaser has the right to proceed to replace, repair or re- execute the order at the seller's expense, with or without help from third parties. Purchaser shall notify the seller of the exercise of this right in advance where ever possible. Unless otherwise specified, **guarantee period shall be 12 months from the date of commissioning or 18 months from the date of supply/replacement whichever is earlier.** For bought out packages which are intended to be incorporated in installations or systems the guarantee period shall not start until the time the installations or systems are commissioned, provided always that the period ends not later than 30 months after the date of supply of the goods. The guarantee period shall be extended by the period during which the goods are not in compliance. A guarantee period as described above shall apply afresh to replaced, repaired or re-executed parts of a delivery.		**Non Deviatable Clause**
3	**Detailed Billing Break up:** Vendor has to provide detailed Price Breakup for the BHEL Material Codes after Price Bid Opening/Reverse Auction.		**Non Deviatable Clause**
4	**Delivery** Please quote the best possible delivery Schedule. However, it may be noted that the delivery mentioned in the RFQ shall be meet by vendors. In case, the delivery mentioned in the tender is not met, BHEL reserves right to reject such offers. Annexure 1 has to be duly filled and Signed Vendor to note that dispatch of goods shall be done only after obtaining Dispatch Clearance from BHEL, Hyderabad.		

5	Following Duly Signed & Stamped Documents has to submitted along with your Technical Offer 1. Annexure 1 – Delivery Mile Stones agreement 2. Annexure 3 – Local Content 3. Annexure 4 – Restriction of procurement from Countries sharing land with India		**Non Deviatable Clause**
6	**Bill of Material:** BOM is enclosed for your reference. Supplier has to quote for the complete Qty of BOM Table. Supplier has to quote FOR Destination inclusive of all taxes, entire BOM as Single Package. Evaluation of offer will be done on **Set wise L1 Package** of this RFQ.		
7	**Others:** Following points shall be noted ➢ **CAV is applicable/Any non CAV Vendor acceptance is subjected to end customer/BHEL approval.** ➢ **Drawing Approval is Applicable** ➢ **QAP Approval is applicable**		**Non Deviatable Clause**
8	For any Further details/queries regarding this Tender, you can contact the following Officers: Evinod Kumar, Dy Manager/Pur/TC – evinodkumar@bhel.in You can call us on 040-23182168		
9	All the offers received through GeM portal will be evaluated subject to End Customer Approval. Vendors quoting for this Enquiry shall be approved vendor of Customer and Project details are mentioned in BOM list.		
10	Please note that vendors offer is liable for rejection, in case any deviation to **Non Devi table Clause.** Any other terms mentioned anywhere in your offer will not be considered. Terms agreed in the Buyer ATC and Special Contract Conditions are final.		
11	Integrity Pact OEM 1 Shri Otem Dai, IAS (Retd.) iem1@bhel.in OEM 2 Shri Bishwamitra Pandey, IRAS (Retd.) iem2@bhel.in OEM 3 Shri Mukesh Mittal, IRS (Retd.) iem3@bhel.in		
12	**Inspection (For Indigenous vendors):** **Deviation to the sampling plan will lead to rejection of your bid.** BHEL appointed TPI for all BHEL Orders. Wherever applicable, End Customer Appointed TPI/End Customer will also have participated in Joint Inspection. Indian Offers will be loaded by 0.198% towards TPI charges to arrive the total destination cost to BHEL wherever TPI is applicable.		
13	**Contact Details of Supplier** **Name:** **Email:** **Contact:**		

Annexure-I				
Major Activity timelines shall be considered for indigenous purchases				
S No	Activity	Agency	Timeline	Acceptance / Remarks
1	PO acknowledgement	Vendor	04 days from the date of receipt of PO	
2	First submission of Drawings, Data sheets and QP Rev-00	Vendor	15 days from receipt of PO	
3	commented / approved drawings / data sheets and QP to vendor	BHEL/Customer	07 days from the receipt of Rev-00 submission.	
4	Subsequent submission of revised drawings / data sheets and QP	Vendor	07 days from the receipt of commented drawings / data sheets and QP	
5	Subsequent Approved /commented Drawings and QP to vendor	BHEL/Customer	07 days from the date of receipt of revised drawings / data sheets and QAP.	
6	Raising of Inspection Call	Vendor	07 days before the proposing inspection date. (BHEL will provide approved QP before raising inspection call)	
7	Inspection completion	BHEL Third party inspection agency / Customer	07 days from inspection call date.	
8	Despatch Instructions	BHEL	07 days from the date of receipt of final approved inspection report to BHEL.	
9	Receipt of Material at BHEL stores/ site	Vendor	15 days from Despatch instructions	

Absence of this annexure in NIT will entail non processing of delivery extension cases in case of delay in supplies of goods owing to reason attributable to BHEL.

Vendor's Signature

Annexure - III

Proforma for self-certification by Supplier for minimum local content on their letter head for tender value less than Rs 10 Crore

"We _____ (Name of Manufacturer) undertake that we meet the mandatory minimum Local Content (LC) requirement i.e. _____ (to be filled as notified in the policy) for claiming Purchase Preference linked with Local Contents under the Govt. policy against tender no. _____."

Note: As per GOI circular, the bidders offering Imported items falls under the category Non-Local Supplier. They can't claim as Class I Local Supplier/Class II Local Suppliers by claiming the services as transportation, Insurance, Installation, Commissioning & training and after sales service support like AMC/CMC etc as local value addition

Auditor's certification with respect to minimum local content on the letter head of Statutory Auditor for tender value above Rs.10 crore

"We _____ the statutory auditor of M/s _____ (name of the bidder) hereby certify that M/s_____ (name of manufacturer) meet the mandatory Local Content requirements of the Goods and/or Services i.e. _____ (to be filled as notified in the policy) quoted vide offer No._____ dated _____ against BHEL's tender No._____ by M/s _____ (Name ofthe bidder)."

Note: As per GOI circular, the bidders offering Imported items falls under the category Non-Local Supplier. They can't claim as Class I Local Supplier/Class II Local Suppliers by claiming the services as transportation, Insurance, Installation, Commissioning & training and after sales service support like AMC/CMC etc as local value addition

ANNEXURE IV

Proforma for self-certification by Supplier for Compliance to below Clause

Clause: Any Bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with competent authority. https://www.mea.gov.in/ to be referred for latest details of competent authority and exemptions.

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and I certify that M/s_____**(Name of firm)**

(Tick the Appropriate)

☐ **Is not from such a country**

☐ **Is from such a country and has been duly registered with the Competent authority.** (If, Yes Please enclose the Approval obtained from Competent Authority)

I hereby certify M/s _____ **(Name of firm)** fulfills all requirements in this regard and is eligible to be considered (where applicable, valid registration by the competent authority shall be attached)

Sd/-
Authorized Signatory with Stamp

BILL OF MATERIAL AND DISPATCHING SCOPE OF ITEMS FOR THIS RFQ/ENQUIRY ARE AS FOLLOWS:
Project: Numaligarh Refinery Ltd. - RPTU RGC & SGC

SET	PR	Matl Code	Material Description	Qty	MU	Delivery Location
1	7000108280	TC9767659013	RS-MO-BALL_VLV-6”-1500#-RJ-NACE-H2-SOUR	1	EA	TC STORES BHEL HYDERABAD R C PURAM 502032
	7000109160	TC9767660011	MAND.SPARES FOR 6"-1500#-RJ-RS-BALL_VLV	1	SET	
2	7000108281	TC9767659021	RS-MO-BALL_VLV-10”-1500#-RJ-NACE-H2-SOUR	1	EA	
	7000109161	TC9767660020	MAND.SPARES FOR 10"-1500#-RJ-RS-BALL_VLV	1	SET	
3	7000108282	TC9767659030	RS-MO-BALL_VLV-12”-1500#-RJ-NACE-H2-SOUR	1	EA	
	7000109162	TC9767660038	MAND.SPARES FOR 12"-1500#-RJ-RS-BALL_VLV	1	SET	
4	7000109163	TC9767659048	RS-MO-BALL_VLV-8”-300#-RF-NACE-H2-SOUR	1	EA	
	7000108810	TC9767660046	MAND.SPARES FOR 8"-300#-RF-RS-BALL_VLV	1	SET	
5	7000109164	TC9767659056	RS-MO-BALL_VLV-18”-300#-RF-NACE-H2-SOUR	1	EA	
	7000108811	TC9767660054	MAND.SPARES FOR 18"-300#-RF-RS-BALL_VLV	1	SET	
6	7000109165	TC9767659072	RS-MO-BALL_VLV-12”-300#-RF-NACE-H2	1	EA	
	7000108812	TC9767660070	MAND.SPARES FOR 12"-300#-RF-RS-BALL_VLV	1	SET	

Evaluation Scope for above items listed is on Set wise L1 Evaluation.

ANNEXURE A FOR ENQUIRY B7H1W08280(Rising Stem Ball Valve)

1. Financial PQC.

Average Annual Financial Turnover of bidder, during the last three financial years (ending on 31.03.2023 or latest closing date of financial year) should not be less than in below table for respective categories.

SET	PR	Matl Code	Material Description	Qty	MU	Average annual Turnover in Lakhs
1	7000108280	TC9767659013	RS-MO-BALL_VLV-6”-1500#-RJ-NACE-H2-SOUR	1	EA	18
	7000109160	TC9767660011	MAND.SPARES FOR 6"-1500#-RJ-RS-BALL_VLV	1	SET	
2	7000108281	TC9767659021	RS-MO-BALL_VLV-10”-1500#-RJ-NACE-H2-SOUR	1	EA	34
	7000109161	TC9767660020	MAND.SPARES FOR 10"-1500#-RJ-RS-BALL_VLV	1	SET	
3	7000108282	TC9767659030	RS-MO-BALL_VLV-12”-1500#-RJ-NACE-H2-SOUR	1	EA	36
	7000109162	TC9767660038	MAND.SPARES FOR 12"-1500#-RJ-RS-BALL_VLV	1	SET	
4	7000109163	TC9767659048	RS-MO-BALL_VLV-8”-300#-RF-NACE-H2-SOUR	1	EA	11
	7000108810	TC9767660046	MAND.SPARES FOR 8"-300#-RF-RS-BALL_VLV	1	SET	
5	7000109164	TC9767659056	RS-MO-BALL_VLV-18”-300#-RF-NACE-H2-SOUR	1	EA	40
	7000108811	TC9767660054	MAND.SPARES FOR 18"-300#-RF-RS-BALL_VLV	1	SET	
6	7000109165	TC9767659072	RS-MO-BALL_VLV-12”-300#-RF-NACE-H2	1	EA	18
	7000108812	TC9767660070	MAND.SPARES FOR 12"-300#-RF-RS-BALL_VLV	1	SET	

Vendor shall meet the turnover criteria for each category quoted by the vendor. If vendor is quoting for more than one category, the qualification shall be based on cumulative turnover required for all the categories quoted.

1. SCOPE:

This standard specifies the requirement of MOTOR OPERATED RISING STEM BALL VALVES flanged, carbon steel body material, with special requirement of NACE+ Hydrogen service+ Sour Service +PWHT

APPLICATION:

These valves are used for compressor suction and discharge line

2. DESIGNATION:

The Ball Valve shall be designated on the material indents as follows:
EX: MOTOR OPERATED BALL VALVE CS 10" #1500RJ NACE +H2

3. GENERAL REQUIREMENTS OF BALL VALVES:

3.1 For Valves in NACE/ Wet H2S Service, the material certificates and valve certificates shall indicate compliance with ANSI-NACE MR 0103.

3.2 Valve and its actuator shall be min SIL-2 certified from authorised agency.

3.3 For valve used in Hydrogen Service, the valve must be certified for the use in Hydrogen service, specifically Hydrogen diffusion problems. Reference list, along-with performance feedback shall be furnished.

3.4 For hydrogen service the valve shall meet all the material and testing requirements such as Helium leak test etc. The leakage class for valve shall be in accordance with ISO 15848-1. Stem and body leakage should be as per table 1 and table 2 respectively of ISO 15848-1 with test fluid of min. 97% pure Helium.

3.5 Fire safe valves having soft components (stem, seat or body seals) shall be of a fire type tested design in accordance with ISO 10497 and provided with appropriate certification. For valves that have been type tested before 2005, testing in accordance with BS 6755 Part 2, ISO 10423 (API 6A) is acceptable.

3.6 100 % PMI shall be done on All SS parts. The Supplier, Manufacturer or Fabricator shall provide material certification for materials requiring PMI.

3.7 Seals used in Ball valves shall be Anti Explosive Decompression (AED) Seals.

3.8 Short-pattern valves shall not be used.

3.9 Partial Stroke test is applicable for all valves of this specification. Bidder shall verify applicable clauses for more details.

3.10 Valves shall have position-indicator showing open and close positions.

3.11 In case of ball valves, usually with 2-piece or 3-piece split-body design, the valve body diameter may exceed the valve connecting flange diameter. If this is the case, the vendor shall clearly state the valve body diameter in the ball valve data-sheets and bring it to customer attention for consideration of special requirements for the valve piping design and layout.

3.12 **Valve Identification shall as a minimum be as per MSS SP 25. The minimum letter size is 4.5 mm. Each valve shall have a metal tag with its descriptive valve identification number inscribed on it.**

3.13 **Flow direction shall be marked on the valves body conspicuously, where the valves are unidirectional.**

3.14 **All ball valves are to be of a design to provide automatic body cavity pressure relief to prevent over pressurization of the valve body when valve is closed. Trunnion mounted ball valves shall have body cavity pressure relief to the upstream side.**

3.15 **All the instruments in Hydrogen Service shall be certified for use in Hydrogen service by the manufacturer specifically with respect to Hydrogen Diffusion. All the Instruments in NACE service shall meet specific material requirements like hardness, radiography, material requirements and material testing requirements as per ISO 15156. For specific requirements requiring PWHT, Ultrasonic test, Radiography, Dye penetration etc., piping material specification shall be referred. Specific treatment (e.g.: Silicon-coating) shall be given to threads and stem to avoid Galling.**

3.16 **All instruments wetted parts shall be SS 316 as minimum and Electronic housing material shall be of Epoxy coated die cast Aluminium.**

3.17 **Flying leads shall not be acceptable in any Instruments.**

3.18 **MOV actuators shall be Explosion proof design, with hazardous area classification and ingress protection class shall be IP-67 as per IEC-60529 / IS-2147.**

3.19 **As a minimum, for all valves, Leakage class shall be ANSI/FCI 70.2 - Class IV**

3.20 **Noise from On-Off valve during operating condition shall be limited to OSHA specified limit or better. The predicted aerodynamic noise level at a 1-meter radius from the valve discharge flange shall not be greater than 85 DBA.**

3.21 **Ball valves shall normally be full Bore Ball type unless specified otherwise.**

3.22 **The ball valves shall have the following ball-mounting configuration.**

Sr. No.	Valve Size DN (NPS)	SW or Screwed Ends	Flanged			
			#150	#300	#600 & #900	#1500 & #2500
1	DN15 to 40	Floating	Floating	Floating	Floating	Trunnion
2	DN 50 to 80	NA	Floating	Floating	Trunnion	Trunnion
3	DN 100	NA	Floating	Floating	Trunnion	Trunnion
4	DN 150	NA	Floating	Trunnion	Trunnion	Trunnion
5	DN 200 & ABOVE	NA	Trunnion	Trunnion	Trunnion	Trunnion

3.23 **Ball valves with welding-ends or with threaded-ends requiring seal-welding shall permit soft seal and ball replacement without cutting valve end connections to remove the valve from connected piping.**

3.24 **Single piece valve bodies with axial entry (i.e., threaded insert holding the ball, e.g., Velan Model HB 2000 or Nutron Model H1 or equivalent models) are not acceptable.**

3.25 **For multi-piece ball valves, vendor shall verify that the body joints are capable of withstanding loads imposed by a fully stressed connected piping system with no resultant joint leakage. A fully stressed piping system has the maximum allowable calculated stresses due sustained loads or displacement strains as defined in ASME B31.3.**

3.26 **The ball and stem of all ball valves shall be of solid construction of the specified material.**

3.27 **Weld overlayed balls and or stems are not acceptable**

3.28 **Body split shall be outside the plane of the stem.**

3.29 **Floating type ball valves with integral stem to ball joint are not acceptable.**

3.30 **Stem shall be anti-blow-out type and shall be capable of withstanding the full internal pressure of the valve as per the appropriate ASME class.**

3.31 **The design shall be of anti-static type to ensure electrical continuity between the ball and the body.**

3.32 **Lever operator shall not be longer than twice the F/F dimension of the valve.**

3.33 **Two- or three-piece bodied valves shall be designed so that body joint gaskets and bolting can safely withstand piping loads without any leakage or affecting valve seat leakage performance. Body bolting studs shall be fully enclosed within the body components.**

3.34 **Vendors and bidders should note that some or all the valves may be subjected to site seat leakage test and or functional test. For valves in gas service, high pressure and low-pressure gas leak test may be conducted at the site any leakage shall be corrected by vendor or at the vendor's cost.**

3.35 **Vendor shall deploy to site their valve repair and service personnel and experts along with the quality personnel along with the necessary tools and components to rectify the situation within one week from the date of the compliant from the site for the necessary correction and supervision at their own risk and cost.**

3.36 **For fire safe valve with fire safe actuator, fire resistant blanket / jacket shall be provided as per Licensor specifications. In case, the type of protection is not specified by licensor, contractor can consider fire resistant blanket / jacket type of protection. The protection system supplied shall be able to provide fire coverage of minimum half an hour of hydrocarbon pool fire to protect the valve components i.e., valve positioner, actuator and accessories like air tank, limit switch, SOV, AFT etc. Selected fire protection system should have undergone type test as per UL1709**

(Hydrocarbon fire exposures) and BS 476 Part 20 for hydrocarbon fire and type test certification shall be provided for the same.

3.37 Hazardous area classification: Zone 2 Gr. II C, T3

3.38 Inspection certificates for all valves shall be submitted as per ISO 10474 Type 3.2 , EN 10204 type 3.2 from an authorised TPI.

4. TECHNICAL REQUIREMENTS:

TABLE - I

CL	REQUIREMENTS	COMPLIANCE
4.1	**Pressure Temperature ratings**	**ASME B16.34**
4.2	**Materials**	**As specified in Table - II**
4.3	**Construction**	**API 6D**
4.4	**End Connections**	**Flanged RJ**
4.4.1	**Flanged**	**ASME B16.5**
4.5	**Face to Face and End to End dimensions**	**ASME B16.10**
4.6	**Schedule**	**As per PR**
4.7	**Hydraulic test pressure**	**1.5 times of maximum working pressure corresponding to valve class**
4.7.1	**Body**	**As per pressure class**
4.7.2	**Seat**	**As per pressure class**
4.7.3	**Low Pressure Test**	**As per relevant standard**
4.7.4	**Additional requirement**	**H2 service as per Annexure-1, Sour Service as per Annexure-2 and NACE MR0103**
4.8	**Maximum Allowable Pressure Drop across the NRV**	**Vendor to specify**
4.9	**Fugitive Emission**	**as per ISO 15858 Part-1: Tightness class C**
4.10	**Mode of Operation**	**Motor Operated**
4.11	**Special requirements**	**Valve shall be fire safe with fire proof actuator. Power and control cables shall be fire proofed**
4.12	**Fire test**	**API 607 for blow down and valves in Hydrocarbon services**
4.13	**Corrosion allowance**	**3.2 mm**

5. Actuators and their Accessories

5.1 Actuator Design Basis

Each MOV actuator shall include the motor, actuator unit, gears, position indicators, limit switches, hand wheel, electrical starter and controls, terminal box etc. as a self-contained unit.

The actuator shall be sized to provide adequate torque and/or thrust to ensure the complete intended travel of the valve under the worst operating and electrical power supply conditions.

The enclosure of complete MOV actuator including motor, integral starter, control transformer unit and all control devices shall be Ex d certified and shall have minimum IP-67 degree of protection which shall include the 'O' ring for complete environmental protection.
When specified, Smart MOV and Field Control Unit to be supplied. 1 Number Hand-held Infrared/ Bluetooth Remote Programming Device shall be supplied with each valve.
Actuator color: RAL 7031.

5.2 Master Control Unit

Central control unit shall be microprocessor-based unit complete with a dedicated keyboard and a display unit. It shall be possible to operate the actuators and configure the network devices from the keyboard/display unit. Protection shall be provided in the central control unit for selecting configuration mode.

Central control unit shall be with dual redundant configuration in such a way that failure of one unit shall automatically transfer the control to the redundant unit. The switch over time shall be of the order of 100 msec. The output shall hold to the last state during switch over.
The system software shall include all software necessary for operation, displays and configuration of the complete system, along with software for communication with DCS/ Host computer. Software shall also be provided for the detailed diagnostics within the system including in the master control unit and in the network. The system shall also be capable to display all diagnostic alarms including those for field control units, network and of central control unit. Diagnostics shall also identify and display the exact location of network fault.
The system shall operate satisfactorily at 415 V ± 10% 50 Hz ± 3% power supply, unless specified otherwise elsewhere in the document.
The system configuration shall be stored in the retentive memory. Communication with Distributed Control System /HOST computer
The master control unit (Slave) shall provide RS 485 port with MODBUS protocol for transferring data to DCS / host computer (Master). Redundant ports shall be provided for this connectivity.
It shall be possible to transfer data to and from the DCS to master control unit through this connectivity.
It shall be possible to include or delete any of the MOV from the system from Master Control Station.

5.3 Motor

The Motor shall be 3-phase squirrel cage induction type unless otherwise specified. It shall have totally enclosed non-ventilated and surface cooled construction.
The motor shall be designed for valve actuator service with high starting torque and shall be suitable for direct on line starting. It shall be rated for S2- 15-minute duty and shall conform to IS 325 or equivalent international standards.
The actuator assembly shall be provided with thermostat(s) embedded in it to achieve protection of motor against over-temperature.
The motor shall be suitable for starting under required torque with 75% of rated voltage at motor terminals
The motor shall have class 'F' insulation with temperature rise limited to class 'B' limits. Motor winding shall be treated to resist corrosive agents and moisture.
Motor fault may hold the valve in last position(Stayput).
System shall be solidity earthed.
Motor rotor shall preferably be of die-cast aluminium and, if brazed, shall be free from phosphorous.
Motor installed in actuator shall be rated for minimum of 60 starts/stop per hour. This is minimum requirement of actuator envisaged for On-OFF duty only.
In case of intrusive type actuator, anti-condensation heater shall be provided irrespective of IP-66/68 enclosure. However, in case of non-intrusive type actuator, space heater is not required.

5.4 Integral Starter and Control Transformer

The reversing starter, control transformer and local controls shall be integral with the valve actuator, unless specified otherwise. Solid state control of valve actuator and electrically isolated interface for remote control requirement shall be provided, wherever these features exist in manufacturer's design.
The integral starter shall be supplied with the following devices:

a. Electrically and mechanically interlocked reversing contactors for opening and closing operations

b. Control transformer with necessary tapping and protected with suitable easily replaceable fuses.

c. Terminal block for external cable connection fully prewired for internal devices of valve actuator.

d. MOV actuators operating with AC power supply shall be provided with Instantaneous Phase reversal protection.

5.5 Integral Push Button, Selector switches, Indications and Control devices

The following local control device shall be provided integral with the MOV actuator:

a. Push buttons for 'Opening/Closing/Stop' or alternatively 'Open/Close' selector switch

b. 'Local/Off/Remote' selector switch, pad-lockable in each position

c. Local continuous position indication from 'Valve fully open' to Valve fully closed' position, which may be of analogue or digital type using mechanical indication/Indicating lamps/LEDs.

5.6 Torque and Travel Limit Switches

Torque limit switches shall be provided to protect the motor from over-loading by cutting-off the power supply to motor during opening and closing operations. The limit switches shall be preset, However, it shall be possible to set the value of maximum torque during closing from 50% to 100% of rated torque of actuators. Travel limit switch shall be provided to cut-off the power supply to the motor at the end of preset limit of valve travel. The switches shall be provided with requisite number of potential-free contacts for valve actuator operation and for indication on remote panels. Instead of mechanical torque limit switches, magnetic pulse counter/encoders to measure and control the stroke of actuator may be provided, wherever this feature exists in manufacturer's design.

5.7 Control Facilities

The internal controls and monitoring circuits shall be incorporated within the integral starter along with transformer and control unit of valve actuator.
Remote control facility shall be provided as a standard feature. The remote control circuits shall be powered from internally derived control supply voltage. Common status contact indicating the availability of the MOV actuator for remote control shall be provided by monitoring the following:

a. Loss of one or more phases of power supply
b. Loss of control circuit supply
c. Selector switch in local mode
d. Local stop push button set to 'Off'
e. Motor thermostat tripped
f. Any other local fault/abnormal condition.

Where applicable, one number hand-held infrared/blue tooth remote programming device required for site commissioning and reconfiguring (without the need of removal of the MOV cover) shall be supplied for each group of 10 valve actuators (subject to minimum one infrared/Bluetooth remote setting device, even if number of valve actuators are less than ten)

5.8 Interface with Owner's DCS/Remote Pushbutton Station

As a minimum as specified in project requirements, PID and licensor document, Potential free contact for the following shall be provided in actuator assembly for hardwire interface with Owner's DCS and/or Remote Push button station.

a. Run indication
b. Trip indication -
c. Open status - 2 Nos.
d. Close status - 2 Nos.
e. Ready to start indication
f. Torque high indication
g. Thermostat status
h. Open command
i. Close command
j. Local/Remote

MOVs should be operated with 4 hand switches each. One open/stop/close switch at the valve, one at the Local Compressor panel, one close switch 30 meters (100

feet) away from the Compressor for stopping flow to the compressor in case of compressor fire, and One close switch in the control room.

5.9 Hand Operation

A hand wheel with hand/auto lockable lever shall be provided for emergency operation of the MOV. the energization of the motor shall automatically re-engage power operation.

5.10 Remote Position Indicator

a 4-20 mA remote position transmitter shall be provided in the valve actuator and a continuous position indicator for mounting in remote panel shall be supplied as a loose item, the remote position indicator shall continuously indicate the position of travel of the valve.

5.11 Wiring and Terminals

All devices provided in the actuator shall be wired up to the terminal block. The contacts for remote operation and indication shall also be wired up to the terminal block. Minimum 10% spare terminals shall be provided for future interlocks. internal wiring for power and control circuits shall be appropriately sized for MOV actuator rating. Each wire shall be identified at both ends using PVC ferrules. The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal so that the actuator electrical components are protected from the ingress of moisture and foreign materials when the terminal cover is removed during installation and maintenance.

The actuator shall be provided with minimum five adequately sized cable entries viz., one for power cable and two for control cables. Suitable double compression cable glands shall be provided with each actuator for all cable entries and sealing plugs for all control cable entries. The cable glands and plugs shall be made of SS 316. Plastic plugs shall not be acceptable.

5.12 Limit Switches

Limit switches wherever applicable shall be supplied with valve to indicate open and close position of the valve. Limit switches shall be mounted on the actuator yoke. Limit switches shall be proximity(inductive) type as per NAMUR DIN 19234, separate for open/close position of the valve. Limit switches shall be actuated directly from the valve stem or shaft must be adjustable and shall not be affected by the vibration.

On/Off valve limit switches shall be external to the actuator, shall not be integral part of actuator.

All valves shall be supplied with a high visibility mechanical position indicator for easy verification of the valve position status.

Limit Switches shall be intrinsically safe Ex(ia) certified (Exd for MOV). Limit switches shall be 2-wire installed in the junction box, enclosure material shall be die-cast Aluminium and ingress protection class shall be minimum IP- 65 as per IEC 60529. Terminal blocks shall be anti-vibration terminal block suit for 1.5 sq.mm.

Each junction box shall have two cable entries of min. ½" NPTF for open and close limit switches. Cable gland/plug material shall be SS304/316. Cable gland shall be Ex-e/Ex'd', double compression type.

DESCRIPTION	MATERIAL
Body	**ASTM A216 Gr.WCC**
Bonnet	**ASTM A216 Gr.WCC or A105N**
Bonnet Gasket	**316 or 347SS / Graphite**
Fasteners	**B7M/2HM or (Grade 660SS-onshore only)**
Core/Ball	**SS316 (Minimum)**
SPRINGS	**INCONEL X-750**
GLAND FLANGE	**A105N**
O rings	**AED (Anti Explosive Decompression)**
Packing Rings	**Graphite**
STEM SEAL	**Flexible Graphite / PTFE / PTFE VRings+ Flexible Graphite**

Unless otherwise stated, General valve trim shall be constructed from 316 SS. However, the use of trim materials such as Stellite No 6 faced 316 SS,17-4 PH, 440C, Hastelloy C, Monel or tungsten Carbide coated 316 SS etc may be considered.

Bonnet

Generally, stem seals shall comprise of a bolted packing box assembly, designed to allow the packing to be adjusted or completely removed without having to disturb any other components of the valve assembly.

Where process streams containing Toxic / Volatile Organic Compounds (VOCs) are specified, the valve may require special low fugitive emission valve packing (Class B or better) as per ISO-15848-1 and / or bellows sealing. Leakage requirements for Fugitive emissions are listed below:

For hydrocarbon service, "Low Emission Packing Technology" shall be used to achieve 100 ppm maximum leakage.

a. For non-hydrocarbon service (i.e. steam), 500 ppm maximum leakage is required.

b. For hydrogen service, 50 ppm maximum leakage is required. For such case, the API standard

(API622) does not cover it. So ISO 15848 shall apply.

The type of packing / sealing selected shall be compatible with the process and environmental conditions prevailing for each given application. Generally,

the type of packing shall be selected in accordance with the following temperature limits:

Temperature	Packing Material
-40 to +200 °C	**PTFE**
Above +200 °C	**Graphite in pre-formed rings (non- asbestos)**

Extension bonnets shall be provided for design temperatures below 0 Deg C and above 200 Deg C. (Higher temperature range limit can vary with supplier with proper justification and PTR)

NOTES:

- **100% valve castings shall undergo radiographic examination.**
- **Testing shall be as per BS EN-12266-1. Valve testing as per BS 6755 (Part-1) is also acceptable.**
- **Supplier shall strictly comply with this standard in all respects. No deviation shall be allowed unless written permission of BHEL is obtained before finalization of the order**
- **IGC test shall be done for all SS parts.**
- **Solenoid valve and other tube fittings shall be as per customer approved vendor list.**

6. INSPECTION and TESTING:

The inspection agency shall be authorized inspector of BHEL and Lloyds /TUV or any other inspection agency approved by BHEL.

Testing and inspection for all items shall be carried out as per approved factory testing procedures.

Unless otherwise specified, BHEL reserves the right to test and inspect all the items at the vendor's works, in line with inspection test plan for valves.

Vendor shall submit following test certificates and test reports:

- **Material test certificate as per clause 3.1 of EN 10204 for each valve body, bonnet castings/ forgings and as per clause 9.4 for trim.**
- **Certificate of radiography/X-ray for valve castings. 100% radiography shall be carried out for the following valve castings as a minimum:**
  - **a. As per piping material specification.**
  - **b. Body rating ANSI 600 pounds and above.**
  - **c. Radiography procedure for casting shall be as per ANSI B16.34 and acceptance shall be as per ANSI B16.34 Annexure-B.**
  - **d. Radiography procedure for welded parts shall be as per Piping Material Specifications /ASTM – ASME 31.3**

- **Post-weld heat treatment shall be provided for welds, as per piping material specification.**
- **Dimensional, hydrostatic test reports for all valve bodies and functional test reports for all valves as per clause given below of this specification.**
- **Type test certificate for fire safety for fire safe valves and its actuator and controls.**
- **Certificate from statutory body for intrinsic safety/explosion proof for limit switches, solenoid valves etc. and type test certificate for weatherproof for these items.**
- **Following type test certificates of offered model of actuator (MOV) shall be submitted for review and approval**
  a. **Life test.**
  b. **Test on motor terminal box.**
  c. **Damp heat recycling test.**

6.1 A. Stem and stem to obturator connection shall be designed for the maximum torque during valve operation by the higher of :
- Spring load
- Specified maximum air supply pressure
6.2 The safety factor against specified minimum yield strength of any part of the stem and stem to ball connection shall be minimum 1.2.
6.3. The value for maximum required torque to open/close valve shall be based on original documentation from the valve manufacturer.
6.4 All On/Off valve actuator shall be designed, manufactured and tested in the actuator manufacturer's shop as per API 6DX. After the actuators are tested and witnessed by Valve manufacturer and by
the EPC contractor's inspector the actuator shall be mounted to the respective valves at the valve assembly shop and the valve seat test shall be carried out (all seat tests) using the job actuator.
6.5 The actuator drawing shall provide the dimension of the actuator (maximum in all directions) and all connection dimension, mounting dimension, mounting kits dimension and material of construction of all items with corresponding ASTM specification and UNS number or IS standard or full ISO standard. All pressure bearing parts shall be supplied with IS/ISO 10474-3.1B (3.1)
certificate or EN 10204-3.1 certificate.
B.16.4 The following information shall be submitted by the Valve/actuator manufacturer (for On/Off Valves) as a minimum
a. Maximum design temperature
b. Minimum design temperature
c. Design pressure to be used for the design of the pressure-containing parts
d. Maximum rated pressure
e. Torque-stroke profile of scotch-yoke gearbox
f. Valve torque and/or thrust data

g. Other specific torque or thrust data
h. Input thrust and/or torque for linear valves
i. Recommended means of limiting supply pressure

Hydrostatic Test

Each valve body shall be subjected to hydrostatic test pressure equal to 1.5 times the maximum working pressure at ambient temperature in accordance with ANSI B16.34. All valve bodies covered under IBR, shall be tested as per IBR regulations. There shall not be any visible leakage during this test.

Functional Tests

Following tests shall be done as minimum as part of functionality check for MOVs.

- **Seat Leakage Test**

All valve shall be seat leak tested against standard ANSI/ FCI 70.2 / ISO 5208

- **MOV Actuator**

a. Functional and calibration test for torque and limit switches
b. Response time test
c. Variation of supply voltage
d. Variation of frequency
e. Test on output shaft at 100% torque
f. Tests for motor (As per relevant IS/IEC)

Witness Inspection

Pre-dispatch inspection for all valves shall be performed and following tests/checks shall be carried out as a minimum.

- **Physical dimensional verification and workmanship.**
- **Hydrostatic test of this specification on representative samples.**
- **Functional tests of this specification on representative samples.**
- **Review of all certificates and test reports of this specification.**

In the event when no witness inspection is carried out by BHEL/TPIA, the tests shall anyway be completed by vendor and documents for the same shall be submitted to BHEL/TPIA for scrutiny.

7 SPARES

7.1 Two years Operation spares and commissioning spares shall be supplied by the vendor for all valves and its accessories, which shall include plug, seat ring, gasket set, packing set, diaphragm/ O-ring set etc. as a minimum.

7.2 Any special tools needed for maintenance work shall be supplied. Vendor must certify in their offer in case no special tools are necessary for the offered control valves and their accessories

7.3 For Mandatory spares requirements, refer to SPEC TC67660.

8. GUARANTEE:

A guarantee certificate for trouble free service for a period of 12 months from the date of commissioning or 24 months from the date of dispatch shall be submitted.

9. DOCUMENTATION:

Along with Offer:

Two copies **each of the following documents shall be submitted along with offer.**

a. Drawings / leaflets / catalogues for the offered item indicating direction of flow, binding dimensions, bill of materials with material specification details, hydraulic test pressure, weight, performance curve etc.

b. Quality plan adopted by the supplier during manufacture and inspection / testing.

c. Any deviation to this standard proposed by the supplier

d. MOV Specification compliance sheet (Annexure-3) shall be filled and submitted.

e. Installation Guidelines

After placement of order:

1. **General Arrangement drawing for each valve providing the complete dimension of valve assembled with actuator and other accessories, weight of the valve assembly and Complete Bill of material of the valve. Service and line number for each valve shall be indicated in the GAD, BHEL will provide the same after placement of order.**
2. **Dimensions of clearance space required for maintenance work**
3. **Lifting Instruction for the valves.**
4. **Provide detail of MOV actuator in GAD. Show all limit switches (travel and torque limit switches) and local position indicator, local push buttons and selector switches etc.**
5. **Show 3 MZSM limit switches orientation on stem in GAD. Provide make/ Model of the same.**
6. **Wiring diagram for MOV actuator terminal compartment showing power supply, control signals and other contacts including spares with terminal numbers and cable type. Provide and show cable entries on MOV actuator. Mininum 5 Nos, Separate for control and power cables, NPT(F).**
7. **Copy of type test certificates including SIL certificate.**
8. **Installation procedure.**

9. **Five copies of the following test certificates shall be furnished to BHEL along with each consignment attested by authorized inspector:**
   a. **Chemical and Mechanical Test Certificates for components used (for each heat/melt)**
   b. **Hydraulic Test Certificate**
10. **Ten copies of Operation & Maintenance manuals to BHEL (Hyderabad)**
11. **Three copies of recommended spare parts with Part nos. contact addresses to BHEL(Hyderabad)**
12. **All documentations required as applicable and indicated above shall be submitted within 7 days of PO placement.**

BHEL will furnish their approvals / comments within 15 days after submission of drawings/ documents.

10. SHIPPING

It is the responsibility of the contractor to ensure that the equipment is adequately protected and packed to meet the shipping and delivery requirements. The equipment may be stored outdoor for long period before installation. Packing shall be suitable for outdoor storage in the area with heavy rains and high ambient temperature.

Machined surface which may be exposed to the atmosphere in the transit and subsequent storage shall be properly protected with an ea y removable rust preventing coating of the proper consistency applied by the manufacturer, but not until inspection.

The valve and its accessories shall be supplied pre-assembled and pre-tubed.

All threaded and flanged openings shall be suitably protected to prevent entry of foreign material. Temporary plugs used should be readily distinguishable from permanent metal plugs.

Valves with external lubricators shall be lubricated prior to shipment.

<u>Certification requirement for valve components:</u>

1. For all material, all sizes and all rating in H2, Lethal, Toxic Service IS/ISO 10474 3.2, EN 10204 3.2 certificate by BHEL Authorized inspector, appointed by valve vendor.

2. For CS (other than IBR) up to and including 600 Rating in non-sour service irrespective of size:IS/ISO 10474 (3.1) 3.1.b or EN 10204 3.1 certification.

3. CS in Sour Service up to and including size 1.5" irrespective of rating: IS/ISO 10474 (3.1) 3.1.b or EN 10204 3.1 certification.

4. CS in wet H2S service irrespective of the rating, for sizes 2" and above IS/ISO 10474 3.2, EN10204 3.2 certificate by authorized BHEL inspector, appointed by valve vendor.

5. For LAS (other than IBR) irrespective of size and rating IS/ISO 10474 3.2, EN 10204 3.2 certificate by authorized BHEL inspector, appointed by valve vendor.

6. For SS 304, CF8, 304L, CF8M, SS 316, CF3, SS316L CF3M up to and including 1.5" irrespective of size and rating: IS/ISO 10474 (3.1) 3.1.b or EN 10204- 3.1 certification.

7. For SS 304, CF8, 304L, CF8M, SS 316, CF3, SS316L CF3M up to and including 6" in nonlethal

8. and non-toxic service and non-sour service and non-IBR service up to and including 300 rating: IS/ISO 10474 (3.1) 3.1.b or EN 10204 3.1 certification.

9. For all sizes and rating SS 321, CF8C, CF10C, SS 347H, SS347 IS/ISO 10474 3.2, EN 102043.2 certificate by authorized BHEL inspector, appointed by valve vendor.

10. For SS 304, CF8, 304L, CF8M, SS 316, CF3, SS316L CF3M >= 8" in non-lethal and non-toxicservice and non-sour service and non-IBR service up to and including 300 rating and all sizes of 600 rating and above irrespective of service: IS/ISO 10474 3.1, EN 10204-3.1 certification

CAV list for Actuators

	5.163 ACTUATORS – MOV		
1		AUMA INDIA PVT LTD	INDIA
2		EMERSON PROCESS MANAGEMENT INDIA PVT LTD	INDIA
3		FLOWSERVE	INDIA
4		LIMITORQUE INDIA LTD	INDIA
5		MARSH AUTOMATION PVT LTD	INDIA
6		ROTORK CONTROLS INDIA LTD	INDIA

Variant table

Var. No	Description	Special Requirement
01	**Motor Operated Ball valve 6"#1500RJ NACE +H2**	**NACE +H2 + Sour Service**
02	**Motor Operated Ball valve 10"#1500RJ NACE +H2**	**NACE +H2 + Sour Service**
03	**Motor Operated Ball valve 12"#1500RJ NACE +H2**	**NACE +H2 + Sour Service**
04	**Motor Operated Ball valve 8"#300RF NACE +H2**	**NACE +H2 + Sour Service**
05	**Motor Operated Ball valve 18"#300RF NACE +H2**	**NACE +H2 + Sour Service**
06	**Motor Operated Ball valve 10"#300RF NACE +H2**	**NACE +H2**
07	**Motor Operated Ball valve 12"#300RF NACE +H2**	**NACE +H2 + Sour Service**

RECORD OF REVISIONS					
Rev. No.	Date	Revision Details	Revised	Checked	Approved
00	**30.08.2023**	**First Issue**	**MCK**	**CHANDU**	**BNR**

Scope

This specification specifies the mandatory spares requirement for each size and type of ball valve specified in Technical specification number TC67659.

Mandatory Spares (As applicable)

Sl.No	Item Description	Quantity
1	1 no. of each type, size, rating of Trim set consisting of seat, seat ring / seal ring, wedge/ disc with stem.	Quantity of each item should match the quantity of the same used in the valve actuator assembly.
2	1 no. of electronic card for actuator.	
3	1 no. of gland packing, O-rings, bearing, bonnet gaskets for each type, size and rating of valve	
4	1 no. of maintenance kit for each type, size and KW rating of motorized actuator.	1 number for each actuator

VARIANT TABLE

VARIANT	DESCRIPTION
01	MANDATORY SPARES FOR 6” 1500# RJ BALL VALVE – VARIANT 01 OF TC67659
02	MANDATORY SPARES FOR 10” 1500# RJ BALL VALVE – VARIANT 02 OF TC67659
03	MANDATORY SPARES FOR 12” 1500# RJ BALL VALVE – VARIANT 03 OF TC67659
04	MANDATORY SPARES FOR 8” 300# RF BALL VALVE – VARIANT 04 OF TC67659
05	MANDATORY SPARES FOR 18” 300# RF BALL VALVE – VARIANT 05 OF TC67659
06	MANDATORY SPARES FOR 10” 300# RF BALL VALVE – VARIANT 06 OF TC67659
07	MANDATORY SPARES FOR 12” 300# RF BALL VALVE – VARIANT 07 OF TC67659

RECORD OF REVISIONS

Rev. No.	Date	Revision Details	Revised	Checked	Approved
00	30.08.2023	First Issue	MCK	CHANDU	BNR
01	03.10.2023	List of spares revised	MCK	CHANDU	BNR

1. PURPOSE AND SCOPE

1.1 This specification covers additional requirements relating to components intended for operation in Hydrogen service.

1.2 Applicability : This specification applies to all components for which Hydrogen Service requirement is indicated on the component technical data sheets.

2. REQUIREMENTS FOR PIPES, FITTINGS & FLANGES :

2.1 **GENERAL** (applicable to all pipes, fittings, flanges & special parts)

2.1.1 Material identification stamps (cold stamping) including punch marks and large hardness impressions are not permitted on hydrogen contacted surfaces.

2.1.2 Cold stamping on the outside surface shall be performed before heat treatment. Depth and sharpness of indentation shall be compatible with wall thickness of the component. These requirements do not apply to the stamping of flanges on their circumference.

2.1.3 Stamping of fittings after heat treatment is not permitted.

2.1.4 For steels which need to be preheated for welding, the preheat temperatures shall be maintained in all cases such as temporary welding, auxiliary welds and thermal cutting. Preheating shall penetrate the entire cross-sectional area of the material and shall extend over a width of 300 mm on both sides of the weld. Thermocouples shall be attached to the item being heat treated and the temperature shall be recorded for confirmation of the heat treatment.

2.1.5 Evidence shall be furnished for the base metal, heat affected zone and weld metal that hardness limitations have been satisfied. For this purpose, measurements shall be taken on the procedure qualification specimens and on the item concerned. Hardness values shall be checked at least at three locations in a direction perpendicular to the weld.

2.1.6 Serrations on the flange face shall be concentric for hydrogen service. Spiral serration is not acceptable.

2.2 APPLICABLE TO CARBON STEEL (CS) PIPES, FITTINGS, FLANGES & SPECIAL PARTS:

2.2.1 All pipes, forgings and fittings having wall thickness 9.53 mm and thicker shall be normalized. Cold drawn pipes & fittings shall be normalized after the final cold draw pass for all thickness. The normalizing shall be a separate heating operation and not a part of the hot forming operation. In addition, fittings made from forgings shall have carbon – 0.35 % Max. and Silicon – 0.35 % Max.

2.2.2 Carbon equivalent shall not exceed the following value:

$$Ceq = \%C + \frac{\%Mn}{6} + \frac{\%(Cr + Mo + V)}{5} + \frac{\%(Ni + Cu)}{15} \leq 0.42$$

Under no condition Ni content shall be in excess of 1%.

ANNEXURE-1

2.2.3 All full penetration weld joints shall be 100% radiographed in accordance with ASME SECTION-VIII, DIV.-I,UW-51 & ASME SECTION-V. Radiography shall be done before PWHT and 100% UT shall be done after PWHT.

2.2.4 The hardness of any pressure containing component, weld & heat affected zone (after heat treatment) shall be limited to 200 BHN max.

2.3 APPLICABLE TO ALLOY STEEL (Cr-Mo) PIPES, FITTINGS, FLANGES & SPECIAL PARTS :

2.3.1 All pipes, flanges and fittings shall be normalized and tempered. The normalizing and tempering heat treatment shall be a separate heating operation and not a part of hot forming operation.

2.3.2 All full penetration weld joints shall be 100% radiographed in accordance with ASME SECTION-VIII, DIV.-I, UW-51 & ASME SECTION V. 100% radiography & UT shall be performed after PWHT.

2.3.3 The hardness of any pressure containing component, weld & heat affected zone (after PWHT) shall be limited to 225 BHN max.

2.3.4 The alloy content of welds shall be verified by chemical analysis. Tests shall be conducted when changes in weld wire and/or weld flux are made, or when a new set of electrode is used.

2.3.5 Maximum room temperature tensile strength of all pressure containing components and welds shall not exceed 100,000 PSI.

2.3.6 Under no condition Ni content shall be in excess of 1%.

2.4 APPLICABLE TO STAINLESS STEEL PIPES, FITTINGS, FLANGES & SPECIAL PARTS :

2.4.1 All pipes, flanges & fittings shall be solution annealed after welding and pickled.

2.4.2 All stabilized grades of stainless steel (SS321, SS321H, SS347, SS347H) shall be given a stabilizing heat treatment in addition to solution heat treatment at 900 ±10 Deg.C for 4 hours. For "H" grades C content shall be 0.04% minimum. 01

2.4.3 All full penetration weld joints shall be 100% radiographed in accordance with ASME SECTION-VIII, DIVISION I, UW-51 and ASME SECTION V.

2.4.4 For all austenitic stainless steels, weld deposits shall be checked for ferrite content. A ferrite number (FN) of not less than 3% and not more than 10% is required to avoid sigma phase embrittlement during heat treatment and high temperature service. FN shall be determined by use of a ferrite scope. Ferrite scope measurements must be made prior to post weld heat treatment to be meaningful.

2.4.5 The maximum hardness of any pressure containing component, weld & HAZ shall be 200 BHN.

ANNEXURE-1

3 REQUIREMENTS FOR VALVES:

3.1 GENERAL (applicable to all valves)

3.1.1 Each valve body, bonnet & cover casting shall be subjected to examination by radiography in accordance with ASME SECTION VIII,DIVISION I, APPENDIX 7.

3.1.2 Valves shall be labelled "SUITABLE FOR HYDROGEN SERVICE"

3.1.3 Helium Leakage Test :

Body/bonnet/cover joints & stuffing box of all valves and special parts (both forged and cast) shall have low emission. One valve per metallurgy, per rating and per size shall be helium leak tested as per ASME SECTION V, SUBSECTION A, ARTICLE 10, APPENDIX IV. (Detector Probe Technique) at a minimum of 25% allowable cold (rated) working pressure. Selection of valve for test shall be random. Test duration shall be as follows.

TEST DURATION IN MINUTES				
Nominal Size (mm)	**PRESSURE CLASS**			
	Upto 300	**600**	**800, 900**	**1500**
Upto 2"	3	6	9	12
3" to 6"	6	9	12	15
8" to 16"	9	9	12	15
18" to 24"	9	12	15	18

Leakage rate shall be less than 0.0001 ml/sec of helium.

3.1.4 The design & geometry of valve internals shall remove crevices & stagnant areas.

3.1.5 Valves shall be internally cleaned & free from moisture and grease.

3.2 APPLICABLE TO CARBON STEEL & ALLOY STEEL VALVES :

3.2.1 Carbon steel castings / forgings shall be normalized & alloy steel castings / forgings shall be normalized and tempered.

3.2.2 Critical body, bonnet, cover casting sections, typically defined by ASME B16.34, shall be radiographed and shall meet ASTM E446 (up to 2" thick) Category A, B & CA-Level 2, Category CB, CC & CD-level 3, Category D, E & F level 0. For wall thickness 2" to 4.5" comparable plates of ASTM E186 shall be used. ASTM E94 shall be used for recommended practice & controlling quality of radiography as guide. The entire surface of the castings shall be dye penetrant inspected.

3.2.3 Bend tests and magnetic particle inspection of the entire surface of body and bonnet castings shall be carried out in accordance with ASTM A217 supplementary requirements S3 & S4. Evaluation of magnetic particle inspection shall be in accordance with MSS SP-53 except that no linear discontinuities shall be allowed.

ANNEXURE-1

3.2.4 The brinell hardness of heat treated casting shall not exceed 200 BHN for carbon steel and 225 BHN for alloy steel.

3.2.5 The tensile stress for A.S. shall be less than 100,000 PSI for alloy steel.

3.2.6 Repair of defective casting shall be outlined in writing to the purchaser before repair starts. Repair method to be approved prior to welding.

Castings shall be preheated to a minimum of 400F prior to welding and all Chromium-molybdenum alloys shall be postweld heat treated after welding is complete. Stress relieving is essential for welds.

Dye penetrant test of welds shall be in accordance with ASTM B165 procedure B-2. Interpretation as per appendix-8 of ASME – VIII Div.1.

Repair welds shall be 100% radiographed and evaluated in accordance with paragraph 344.5 of ASME B31.3 with a minimum casting quality factor of 0.95. Dye penetration test shall be as per ASTM E165 procedure B-2, interpretation as per Appendix -8 of ASME-VIII Div.1.

3.3 APPLICABLE TO STAINLESS STEEL VALVES:

3.3.1 Casting shall be in the solution heat treated and pickled condition. All castings and test bars shall be heat treated together.

3.3.2 Critical body and bonnet casting sections, typically defined by ASME B16.34, shall be radiographed and shall meet ASTM E446 (up to 2" thick) Category A, B & CA-Level 2, Category CB, CC & CD-level 3, Category D, E & F level 0. For wall thickness 2" to 4.5" comparable plates of ASTM E186 shall be used. ASTM E94 shall be used for recommended practice & controlling quality of radiography as guide. The entire surface of the castings shall be dye penetrant inspected after pickling.

Repair welds shall be 100% radiographed and evaluated in accordance with paragraph 344.5 of ASME B31.3 with a minimum casting quality factor of 0.95. Dye penetration test shall be as per ASTM E165 procedure B-2, interpretation as per Appendix -8 of ASME-VIII Div.1.

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4 IMPACT TESTING:

4.1 For all carbon steel and alloy steel pipes, flanges and fittings with thickness over 19 mm, Charpy V-notch impact testing shall be carried out in accordance with paragraph UG-84 of ASME Section VIII, Div.-1 for weld metal and base metal from the thickest item per heat of material and per heat treating batch. Impact test specimen shall be in complete heat treated condition and in accordance with ASTM A370. Impact energies at 0 Deg. C shall average greater than 27J (20ft-lb) per set of 3 specimens with a minimum of 19J (15 ft-lb)

If welding is used in manufacturing, impact test of heat affected zone (HAZ) and weld metal shall also be carried out.

Charpy V notch impact testing is to be done for all CS & AS valves material (average 20 ft-lb for set of 3 [minimum value 15 ft-lb] at 30 F).

TECHNICAL DOCUMENTATION FRONT SHEET

NUMALIGARH REFINERY LIMITED

Total Pages: 11

Annexure-2

NRL EXPANSION PROJECT

SPECIFICATION FOR

MATERIAL REQUIREMENTS FOR CARBON STEEL COMPONENTS USED IN SOUR SERVICE IN PETROLEUM REFINERY ENVIRONMENTS

							Digitally signed by Medini Kumar Bora Date: 2021.02.13 16:30:02 +05'30'	
D1	06-Jan-2021	Approved for Design/Enquiry	BM	DGK	BM			
Rev.	Date	Reason for Issue	Prepared by	Checked by	Approved by	Prepared by	Reviewed by	Reviewed by
			Discipline Engineer	Discipline Lead	Contractor Representative	Discipline Engineer	Project Engineer	Department Head

Numaligarh Refinery Limited

NRL

Category	Code	Description
Facility Area Code	0Z	Common Document
Document Type		Specification
System Number	00	General
Life Cycle	01	Disk Ref.:

Originator/ Contractor	Asset Code	Discipline	Document Type	Sequence Number	Revision
NR	**0ZZZZ**	**PI**	**SPE**	**0025**	**D1**

FOREWORD

This document covers the basis of material selection for carbon steel components used in sour service in petroleum refinery environments for the new grass-root projects and also for the revamping projects handled In-house.

This document is equally useful for the maintenance projects carried out through the “Management of Change” (MOC) procedures, where the welding of piping materials is required. The job shall be carried out under proper supervision adhering to other company specifications.

This document serves dual purpose (i) It specifies the core requirements of NRL, which all external consultants are required to adhere to, (ii) It serves as a guideline for NRL’s In-house projects. Therefore, some of the details furnished hereinunder, may be or may not be relevant to the external Consultants. These details are meant for the guidance of the NRL personnel. If external consultants are in doubt about the validity and/or the applicability of a particular detail, they should consult NRL for the clarifications.

Attempts have been made to align the requirements with the Indian statutory regulations and national and international codes and standards, minimising the Owner’s preferences over the established norms. The consultants and the contractors shall ensure this spirit is maintained throughout the execution of the projects.

Although, it is recognized the engineering consultants may desire to modify, delete, or amplify sections of the national and international codes and standard, it is strongly recommended such modifications, deletions, and amplifications are initiated by supplementing the relevant national and international norms rather than by rewriting the revised clauses into consultants’ documents. Any modification(s) to the national and international codes and standards and to NRL specifications shall not be acceptable, unless approved by the concerned code authorities or NRL, as the case may be.

Throughout the document, the term “NRL” is used. It represents NRL Engineer(s) and the external parties, such as the Process Licensors, Consultants in various roles, Engineering Contractors, Suppliers, Sub-suppliers, Site Contractors and the third-party Inspectors engaged by NRL to act on behalf of NRL in a context-sensitive manner.

Compliance with this Specification does not in itself confer immunity from the mandatory legal and statutory requirements. In the event of a conflict of requirements, the order of precedence shall be as follows: (a) Indian Statutory Regulations like PNGRB, OISD, CPCB, IBR, (b) Project Specifications, (c) NRL Specifications, (d) Applicable Codes and Standards, (e) Process Licensor’s specific requirements. In case, the process licensor(s) requirements have a conflict with the documents higher in the hierarchy, they shall submit a list of deviations, detailing how their requirements differ and why these requirements need to be implemented.

NRL documents are drafted for viewing on a computer-screen as few diagrams may use colours to enhance clarity and viewing experience. If printed on a black-and-white printer, few diagrams may not reflect correctly.

NRL engineers will continue to enrich this document based on their in-house experience and the feed-back received from the consultants and contractors. Feedback, comments or suggestions derived from the application of this document at any stage of the project design, purchase, construction, field installation, commissioning, operation and maintenance are welcome and should be directed to NRL.

TABLE OF CONTENTS

1.0 Scope

A. This document provides requirements for the specification of carbon steel (CS) materials for refinery wet H_2S services.

B. The high-pH sour environments differentiate refinery sour service from the oil and gas production sour environments covered by NACE MR0175/ISO 15156, because many wet sour streams in oil and gas production also contain carbon dioxide and, hence, exhibit a lower pH. Another major difference is that chloride ion concentrations tend to be significantly lower in refinery sour services than in oil production sour services. In many refinery sour water environments, the presence of dissolved ammonia (NH_3) increases the pH, thereby increasing the solubility of H_2S and resulting in a high HS^- concentration. At elevated pH, the presence of free cyanides, which include dissolved hydrogen cyanide (HCN_{aq}) and cyanide ion (CN^-), can further aggravate the degree of atomic hydrogen charging into the steel. Even though SSC susceptibility is known to increase with total sulfide content of the aqueous phase, the presence of as little as 1 ppmw total sulfide in the aqueous phase can cause SSC under conditions that promote aggressive hydrogen charging.

C. This specification is directed at the prevention of HSC (Hydrogen Stress cracking), Sulphide Stress Cracking (SSC), Blistering, Hydrogen Induced Cracking (HIC), Stress Oriented Hydrogen Induced Cracking (SOHIC), Alkaline stress corrosion cracking (ASCC), Alkaline Carbonate Stress Corrosion Cracking (ACSCC), Caustic SCC (Caustic Stress Corrosion Cracking) of equipment (including pressure vessels, heat exchangers, piping, valve bodies, and pump and compressor cases) and components used in the refining industry.

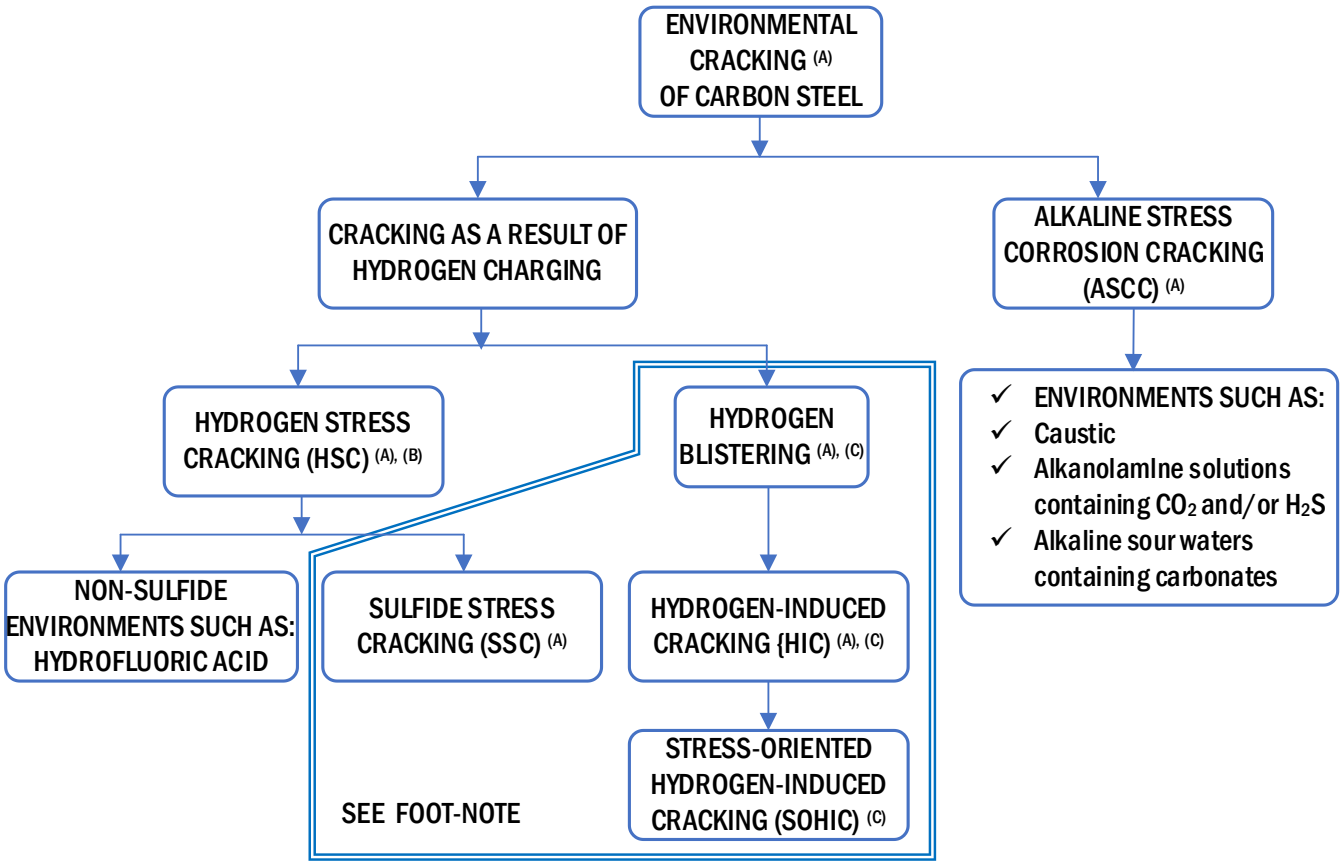
D. Prevention of SSC in carbon steel materials categorized under P-No. 1 in Section IX of the ASME Boiler and Pressure Vessel Code (BPVC) is addressed by requiring compliance with NACE SP0472 and Materials requirements for sulphide stress cracking (SSC) in Corrosive Petroleum Refining Environments are covered in ANSI/NACE MR0103/ISO 17495-1. It should be noted that Carbon steel materials typically used in pressure vessels and piping are not highly susceptible to SSC if the hardness of the material is controlled and is kept <= 200 BHN (HBW) Brinell hardness.

2.0 Purpose

A. The purpose of this document is to list the material requirements for the Carbon Steel Pressure Vessels, Piping and Items of various product forms use in pressurized items including rotating machinery such as pumps, compressors.

B. Whether a particular material needs a particular test or control or treatment (or not) (for example, HIC Test), is based on the fluid it handles and its severity and hence shall be indicated in the process data sheets and process licensor's requirements. Under certain circumstances the need for the HIC testing may be made even of moderate service with medium severity and this requirement may arise out requirement for interchangeability, longevity, maintainability, capital cost of the equipment, reduced maintenance and inspection regimen during operations etc.

C. Relationship amongst various environmental cracking mechanism is depicted in the figure 1 below.



(A) Refer to NACE/ASTM G193 for definitions including stress corrosion cracking.

(B) The forms of environmental cracking included within the double lines are commonly referred to as wet H_2S cracking when they occur in wet H_2S environments.

(C) This form of environmental cracking can also occur in non-sulfide environments such as hydrofluoric acid.

Figure 1: Interrelationships of the Various Cracking Mechanisms

3.0 Wet H_2S environment (Sour/NACE Service)

When the service environment contains free water and if one of the following conditions is satisfied then the service is classified as Sour service/NACE service and the requirement of NACE MR 0103/ISO 17495-1 becomes applicable.

A. Wet H_2S cracking refers to the several forms of hydrogen damage that can occur in fabricated carbon steel equipment when exposed to corrosive refinery environments containing wet H_2S. These damage mechanisms include, Hydrogen Blistering, HIC, SOHIC & sulphide stress cracking (SSC).

B. Wet H_2S environment is defined as a service with liquid water present (either during start-up, shutdown, upsets, or normal operation) with > 50 parts per million weight (henceforth ppmw) H_2S dissolved in the free water phase.

I. when the fluid has over 50 ppm of dissolved H_2S in free water (> 50 ppmw total sulfide content in the aqueous phase).

II. free water pH <4 and some dissolved H_2S present (> = 1 ppmw total sulfide content in the aqueous phase and pH< 4)[1].

III. free water pH > 7.6 & >=20 ppm dissolved hydrogen cyanide (HCN) in water and some dissolved hydrogen H_2S present (>=1 ppmw total sulfide content and>=20 ppmw free cyanide in the aqueous phase, and pH > 7.6).

IV. gas phase in contact with the water having an H_2S partial pressure > 0.003 kg/cm^2 (> 0.05 psia).

Note 1: Some process licensors and users are conservative and consider the service as sour service when free water pH is < 5.5 with some dissolved H_2S, and a few others (Including the one in India) considers the service as sour service when free water pH is < 4 with some dissolved H_2S in water free water. Determination on whether to use < pH 4 or < pH 5.5 is based on past experience and based on life cycle cost.

4.0 Applicability

A. This document applies to all components of equipment exposed to sour refinery environments where failure would

a) compromise the integrity of the pressure-containment system,

b) prevent the basic function of the equipment, and/or

c) prevent the equipment from being restored to an operating condition while continuing to contain pressure.

B. The process data sheets for the pressure vessels shall indicate whether the service is Sour/ NACE service. With respect to piping, notes in the document that lists the stream composition or the heat and mass balance or any other suitable document like P & ID (Notes) may indicate the lines that are sour/NACE service. To indicate which all pressure vessels and which all piping lines are in sour/NACE service, is one of the key inputs from the process discipline.

5.0 PMS and Sour Service

A. As noted in 3.0 (B), a value of 50 ppmw H_2S in the water phase is often stated as the minimum concentration where wet H_2S damage can occur. However, there are cases where cracking has occurred at lower concentrations or during upset conditions where wet H_2S was not ordinarily anticipated. The presence of as little as 1 ppmw of H_2S in the water has been found to be sufficient to cause hydrogen charging of the steel, hence for the material that are procured for new projects, a conservative approach of standardizing most of the piping class that handles hydrocarbon are marked as NACE. This is one of the reasons one can observe that most of the piping classes in the PMS (NR-0ZZZZ-PI-SPE-0001- Piping Material Specification) states the items are in NACE/Sour service.

B. Although in PMS many piping classes may contain NACE/Sour Service, only for certain pipping classes HIC tests are invoked. Typically, the following pipping classes will require HIC testing, A28A, B28A, D28A, this does not mean only these classes will need HIC test, process licensor and or engineering discipline engineer may invoke the need for HIC testing for material in other piping classes as well.

6.0 Requirements for HIC tested Plates and items made from plates.

A. For plates (A516) and items made from plates (such as welded pipes A671 & A672), welded fittings (A234), Seamless pipe caps made from plate, Blinds, Spades, Drip rings), HIC test shall be carried out at a frequency of 1 per heat number per thickness of plate. HIC test shall be conducted for piping class

A28A, B28A, D28A and when the process data sheet or equipment data sheets or notes in heat and mass balance or notes in P & ID or notes in document that lists fluid streams or when process licensor specifies the need for HIC testing. The acceptance criteria shall be as follows

I. CLR (Crack length ratio) Less than or equal to 10%

II. CTR (Crack thickness ratio) Less than or equal to 3%

III. CSR (Crack sensitivity ratio) Less than or equal to 1%

B. The steel shall be made in an open-hearth, basic-oxygen, or electric-arc furnace and shall be fully-killed. The Plate MTR shall indicate the steel making practice. All plates shall be supplied in the Normalized condition.

C. Both heat analysis and product analysis shall be conducted and shall be indicated in the MTR.

D. Following Chemical restrictions apply

i. Material shall not contain intentional additions of elements such as lead, selenium, or sulfur to improve machinability
ii. Carbon <= 0.18%
iii. Silicon 0.15% to 0.35 % (both inclusive)
iv. Sulphur <=0.002%
v. Phosphorous <=0.01
vi. Nitrogen <= 0.01%
vii. Niobium <= 0.01
viii. Vanadium <= 0.01
ix. Titanium <= 0.01
x. Boron <= 0.0005
xi. Niobium + Vanadium <= 0015
xii. Carbon Equivalent CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15 shall be <= 0.43 for plates with thickness < 25 mm & <= 0.45 for plates with thickness > = 25 mm.
xiii. Mn/C >= 5
xiv. Ca/S shall be between 2-3 (If the %S is less than 0.0015% then Ca/S ratio is not applicable and, in this case, Maximum Ca shall be 5 PPM.)
xv. Al/N >= 2

E. Plates with thickness < 25 mm shall be vacuum degassed and Calcium treated for Sulphur Shape control. Plates 25 mm thickness and above, through thickness test as per A770 shall be carried out as per the frequency and location specified in A770 and the minimum % reduction Area shall be 35%. This shall be indicated in the MTR of the Plate.

F. The MTR for plate shall indicate whether the steel is continuous cast (also called Strand cast) or were cast in stationary moulds. MTR shall indicate the reduction ratio for strand cast plates. The ratio of reduction of thickness from a strand-cast slab to plate shall be at least 3.0:1.

G. For plates with thickness >= 10mm, ultrasonic examination to ASME SA-578 supplementary requirement S1 (100% scanning) acceptance level C shall be conducted.

7.0 Requirements for Pipes, Flanges, Fittings, Fasteners, Tubes & Casting.

A. All CS material (Pipes, Flanges, Fittings, Fasteners, Tubes & Casting) shall not contain intentional additions of elements such as lead, selenium, or sulfur to improve machinability.

B. Seamless pipes are not generally subjected to HIC tests. SA106/A106 pipes shall be as per NR-0ZZZZ-PI-SPE-0007 Specification for Pipes.

I. CS Pipes shall be supplied in normalised condition.
II. When Normalising is required, Normalised rolling is not considered as normalised. Normalising has to be a separate heat treatment.
III. For CS Hardness of base metal shall be ≤ 200 BHN. Hardness test frequency shall be identical to the tensile testing and shall be conducted in the laboratory.
IV. Deliberate addition of Micro-alloying elements like V (Vanadium), Cb (Nb) (Columbium/Niobium), B (Boron), Ti (Titanium), Lead (Pb), Selenium (Se), and Sulphur (S) to improve properties (Tensile and or Machinability) is not allowed.
V. In addition to the elements indicated in the ASTM A106 table 1 the following chemical restrictions apply in heat analysis and the product analysis.
a) % Carbon ≤ 0.23%
b) Mn/C ≥ 5
c) % Sulphur ≤ 0.01%,
d) % Phosphorous ≤ 0.02%,
e) % Vanadium ≤ 0.02%
f) % Niobium ≤0.02%
g) % Boron ≤ 0.002%
h) Vanadium + Niobium ≤ 0.03
i) Carbon Equivalent CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15 shall be ≤ 0.43.

C. Forgings are not generally subjected to HIC tests. All forgings shall meet the requirements of NR-0ZZZZ-PI-SPE-0009 Specification for Flanges, Spectacle Blinds & Drip Rings. All flanges & forgings irrespective of rating shall be in normalized condition.

D. MTR shall indicate heat analysis and both product analysis, in addition to the elements indicated in the ASTM A105, the composition of the following elements shall also be shown in the MTR: niobium, vanadium, titanium, nickel, copper, and boron.

I. Maximum boron shall be 5 PPM.
II. Maximum Vanadium = 0.02 wt %
III. Maximum Niobium = 0.02 wt %
IV. Maximum % Sulphur shall be 0.025%.
V. Maximum % Phosphorous shall be 0.030%.
VI. Maximum Vanadium plus Niobium = 0.03 wt %
VII. Maximum Nickel + Copper = 0.15 wt %.
VIII. Mn/C >= 5 in heat analysis and both the product analysis.
IX. Maximum % Carbon in all Carbon steel Items shall be <=0.23%
X. For Steel with thickness <= 25 mm CE shall be <= 0.43.
XI. For Steel with thickness > 25 mm CE shall be <=0.45.
XII. Carbon Equivalent CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15

E. Seamless fittings made from seamless pipes are not generally subjected to HIC tests. SA234/A234 Seamless fittings made from seamless pipes shall be as per NR-0ZZZZ-PI-SPE-0010-Specification for Butt Welded, Socket Welded & Screwed Fittings. Fittings made from forgings shall meet the requirements of forging specified in the points “C” & “D” above.

I. In addition to meeting the requirement in the ASTM the following shall apply

II. CS fittings made from seamless pipes shall be supplied in normalised condition.
III. Deliberate addition of Micro-alloying elements like V (Vanadium), Cb (Nb) (Columbium/Niobium), B (Boron), Ti (Titanium), Lead (Pb), Selenium (Se), and Sulphur (S) to improve properties (Tensile and or Machinability) is not allowed.
IV. The following chemical restrictions apply in heat analysis and the product analysis.
    a) % Carbon ≤ 0.23%
    b) Mn/C ≥ 5
    c) % Sulphur ≤ 0.01%,
    d) % Phosphorous ≤ 0.02%,
    e) % Vanadium ≤ 0.02%
    f) % Niobium ≤0.02%
    g) % Boron ≤ 0.002%
    h) Vanadium + Niobium ≤ 0.03
    i) Carbon Equivalent CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15 shall be ≤ 0.43.

F. Fasteners are not subjected to HIC tests. SA193/A193 & SA194/A194 Fasteners shall be as per NR-0ZZZZ- PI-SPE-0012 - Specification for Bolts & Nuts. In Sour/NACE Services. External bolting and fasteners used underground, buried, covered with insulation, equipped with flange protectors, or otherwise denied direct atmospheric exposure, and that are used on equipment that contains a sour environment, shall be considered exposed to a sour environment. All such exposed fasteners shall be SA/A 193 B7M + SA/A 194 2HM for Carbon steel piping and equipment. SA/A193 B7M + A194 2HM fasteners shall be used in floating head assembly and all pressure fasteners that are in contact with the fluid. Please refer to PMS on the selection of fasteners for specific piping class.

G. Seamless tubes are not subjected to HIC test. SA179/A179 tubes shall be as per ASME/ASTM standards, also please refer to respective equipment data sheet and specifications for special requirement if any.

H. Castings are not subjected to HIC tests. SA216/A216 Carbon Steel Castings for valve parts, flanges, or other pressure containing parts for sour/NACE service shall be in Normalized or Normalized & tempered or Normalized and PWHT condition:

I. All Castings shall be suitably heat treated (PWHT after welding, PWHT after minor repair, normalized after major repair) after welding operations have been performed. This requirement also applies to the weld repair of defects, irrespective of size.

II. The method of heat treatment and the Time-Temperature thermal cycle shall be given on the mill certificate,

III. For butt-welded end or Socket welded end castings, the carbon equivalent shall not exceed 0.43

I. Castings, MTR shall clearly indicate mechanical properties, hardness Heat and product analysis shall be conducted and shall be included in the MTR;

I. Carbon <= 0.20%
II. Silicon 0.15% to 0.35 % (both inclusive)
III. Sulphur <=0.02%
IV. Phosphorous <=0.01%

8.0 Fabrication & Welding

A. Cold forming of CS plates and pipes are permitted. The plates prior to cold forming shall be in normalised or normalised and tempered condition. Pipes prior to cold forming may in hot formed or normalized or normalized & tempered condition. Cold-formed material shall be thermally stress relieved following any cold deforming by rolling, cold forging, or another manufacturing process that results in a permanent outer fibre deformation greater than 5 %. Hydraulically formed materials shall be thermally stress relieved regardless of the percent outer fibre deformation.

B. WPS (Welding Procedure Specification) supported by duly witnessed & certified and or endorsed (by NRL's representative or an independent NRL approved third party inspection agency) PQR (Procedure Qualification Record) shall be submitted for approval. WPQT (Welding Procedure Qualification Test) including the welding of test piece, testing in the laboratory shall be witnessed by NRL'S representative or an independent NRL approved inspection/certification agency.

C. Weldments in carbon steels listed as P-No. 1 materials in Section IX of the ASME BPVC shall be produced using one or more of the methods outlined in NACE SP0472 to prevent excessive weldment hardness. In addition to ASME Sec IX testing requirement, hardness survey shall be conducted as per NACE MR 01013 appendix C as a part of PQRT. Hardness survey conducted as per NACE MR0175/ISO 15156-2 is acceptable in lieu of ANSI-NACE MR 01013/ISO 17495-1 appendix C method as both are considered equivalent and interchangeable. A separate weld repair WPQT shall be performed and hardness test shall be conducted as described in appendix C of NACE MR 0103/ISO 17495-1 or as per NACE MR 0175/ISO 15156-2.

D. Maximum Production Weld Deposit Hardness is 200 HBW. Maximum hardness in the HAZ in PQRT is 237 HBW or 237 HV10.

E. Maximum % Nickel shall be 1% in the deposited weld metal. As a part of PQRT, chemical analysis of the weld metal is mandatory. Electrode with "G" suffix shall not be used. Only Low hydrogen welding electrodes, having a maximum diffusible hydrogen of 8 mL per 100 g of weld metal per AWS A4.3, shall be used. Welding consumables shall be baked, stored, and used in accordance with manufacturer's instructions (for holding in electrode oven, length of time out of oven, use of electrically-heated quivers, etc.)

9. Pre-Heating, Hardness & Post Weld Heat Treatment.

A. A minimum 93 °C (200 °F) preheat is used for all welding.
B. Hardness of the production weldment after PWHT shall be <=200 BHN.
C. PWHT of piping using local heat band during is a common practice adopted by the fabricators (especially piping assembly fabricators). Investigations have shown that an inadequate heated band width during local PWHT can induce or inadequately relieve residual stresses in the weld. The following local PWHT procedures, derived from AWS D10.10 and WRC Bulletin 452, shall be used along with the other requirements in AWS D10.10 and WRC Bulletin 452 for piping and vessels to minimize residual stresses and thereby increase resistance to caustic SCC.
D. The minimum heated band (HB) & gradient control band (GCB) widths for pipe shall be as shown in the Table 1: Local 360° Band PWHT on ASME B31.3 Piping.

Table 1: Local 360° Band PWHT on ASME B31.3 Piping[1]

DN (NPS)	Minimum HB Width Centred Over the Weld[2]	Minimum GCB Width Centred Over the Weld
≤ 50 mm (≤ 2")	280 mm (11.0")	330 mm (13.0")
100 mm (4")	370 mm (14.5")	465 mm (18.5")
150 mm (6")	435 mm (17.0")	575 mm (23.0")
≥ 200 mm (≥ 8") (Note 3)	HB = SB + 4√(RT) (230 mm [9.05"], minimum)	GCB = HB + 8√(RT) (355 mm [14.0 "], minimum)
Note 1: Widths are for thickest piping schedules per AWS D10.10. Thinner pipe can reduce widths using AWS D10.10 Table 4. Note 2: The HB width uses the HB2 formula per AWS D10.10 for smaller-diameter pipe but for ease of implementation and use consistent with WRC 452, the HB1 formula is used for the larger-diameter piping. Note 3: ≥ 200 mm (8.00 in) pipe can have HB and GCB less than smaller-diameter piping, in accordance with AWS D10.10.		

E. Post Weld Heat Treatment (PWHT) soaking temperatures for items in various services shall be as per table 2 for Carbon Steel Material (P1 as per ASME Sec IX).

Table 2: PWHT Soaking Temperatures for various services

Nominal Thickness at Weld	Service Environment	Holding Temperature °C (°F)	Minimum Holding Time (hr)[1]
As per Code	As per PMS (the piping classes not defined as Sour/NACE)	593 to 648 (1100 to 1200)	As per Code
All	Wet H_2S (Sour/NACE), Caustic, Amine, HF acid, Deaerator, Ethanol	621 to 648 (1150 to 1200)	1 Hour minimum.
All	Carbonate	648 to 676 (1200 to 1250)	1 Hour minimum.
Note 1: For thickness above 25 mm (1") please follow code for holding time.			

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Annexure-3

Sr. No.	CHARACTERISTIC / DESCRIPTION	REQUISITION REQUIREMENT	VENDOR OFFER	
1.0	**General**			
1.1	Hazardous Area Classification	Zone-1, Gas Gr. IIC,Temp. Class T3		
1.2	Ingress Protection	IP-66 or better as per IEC-60529 / IS-2147		
2.0	**MOV Actuator**			
2.1	Make	VTA		
2.2	Model	VTA		
2.3	Motor Type	3-phase squirrel cage induction type		
2.4	Ex- Protection	Explosion proof, Ex"d" IIC T3		
2.5	Factor of Safety	2		
2.6	Motor Starter	DOL Starter		
2.7	Motor Duty	S2-15 minute (conform to IS 325)		
2.8	Motor Insulation Class	Class F		
2.9	Motor Thermal Protection Class	Class B		
2.10	Motor starts/stops per hour	Min. 60		
2.11	Handwheel	Required		
2.12	Enclosure Protection	IP 66 or better as per IEC-60529 / IS-2147		
2.13	Motor Power Supply	3Ph, 415VAC+/-10%, 50Hz+/-3%		
2.14	Thermostat	Required		
2.15	Instantaneous Phase reversal protection.	Required		
2.16	Local Position Indicator	Required for continuous position indication		
2.17	Position Transmitter	Not required		
2.18	Travel Limit Switches	Required for Open & Close position		
2.19	Torque Limit Switches	Required to protect the motor from over-loading		
2.20	Local Push Buttons(Integral to MOV actuator)	Open, Close, Stop		
2.21	Selector Switch(Pad-lockable in each position)	Local/Remote/Off		
2.22	Common status contact indicating the availability of the MOV actuator	Required for remote control		
2.23	Potential free contacts for hardwired interface with plant DCS	a. Run indication b. Trip indication - c. Open status - 2 Nos. d. Close status - 2 Nos. e. Ready to start indication f. Torque high indication g. Thermostat status h. Open command i. Close command j. Local/Remote status		
2.24	Cable Entries	Mininum 5 Nos, Separate for control and power cables, NPT(F)		
2.25	System earthing	Solidity Earthed		
2.26	Actuator Color	RAL 7031		
2.27	Hand-held Infrared/ Bluetooth Remote Programming Device	Required 1 No. for each group of 10 valve actuators		

Bharat Heavy Electricals Limited
Ramachandrapuram, Hyderabad 502032, India

Ref # TCEL/PQC/VALVES/01 Dt: 11/02/2021

Pre- Qualifying criteria for the vendors participating in "Open Tender for enquiry no _____ – Reg.

Considering BHEL customers' requirement, offers from Chinese manufacturers / Chinese manufactured items are not allowed.

Clause wise response of vendor is necessarily to be submitted for technical evaluation of technical bid

Sl. No.	Description	Vendor's Response	Details of Documents enclosed, if any
1.1. General Requirements			
1.1.1	The manufacturers or their authorized principals (authority letter to be submitted) who are submitting the offer shall have in-house manufacturing facilities, heat treatment and testing facilities suitable for the manufacturing & testing of all valves as per this enquiry. However, the shot blasting & primer coating activity can be outsourced. Note: i) Offers from traders (for the purpose of this tender, any agency who is keeping /buying/supplying martials from different manufacturers under the same company's name, will be treated as trader) will not be considered.		
1.1.2	The offer shall be accompanied with relevant list of the in-house manufacturing and testing facilities & their capacities / ranges etc. Company catalogue or website address which included these details may be provided as an alternative.		
1.1.3	Vendors to confirm that they will meet all the requirements of BHEL specification provided with the enquiry. In case of any dispute/contradictions with the requirement of Pre-qualification criteria (this document) with the specification, the requirements of Pre-qualification criteria will be applicable.		
1.1.4	The vendor must have experience of manufacturing and supplying valves of the corresponding standards and grades as mentioned in the enquiry. Test Certificates shall be submitted as evidence of experience.		

	At least two copies (one for minimum size and class/rating and other for maximum size and class/rating) manufacturer test certificates (TC in IBR form for CS/AS items) for the same or similar grade supplied by them to other customers shall be submitted along with the offer. a) The date of the issue of "Test certificate" shall not be older than 3 years from the NIT date. b) The mill test certificate shall include the results / reports for all the tests like Chemical, Mechanical and NDT etc., as required by BHEL Specification applicable to the present enquiry. c) The test certificates submitted as an evidence of the past experience of the manufacturer must include test requirements as stipulated in BHEL specification.		
1.1.5	Evaluation of Experience Evidence: The experience will be evaluated against the test certificate provided by the vendor with respect to BHEL technical requirement of the specification.		
1.1.6	Prior to dispatch of the material, Test Certificates (English language only) shall be send to BHEL for review and dispatch clearance by BHEL. The photographs of the material with the traceability/ marking and condition of the material before dispatch may be provided for dispatch clearance.		
1.1.7	As per "Ministry of Steel Order (latest as applicable)," if any of the enquiry items fall under "List of Steel Products under Mandatory Bureau of Indian Standards Certification," BIS certificate is to be provided mandatorily. The BIS certificate submitted by the vendor shall be valid till the delivery of material. In case the BIS certificate is expiring before the material delivery date, Vendor shall confirm the renewal of the certificate in advance so that the timely supply of the material to BHEL is ensured.		

INTEGRITY PACT

Between

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

and

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

Preamble

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

_____

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

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

Section 1 – Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

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

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved

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

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

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

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

Section 4 – Compensation for Damages

4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

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

6.1 The Bidder(s)/ Contractor(s) undertake(s) to obtain from all subcontractors a commitment consistent with this Integrity Pact and report Compliance to the Principal. This commitment shall be taken only from those sub-contractors whose contract value is more than 20 % of Bidder's/ Contractor's contract value with the Principal. The Bidder(s)/ Contractor(s) shall continue to remain responsible for any default by his Sub-contractor(s).

6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.

6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

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

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

Section 8 –Independent External Monitor(s)

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

8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the

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

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

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

Section 9 – Pact Duration

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

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

Section 10 – Other Provisions

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

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

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

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

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

For & On behalf of the Principal

(Office Seal)

For & On behalf of the Bidder/ Contractor

(Office Seal)

Place----------

Date----------

Witness: _____

(Name & Address) _____

_____

Witness: _____

(Name & Address)_____

_____