BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Undertaking) Ramachandrapuram, Hyderabad, 502032, A.P. India Phone 040-23184526, 23182322 FAX:040-23021910, 1954	भारत हेवी इलेक्ट्रिकल्स लिमिटेड (भारत सरकार का उपक्रम) रामचन्द्रपुरम, हैदराबाद, 502032 आंध्र प्रदेश, भारत	RFQ NO :	PURCHASE DEPARTMENT ENQUIRY क्रय विभाग जांच (ई मेल : tenderbox@bhelhyd.co.in)	SHEET:1 OF :1

HY17001 C REV.NO.0	Phone 091-40-23184526 091-40-23182322	FAX : 091-40-23021910 091-40-23021954	**PURCHASE DEPARTMENT**

GSTIN:	Enq/Collective No :D6A1V97666	Enq.Dt. : 11.03.2022	No.Of Items :4	DUE Dt. OF QUOTN. : 04.04.2022

Office Copy

Please submit your lowest quotation in sealed cover superscribed with Enquiry No./Collective No.(RFQ No .....) and due date subject to our terms and conditions attached ,for the materials mentioned below.Your offer has to reach us onor before due date by 11.00 Hours (IST) and will be opened at 14.00 Hours.(IST).If our Enquiry No./Collective No.(RFQ No .....) and tender due date are not super scribed on the tender cover , your offer shall be summarily rejected. Incomplete offers and late offers will not be considered.

SL NO	Purchase Req.no	item no	Material Code, HSN No.	Drg no - Ver , Rev & Spec - Ver , Rev,Spec-Var	Description	Unit	Qty	Delivery Date	Schedule Qty
1	8000106224	10	TC9765632169 84818030	NA-,,TC65632,,16	UPSTREAM PRESSURE CONTROL VALVE	EA	1.000	01.10.2022	1.000
3	7000097666	10	TC9765632177 84818030	NA-,,TC65632,,17	USPCV - SPARES	SET	1.000	01.10.2022	1.000
2	8000106225	10	TC9765632185 84818030	NA-,,TC65632,,18	DOWNSTREAM PRESSURE CONTROL VALVE	EA	1.000	01.10.2022	1.000
4	7000097667	10	TC9765632193 84818030	NA-,,TC65632,,19	DSPCV - SPARES	SET	1.000	01.10.2022	1.000

Special Remarks

CheckList of Quality Interventions:

BHEL reserves the right to enforce any or all of the following checks during execution of the order.
There is no additional cost to the vendor on account of these checks.

	TEST CERTIFICATE REQD: Y GUARANTEE REQ : Y SAMPLE REQD : N BID TYPE : TWO PART	For and on-behalf of Bharat Heavy Electricals Limited. P.SRAVANI OFFICER/PUR(HE&F)

Pre-Qualification Requirements (PQR) of Bidders for Self Actuated Pressure Control Valves:

1.0 Bidder shall be Original Equipment Manufacturer or OEM's authorized distributor/channel partner of Self Actuated Pressure Control Valves having offices in India. The leakage class requirement shall be as per BHEL specification furnished along with the purchase enquiry for Self-Actuated Pressure Control Valves.

2.0 In case the OEM authorizes their distributors/channel partner for representing them in totality:
   a. Authorized distributor/channel partner shall submit authorization certificate from their OEM to quote for complete job, for authorized distributors/channel partner the expiry date of validity of distributorship should be clearly indicated along with documentary evidences
   b. OEM shall declare that in the event of discontinuation of their partnership, at any point of time during the warranty period, OEM will take the total responsibility for meeting all the commitments made earlier by the authorized distributor/channel partner.
   c. The responsibility of complete item to be supplied as per BHEL specification requirements including engineering and selection of its components shall be with OEM only. For this OEM shall submit a letter in original.
   d. Authorized distributors/channel partner shall have association with the OEM for the past five years and should have supplied and commissioned with the OEM make Self Actuated Pressure Control Valves in India.

3.0 Bidder to confirm that they will provide spares and services support for the offered Self Actuated Pressure Control Valves for at least ten years from the date of supply. In case of authorized distributor/channel partner, "After Sales Service" and availability of spares to be guaranteed by OEM for at least ten years.

4.0 Bidder shall have an established facility in India for engineering documentation, after sale service for the offered make and model of Self Actuated Pressure Control Valves.

5.0 OEM shall offer a proven model of Self Actuated Pressure Control Valves supplied for Lube oil application in any power plant / refinery/ other industries.

Bidder shall submit a certificate of satisfactory performance of the offered model from their clients in India (client details to be provided), working satisfactorily for a period of not less than one year, which has been supplied during the last five years.
Note: If BHEL is unable to verify the PTR furnished, with end user contact details provided above, the offer will be rejected.

6.0 The Bidder shall be registered vendor for at least 2 of the following major Engineering consultants in India:
   a. NTPC EOC Noida
   b. Engineers India Limited (IOCL/HPCL/ONGC/BPCL)
   c. Tata consulting engineers Limited
   d. Development consultants

Bidder must submit the documentary evidence/proof in support of vendor registration by submitting the valid vendor registration letter from the respective agency.
Note: Submitting PO copy of supply against particular project is not acceptable.

7.0 All correspondence, Documentation, catalogs and Manuals shall be in English language.

8.0 Bidder shall furnish the necessary documentary evidence/proof in support of claim for meeting the above Pre-qualification requirements, failing which their offer will be liable for rejection.

Annexure-A

Guidelines for Indian Agents of Foreign Suppliers

1.0 There shall be compulsory registration of agents for all Global (Open) Tender and Limited Tender. An agent who is not registered with BHEL shall apply for registration in the registration form in line with SEARP.

1.1 Registered agents will file an authenticated Photostat copy duly attested by a Notary Public/Original certificate of the Principal confirming the agency agreement and giving the status being enjoyed by the agent and the commission/ remuneration/ salary/ retainership being paid by the principal to the agent before the placement of order by BHEL.

1.2 Wherever the Indian representatives have communicated on behalf of their principals and the foreign parties have stated that they are not paying any commission to the Indian agents, and the Indian representative is working on the basis of salary or as retainer, a written declaration to this effect should be submitted by the party (i.e. Principal) before finalizing the order.

2.0 Disclosure of particulars of agents/ representatives in India, if any.

2.1 Tenderers of Foreign nationality shall furnish the following details in their offers:

2.1.1 The Bidder(s)/ Contractor(s) of foreign origin shall disclose the name and address of the agents/ representatives in India if any and the extent of authorization and authority given to commit the Principals. In case the agent/ representative be a foreign Company, it shall be confirmed whether it is existing Company and details of the same shall be furnished.

2.1.2 The amount of commission/ remuneration included in the quoted price(s) for such agents/ representatives in India.

2.1.3 Confirmation of the Tenderer that the commission/ remuneration, if any, payable to his agents/ representatives in India, may be paid by BHEL in Indian Rupees only.

2.2 Tenderers of Indian Nationality shall furnish the following details in their offers:

2.2.1 The Bidder(s)/ Contractor(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any, indicating their nationality as well as their status, i.e. whether manufacturer or agents of manufacturer holding the Letter of Authority of the Principal specifically authorizing the agent to make an offer in India in response to tender either directly or through the agents/ representatives.

2.2.2 The amount of commission/ remuneration included in the price (s) quoted by the Tenderer for himself.

2.2.3 Confirmation of the foreign principals of the Tenderer that the commission/ remuneration, if any, reserved for the Tenderer in the quoted price(s), may be paid by BHEL in India in equivalent Indian Rupees on satisfactory completion of the Project or supplies of Stores and Spares in case of operation items.

2.3 In either case, in the event of contract materializing, the terms of payment will provide for payment of the commission/ remuneration, if any payable to the agents/ representatives in India in Indian Rupees on expiry of 90 days after the discharge of the obligations under the contract.

2.4 Failure to furnish correct and detailed information as called for in paragraph 2.0 above will render the concerned tender liable to rejection or in the event of a contract materializing, the same liable to termination by BHEL. Besides this there would be a penalty of banning business dealings with BHEL or damage or payment of a named sum.

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Annexure-B

This format is applicable only to Indian Suppliers/ Agents supplying indigenous portion of Foreign Purchases.
* In all other cases, extant guidelines of SEARP, 2010 are to be followed.

SEARP (SRF) Clause No	Detail
	Name & address of the firm
1.0	**Products/ Systems / Services being considered for**
2.0	**General Information**
2.2	Name of Chief Executive
2.3	Details of authorized signatory
3.0	**Ownership Information**
3.1	Type of firm
3.2	Nature of Business • *Attach **authorization letter** and **agency agreement** from Principal (from whom capital equipment is procured)* • *Attach copy of declaration from Foreign Principal for **total guarantee/ warranty of indigenous supplies***
3.3	Year of establishment
3.4	Year of commencement of business
4.0	**Registration particulars**
4.1	Permanent Account No.
4.2 / 4.3	Sales Tax / TIN no
4.6	Service tax no. (in case of E&C)
5.0	**Organisational strength**
6.0	**Other particulars**
6.1	If the company is already registered with other units
6.2	Directors/ Partners, if related to any BHEL Employee
6.9	If any Ex BHEL Personnel employed by the Company
6.12	Details of pending legal issues with BHEL
6.13	Bank Account information
9.0	**Financial information**
9.6	Sales/ Turnover details of last 3 years (or from the date of incorporation whichever is less)

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(To be executed on Non- Judicial Stamp Paper for an appropriate value.
To be stamped as an agreement)

(For Suppliers on Unit's / Division's PMD)

ANNEXURE-II

Framework Confidentiality Agreement Cum Undertaking

This Agreement made on this the _____ day of (month) _____ 20 ___ ("Effective Date") by and between M/s. BHARAT HEAVY ELECTRICALS LIMITED, having registered office at "BHEL House", Siri Fort, New Delhi – 110049 (India), acting through its _____ Unit (hereinafter may be referred to as "BHEL" or "the company").

And

M/s. _____ (address) _____ represented by authorized representative Sri _____ (herein after referred to as the "Supplier").

The supplier and the company may, unless the context otherwise requires, hereinafter be collectively referred to as "Parties" or singly as the "Party".

RECITALS

Whereas, BHEL is engaged in the design, engineering, manufacturing, construction, testing, commissioning and servicing of a wide range of products, systems and services for the core sectors of the economy, viz. Power, Transmission, Industry, Transportation, Renewable energy, Oil & Gas and Defence and providing associated services to varied customers in relation to which BHEL / its affiliates own valuable information of a secret and confidential nature.
Whereas the Company may, in connection with contract(s) (as defined hereunder) placed or to be placed upon the supplier, or otherwise, from time to time, make available, Technical Information as is defined hereunder.

And Whereas BHEL is willing to provide such Technical Information to the Supplier from time to time and the Supplier understands and acknowledges that such Technical Information is valuable for the Company and as such is willing to protect confidentiality of such information, subject to the terms and conditions set out hereunder.

Now therefore, in view of the foregoing premises and in consideration of the mutual covenants and agreements hereinafter set forth, the parties agree as under:

1. Definitions:

Unless the context so requires, in this Agreement, the following terms will bear the meaning ascribed to the said term in this clause.

A. **"Contract"** means the contract entered into with a supplier and includes a Purchase Order, or a Work Order for procurement of any goods or for provision of any services.
B. **"Effective Date"** means the date of this Agreement as mentioned in the preamble of this Agreement.
C. **"Supplier"** includes a Contractor or a Vendor of the Company whether for supplying of goods or for providing any services under a Contract or both.
D. **"Technical Information"** includes Drawings, and / or Product Standards and / or Specifications and / or Corporate / Plant Specifications and / or Technological Process Sheets and / or Technical Data Sheets and / or Jigs & Fixtures and / or Pattern & Dies and / or Special Gauges and / or Tools etc. Belonging to or wherein the Company has acquired from a third party a right of user and includes any improvement thereto from time to time whether carried out by the Company or by the Suppliers.
E. **"Intended Purpose"** means the purpose for which the Technical Information is provided to the supplier under or in connection with a contract.
F. **"Improvement"** includes any modification made to, or adaptation of, the Technical Information which enhances or is calculated to enhance the performance (Whether in terms of effectiveness or in terms of efficiency or both) of the product and / or the service to be provided by the Supplier under a Contract.

2. This Agreement shall come into force / deemed to have come into force, as the case may be, on the Effective Date; or, on the first date when the Technical Information or any part thereof is provided by BHEL to the supplier; whichever is earlier.

3. **Agreement deemed to be incorporated in each contract:** Unless and to the extent otherwise stipulated in the Contract, the conditions of this Agreement are deemed to be incorporated in all Contracts which may be entered into between the Company and the Supplier. Further, unless otherwise stipulated, the obligations under this Agreement are and will be independent of the obligations under the Contracts and such obligations of the Supplier hereunder will remain of full effect and validity notwithstanding that the period of validity of the Contract has expired by efflux of time stipulated therein; or, the contract has been discharged by performance or breach; or, the termination of the Contracts for any reason whatsoever.

4. Ownership:

4.1 The Company may, from time to time, make available to the Supplier, Technical Information on a non-exclusive basis by way of loan.

4.2 The Supplier acknowledges and agrees that all Technical Information and copies thereof that are or may be provided by the Company to the Supplier, are and shall remain the property of

BHEL or that of the concerned entity from whom BHEL has obtained the Technical Information and such Technical Information are and shall constitute trade secrets of the BHEL. Nothing in this Agreement or in any disclosures made hereunder by or on behalf of the Company shall be construed as granting upon the Supplier any patent, copyright or design or any other intellectual property rights of whatsoever description that subsists or may hereinafter exist in the Technical Information. Furthermore, nothing in this Agreement or in any disclosures made hereunder by or on behalf of the Company shall be construed as granting upon the supplier any license or right of use of such patent, copyright or design or any other intellectual property rights of whatsoever description which may now or hereafter exist in the Technical Information except for use of the Technical Information strictly in accordance with this Agreement and the contract and / or as directed in writing by the Company, solely for the Intended Purpose under the Contract.

4.3 Neither party is obligated by or under this Agreement to purchase from or provide to the other party any service or product and that any such purchase / sale of any product and / or service by one party to the other party will be governed by the Contract if any, that may be entered into by and between the Company and the Supplier.

4.4 The Supplier is / has been made well aware and acknowledges that the Technical Information being / which may be shared with it by the Company has been either generated by the Company by incurring huge investment and cost or obtained from foreign collaborators under Technical Collaboration Agreement (TCA) with stringent confidentiality conditions.

4.5 The supplier agrees and undertakes to adhere to confidentiality requirements as applicable to BHEL under a TCA and also ensure that the confidentiality requirements are adhered to by all its concerned employees or sub-contractors /suppliers (where permitted to be engaged by BHEL). Any damages, losses, expenses of any description whatsoever, arising out of or in connection with a breach of the confidentiality requirements under a TCA owing to any act or omission on the part of the supplier or its employees or sub-contractors / suppliers that is claimed by a foreign collaborator from the Company shall be wholly borne by the Supplier and it shall keep BHEL fully indemnified in this behalf. The demand by the Company shall be conclusive upon the Supplier who shall thereupon forthwith pay to the Company without demur, dispute or delay the amount as demanded without demanding any further proof thereof.

4.6 The Supplier agrees and undertakes that unless so decided and advised by the Company in writing all rights / title to any Improvement to the Technical Information shall vest in the Company. The Supplier undertakes and agrees to inform forthwith to the Company of any such Improvement made to the Technical Information and transfer all drawings / documents or other materials connected with such Improvement to the Company and also agrees to fully cooperate with the Company for protecting the Company's interests in such Improvements

in the Technical Information including but not limited to obtaining necessary protection for the intellectual property rights in such improvement, if so desired by the Company. If a question arises whether a modification amounts to improvement to the Technical Information, the same shall be decided by the Company and such decision shall be final and binding upon the supplier.

5. Use and Non – Disclosure:

5.1 Unless otherwise stipulated by the Company, all Technical Information made available to the supplier, by the Company shall be treated as Confidential irrespective of whether the same is marked or otherwise denoted to be Confidential or not.

5.2 The Supplier undertakes and agrees that the Technical Information in its possession shall be held in strict confidence and will be used strictly in accordance with this Agreement and solely for the Intended Purpose under the Contract. Use of the Technical Information for any other purpose other than Intended Purpose is prohibited.

5.3 In particular, the Supplier shall not use Technical Information or any Improvement in its possession for the manufacture or procurement of the product(s) or components or parts thereof or use the Technical Information or any portion thereof or any modification or adaptation thereof in any form to provide any product and / or service to any third party, without the prior written consent of the Company.

5.4 The Supplier shall not disclose any of such Technical Information to any third party without the prior written consent of the Company. The Supplier agrees that without prior written consent of the Company, the supplier shall not disclose to a third party about the existence of this Agreement, or of the fact that it is / was in possession of or has experience in the use of any Technical Information nor shall the Supplier share in any manner whatsoever, with a third party, the name or details of any Contract(s) awarded by the Company to it or performed by the Supplier or the scope of work thereof or share any document or correspondence by and between the Company and the supplier in or in connection with this Agreement or such Contract(s). Notwithstanding what is stated elsewhere, the overall responsibility of any breach of the confidentiality provisions under this Agreement shall rest with the Supplier.

5.5 This Supplier undertakes and agrees not to make copies or extracts of and not to disclose to other any or all of the Technical Information in its possession, except as follows:

(a) The Supplier may disclose the Technical Information to such of its officers and employees strictly to the extent as is necessary for such officer or employee for the Intended Purpose, provided that the Confidential Information (or copies thereof) disclosed shall be marked

clearly as the confidential and proprietary information of Company and that such officers and employees shall similarly be bound by undertakings of confidence, restricted use and non-disclosure in respect of the Technical Information. The Supplier shall be responsible for any breach of such confidentiality provisions by such officers and employees.

(b) With the prior written consent of Company, the supplier may disclose for the Intended Purpose such Technical Information as is provided for in such consent to such of its professional advisers: consultants, insurers and subcontractors who shall be similarly bound by undertakings of confidence, restricted use and non-disclosure in respect of such Technical Information.

(c) The Supplier shall not be prevented to make any disclosure required by (i) order of a court of competent jurisdiction or (ii) any competent regulatory authority or agency where such disclosure is required by law, provided that where the supplier intends to make such disclosure, it shall first consult Company and take all reasonable steps requested by it to minimize the extent of the Technical Information disclosed and to make such disclosure in confidence and also shall cooperate with the Company in seeking any protective order or any other remedy from proper authority in this matter.

6. <u>Exceptions:</u>

The Obligations of the Supplier pursuant to the provisions of this agreement shall not apply to any Confidential Information that:

a) was / is known to, or in the possession of the Supplier prior to disclosure thereof by the Company;
b) is or becomes publicly known, otherwise than as a result of a breach of this agreement by the Supplier.
c) is developed independently of the Disclosing party by the Supplier in circumstances that do not amount to a breach of the provisions of this Agreement or the Contract;
d) is received from a third party in circumstances that do not result in a breach of the provisions of this Agreement.

7. The Obligation of maintaining confidentiality of the Technical Information on each occasion, shall subsist for the entire duration during which the Technical Information / equipment is in possession of the Supplier and shall thereafter subsist for a further period of _____ years from the date when the complete Technical Information has been returned in portions on different dates, the period of ____ years will be reckoned from the date when the last portion of the Technical Information has been returned. Notwithstanding the expiry of the confidentiality obligation, the obligation of the Supplier under clause 5.4 shall continue to subsist for a further period of _____ years.

8. <u>Warranties & Undertakings</u>:

a) The Supplier undertakes to ensure the due observance of the undertakings of confidence, restricted use and non-disclosure by its persons to whom it discloses or releases copies or extracts of the Technical Information.

b) The Supplier shall keep the Technical Information or improvement made therein properly segregated and not mix up the same with any other material / documents belongings to him / it or to any other third party.

c) The Supplier further undertakes that he / it shall not hypothecate or give on lease or otherwise alienate or do away with any of the Technical Information and / or equipment of the Company, made available to him / it, and undertakes that he / it shall hold the same as a trustee, in capacity of custodian thereof and use / utilise the same solely for the purpose of executing the contract awarded by the Company.

d) The Supplier further undertakes that he / it shall return all the equipment and / or Technical Information as far as practicable in the same condition in which the same was made available to him / it by the Company together with any Improvement thereon and the documents connected with such Improvement, to the Company forthwith upon completion of the scope of work or contract for which such Technical Information was provided by the Company to it or as directed by the Company together with a confirmation by way of an affidavit or in such manner as directed by the Company that it has not retained any equipment and / or Technical Information / improvement thereof. In case any such equipment and / or Technical Information or thereof shall remain in his possession or is not capable of being returned, the retention and use of such Technical Information or improvement thereto shall continue to be governed by this Agreement.

e) The Supplier undertakes to indemnify the Company for all the direct, indirect and / or consequential losses, damages, expenses whatsoever including any consequential loss of business, profits suffered by the Company owing to breach by the Supplier of its obligations under this Agreement and / or the confidentiality requirements, if any, contained in the Contract and that the Supplier hereby agrees that the decision of the Company in all such or any such matter/s shall be final and binding on the Supplier. On mere written demand of the Company, the Supplier shall forthwith and without demur or delay pay to the Company any such sum as determined by the Company as the amount of loss or damage or expense which has been suffered by the Company. The Supplier agrees that the Company shall be entitled to withhold and appropriate any amount payable to the Supplier under any Contract then existing between the Company and the Supplier, in case the Supplier fails to make payment, in terms of the written demand, within 7 days thereof. Without prejudice to the forgoing actions, in respect to any breach of this Agreement, the Company shall be entitled to take

any other action against the Supplier as per applicable laws, the Contract, Company's applicable policies, guidelines rules, procedures, etc.

9. Without prejudice to any other mode of recovery as may be available to the Company for recovery of the amount determined as due as per Clause 9 (f) hereinabove, the Company shall have a right to withhold, recovery and appropriate the amount due towards such losses, damages, expenses, from any amount due to the Supplier in respect of any other Contract (s) placed on him / it by any department / office / unit/ division of the said Company.

10. <u>Arbitration & Conciliation:</u>

1. 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, validity or execution of the contract; 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 of an arbitrator appointed by head of the BHEL unit issuing the contract.
   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 at Hyderabad.
   The cost of arbitration shall be borne as per the award of the Arbitrator.
   Subject to the arbitration in terms of clause 55, 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.
   In case of contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:
   In the event of any dispute or difference relating to the interpretation and application of the provisions of the contract, such dispute or difference shall be referred by either party for arbitration to the sole arbitrator in the Department of Public Enterprises to be nominated by the secretary to the Government of India in–charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitration under this clause. The award of the arbitrator shall be binding upon the parties to the dispute, provided, however, any party aggrieved by such award may make further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law and

justice, Government of India. Upon such reference the dispute shall be decided by the Law secretary or the special Secretary or Additional secretary when so authorized by the Law secretary, whose decision shall bind the parties hereto finally and conclusively. The parties to the dispute will share equally the cost of arbitration as intimated by the arbitrator.

2. INTEREST CLAUSE:
   In order to bring uniformity in all the contracts / agreements entered between BHEL and its contractors / vendors / suppliers / service providers etc., it is hereby advised to incorporate the following clause in all tenders and agreements.
   "No interest shall be payable by BHEL on earnest money or security deposit or any money due to the contractor by BHEL."

11. Governing Law & Jurisdiction:

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.

SIGNATURE

WITNESSES

1

Name:

Address:

2

Name:

Address:

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. _____."

Annexure - IV

Proforma for self-certification by Supplier for Compliance to Clause No 20 (B)

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) is **not from such a country/is from such a country (**delete whichever is NOT applicable**)** and has been duly registered with the Competent authority (delete if NOT applicable) . I hereby certify M/s ..... fulfills all requirements in this regard and is eligible to be considered . (where applicable , valid registration by the competent authority shall be attached)

Sd/-
Authorised Signatory with Stamp

SPECIFICATION FOR SELF ACTUATED PRESSURE CONROL VALVES

1.0 SCOPE:

This specification covers the requirement of Self-actuated pressure control valves.

2.0 TECHNICAL REQUIREMENTS:

2.1 – Variants in Table-1

The technical specification in general shall be same as BHEL specification TC55018-R12, TC55017-R10 except Body material, trim material etc. Body material, Trim material etc shall be SS316L. Vendor to consider SS316L in place of SS316 wherever is required.

a) Vendor to follow attached BHEL specification TC55018-R12, TC55017-R10 and customer doc "DOC NO.: IBCE-6373-C00-INC-SPC-000-0001 Rev-3" (If any conflict between the specs, the superior one should be considered) with the following additional requirement.
b) PMI (Positive material identification) test & procedure shall be followed as per attached IOCL-spec "IBCE-6373-C00-ISP-QMS-000-0002 Rev02".
c) Vendor to follow attached inspection and test plan, DOC NO. : BCE-6373-C00-INC-SPC-000-0003 Rev-1.

Variant Table-1:

Var. No.	BHEL Material Code	Description	Reference Specification / Material code
01	TC9765632010	UPSTREAM PRESSURE CONTROL VALVE CV = 30 to 40, 3" 300RF, Set point : 8 to 9 kg/sq.cm(g)	TC55018
02	TC9765632029	3"-300RF USPCV-PACKING MATERIAL	TC9765632010
03	TC9765632037	3"-300RF USPCV-TRIMSET PLUG WITH STEM (3" 300RF-USPCV-TRIMSET consisting of seat, Seat ring/Seal ring, Plug with Stem, cage (wherever applicable))	
04	TC9765632045	3"-300RF USPCV-GASKET, DIAPHRAGM	
05	TC9765632053	3"300RF USPCV-ORIFICE,SPRING,O-RING	
11	TC9765632118	DOWNSTREAM PRESSURE CONTROL VALVE CV = 40 TO 50, 3" 300RF : Set point 2 to 5 kg/sq.cm(g)	TC55017
12	TC9765632126	3" 300RF-DSPCV PACKING MATERIAL	TC9765632118

13	TC9765632134	3" 300RF DSPCV-TRIM SET, PLUG WITH STEM (3" 300RF DSPCV-TRIM SET consisting of seat, Seat ring/Seal ring, Plug with Stem, cage (wherever applicable))	
14	TC9765632142	3" 300RF DSPCV-GASKET, DIAPHRAGM	
15	TC9765632150	3" 300RF DSPCV-ORIFICE,SPRING,O-RING	

2.1 – Variants in Table-2

The technical specification in general shall be same as BHEL specification TC55018-R12, TC55017-R10 except Body material, trim material etc. Body material, Trim material etc shall be SS316L. Vendor to consider SS316L in place of SS316 wherever is required.

a) Vendor to follow attached BHEL specification TC55018-R12, TC55017-R10 and customer doc "DOC NO.: 081757C001-701-JSS-1541-001 Rev B " & Design Basis (If any conflict between the specs, the superior one should be considered) with the following additional requirement.

b) Intergranular Corrosion (IGC) Test shall be conducted as per the following for all the grades of Austenitic stainless steels.

ASTM A262 Practice 'B' with acceptance criteria of "60 mils/ year (max)"

OR

ASTM A262 Practice 'E' with acceptance criteria of "No cracks as observed from 20 X Magnification and microscopic structure to be observed from 250X magnification"

c) PMI (Positive material identification) test & procedure shall be followed as per attached Specification for Positive Material Identification, Doc No: 081757C001-000-PP-509 Rev 01.

d) Inspection and test plan shall be as per attached Doc No. : 081757C001-701-ITP-1541-001 Rev A.

Varinat Table -2

Var. No.	BHEL Material Code	Description	Reference Specification / Material code
01	TC9765632169	UPSTREAM PRESSURE CONTROL VALVE	TC55018

02	TC9765632177	USPCV – SPARES Consisiting of a) 1 no. of repair kit consisting of orifice, plug, spring, gasket, diaphragm, O-ring against each type of valve b) 10% (subject to minimum of 1 no.) for each type, size, rating of trim set consisting of seat, seat ring / seal ring, plug with stem, gland packing. c) 10% (subject to minimum of 1 no.) of accessories like quick exhaust valves, pilot valves, O-rings of actuators etc.	TC9765632010
03	TC9765632185	DOWNSTREAM PRESSURE CONTROL VALVE	TC55017
04	TC9765632193	DSPCV – SPARES Consisiting of a) 1 no. of repair kit consisting of orifice, plug, spring, gasket, diaphragm, O-ring against each type of valve b) 10% (subject to minimum of 1 no.) for each type, size, rating of trim set consisting of seat, seat ring / seal ring, plug with stem, gland packing. c) 10% (subject to minimum of 1 no.) of accessories like quick exhaust valves, pilot valves, O-rings of actuators etc.	TC9765632185

2.2 Valve Sizing Calculation:

Matl code	TC9765632169	TC9765632185
Tag no	701-PCV- 3351	701-PCV-3352
Line size inlet/outlet	3"/4"	3"/3"
Upstream pressure kg/sq.cm	8	5.5
Downstream pressure kg/sq.cm	ATM	3.3
Flow case-1/2 in m3/hr	6.39/39.39	26.61/26.61/39.92/39.92
Cal Cv	2.47/15.24	15.91/19.64/23.87/29.45
Selected CV *	17	67
Rating & End connection	3" 300 RF*	3" 300 RF*
Set Pressure Kg/cm^2(g)	8	3.3

STANDARD SPECIFICATION FOR SELF ACTUATED PRESSURE CONTROL VALVES

LUBE OIL UPSTREAM PRESSURE CONTROL VALVE

1. SCOPE:

This specification covers design, manufacturing, assembling & testing of lube oil down stream pressure control valve.

2. TECHNICAL SPECIFICATIONS:

The valve and accessories shall be designed & fabricated in accordance with latest instrumentation code of practices.

2.1 Service parameters. Table 1.

SERVICE CONDITION		
1.	Ambient temperature °C	Min 3 max 50
2.	Fluid	Lube oil
3.	Sp. Gravity at operating condition	0.87
4.	Noise level dB	≤ 85
5.	Seat tightness	ANSI B16.104 class IV
BODY		
6.	Type	Globe
7.	Material	SS316
8.	Bonnet	Standard
9.	Packing material	Teflon
TRIM		
10.	Flow characteristics	Quick Open/Linear
11.	Plug material	AISI316+Stellited
12.	Seat ring or cage material	AISI316+Stellited
ACTUATOR		
13.	Type	Diaphragm/ Piston (Pilot actuated Type not acceptable).
14.	Flow action	Open
15.	Online pressure failure	Close
16.	Connection	½ " NPT

2.2 No copper or its alloys are allowed.

2.3 Silver, Zinc, Mercury and their alloys have to be excluded from components in contact with any process fluid.

2.4 Vendor to offer following spares:

2.4.1. Diaphragm

2.4.2. Seal ring

2.4.3. Gland Packing

2.4.4. Complete trim including seating plug & stem assembly.

2.5 Control valve sizing for non compressible fluids shall be as per ISA S39.1-1972 & for compressible fluids shall be as per ISA 39.3-1973.Project sp

2.6 Face to face dimensions of control valve shall be as per ANSI B16.10.

2.7 Design pressure and temperature shall be 19 KG/SQ.CM (G) and 100 Deg.cen.

2.8 Impulse tapping shall be taken from piping depending on system requirement. Tapping from valve body is not acceptable.

3. TEST & INSPECTION CERTIFICATES:

3.1 Material certificates

3.2 Hydrostatic test

3.3 Leakage test for actuator

3.4 Seat leakage test

3.5 Operating test.

3.6 Optional price for TPI like Lloyds, DNV, TUV or equivalent in case the valves are supplied from other than Indian origin.

3.7 Optional price for CV test to be provided along with offer. If vendors have Cv type test certificate for the offered valves, then conducting Cv test specifically is not required.

3.8 Pressure regulation on test (By varying upstream pressure and Flow Rate)

3.9 Test for set point adjustment throughout settable range (At least at two points corresponding to minimum and maximum of range by varying Upstream pressure and Flow rate).

3.10 Deviation in measured pressure with reference to actual set Pressure shall not exceed +/-0.2 Kg/cm^2 (+/-0.1 Kg/cm^2 preferable) throughout the flow range.

3.11 The above requirement shall be included in purchase order based on inspection categorisation plan approved by the customer for the project.

4. O & M MANUALS & DATASHEETS.

4.1 The project specific valve datasheets/ sizing calculation shall be furnished along with offer. Sizing Parameters are provided vide Annexure-1 enclosed.

4.2 4 copies required after placement of order.

4.3 All documents indicated in clause 3, 4.1 & 4.2 shall be furnished in soft copy (CD).

5. VARIANT TABLE:

MATERIAL CODE	DESCRIPTION
TC9755018018	NOM. SIZE 2"X2" PR.CLASS ANSI150 FLANGED RF CV47 SPRING4.2-10.5 FISHER-MODEL
TC9755018026	NOM.SIZE 2 1/2"X2 1/2" PR.CLASS ANSI150 FLANGED RF CV58 SPRING 4.2-10.5
TC9755018034	NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF CV90 SPRING 4.2-10.5 FISHER-MODEL
TC9755018042	NOM.SIZE 4"X4" PR.CLASS ANSI150 FLANGED RF CV120 SPRING4.2-10.5 FISHER-MODEL
TC9755018050	NOM.SIZE 1"X1" PR.CLASS ANSI300 FLANGED RF CV18 SPRING4.2-10.5 FISHER-MODEL
TC9755018069	NOM.SIZE 1 1/2"X1 1/2" PR.CLASS ANSI300 FLANGED RF CV27 SPRING4.2-10.5

TC9755018077	NOM.SIZE 1 1/2"X1 1/2" PR.CLASS ANSI300 FLANGED RF CV39 SPRING 4.2-10.5
TC9755018085	NOM.SIZE 2"X2" PR.CLASS ANSI300 FLANGED RF CV47 SPRING 4.2-10.5 FISHER-MODEL
TC9755018093	NOM.SIZE 2 1/2"X2 1/2" PR.CLASS ANSI300 FLANGED RF CV58 SPRING 4.2-10.5
TC9755018107	NOM.SIZE 3"X3" PR.CLASS ANSI300 FLANGED RF CV90 SPRING 4.2-10.5 FISHER-MODEL
TC9755018115	NOM.SIZE 4"X4" PR.CLASS ANSI300 FLANGED RF CV120 SPRING4.2-10.5 FISHER-MODEL
TC9755018123	NOM.SIZE 1"X1" PR.CLASS ANSI300 FLANGED RF CV180 SPRING1.82-5.5 FISHER-MODEL
TC9755018131	CV=13.1,1"300RF,SET=11KG/SQ.CM.M/S FISHER
TC9755018140	CV=13.1,300RF,SET=6KG/SQ.CM,M/S FISHER
TC9755018212	SPARE DIAPHRAGM 6.55-3P FOR CONTROL VALVE NOM.SIZE 1 1/2"X1 1/2" PR.CLASSS ANSI300 FLANGED
TC9755018220	SPARE O-RING NITRILE FOR CONTROL VALVE NOM.SIZE 1 1/2"X1 1/2" PR.CLASS ANSI300 1.82-5.5
TC9755018239	SPARE SPRING FOR ACTUATOR 655 CONTROL VALVE NOM.SIZE1 1/2"X1 1/2"PR.CLASS ANSI300 1.82-5.5
TC9755018247	SPARE STEM FOR ACTUATOR 6553A FOR CONTROL VALVE NOM.SIZE1 1/2"X1 1/2"PR.CLASS ANSI300
TC9755018255	SPARE ASBESTOS GASKET FOR CONTROL VALVE NOM.SIZE1 1/2"X1 1/2"PR.CLASS ANSI300 FLANGED RF
TC9755018263	SPARE GUIDE BUSHING 17-4PHSST FOR CONTROL VALVE NOM.SIZE 1 1/2"X1 1/2"PR.CLASS ANSI300
TC9755018271	SPARE VALVE PLUG FOR CONTROL VALVE NOM.SIZE 1 1/2"X1 1/2" PR.CLASS ANSI300 FLANGED RF
TC9755018280	SPARE SEAT RING TOP FOR CONTROL VALVE NOM.SIZE 1 1/2"X1 1/2" PR.CLASS ANSI300 FLANGED RF
TC9755018298	SPARE SEAT RING BOTTOM FOR CONTROL VALVE NOM.SIZE1 1/2"X1 1/2" PR.CLASS ANSI300 FLANGED RF
TC9755018301	SPARE ACTUATOR DIAPHRAGM FOR CONTROL VALVE NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF
TC9755018310	SPARE GLAND PACKING FOR CONTROL VALVE NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF FISHER
TC9755018328	SPARE PLUG FOR CONTROL VALVE NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF FISHER
TC9755018336	SPARE SEAT RING TOP&BOTTOM FORCONTROL VALVE NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF
TC9755018344	SPARE SEAT GASKET FOR CONTROL VALVE NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF FISHER
TC9755018352	SPARE STEM FOR CONTROL VALVE NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF FISHER
TC9755018360	SPARE SET OF GASKETS FOR CONTROL VALVE NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF FISHER
TC9755018379	SPARE GUIDE BUSHING FOR CONTROL VALVE NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF FISHER
TC9755018387	SPARE UPPER WIRE FOR CONTROL VALVE NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF FISHER
TC9755018395	SPARE SPRING FOR CONTROL VALVENOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF FISHER
TC9755018417	DIAPHRAGM FORUPSTREAM PR. CONTROL VALVE,M/S FISHER MODEL NO.4"-655R-AR
TC9755018611	CV(selected)=9.4 to 15, 1" 300RF Set point :8 to 9 kg/sq.cm(g)

TC9755018620	CV(selected)=20 to 23, 1.5" 300RF Set point : 8 to 9 kg/sq.cm(g)
TC9755018638	CV(selected)=30 to 40, 2" 300RF Set point : 8 to 9 kg/sq.cm(g)
TC9755018646	CV(selected)=30 to 40, 3" 300RF Set point : 8 to 9 kg/sq.cm(g)
TC9755018654	CV(selected)=41 to 70, 3" 300RF Set point : 8 to 9 kg/sq.cm(g)
TC9755018662	CV(selected)=80 to 90, 3" 300RF Set point : 8 to 9 kg/sq.cm(g)
TC9755018670	CV(selected)=60 to 110, 4" 300RF Set point : 8 to 9 kg/sq.cm(g)
TC9755018689	CV(selected)=60 to 110, 4" 300RF Set point : 10 to 22 kg/sq.cm(g)
TC9755018697	CV (selected) = 20 to 23, 2.5" 300RF Set Point: 10 to 22 Kg/sq cm(g) along with counter flanges +Gasket +Nuts and Bolts.
TC9755018700	CV (selected) = 20(Maximum) , 2" 300RF Set point : 8 to 9 kg/sq.cm(g)
TC9755018816	1" 300RF USPCV-SPARE GASKET, DIAPHRAGM
TC9755018824	1" 300RF USPCV-TRIM SET consisting of seat, seatring/seal ring, PLUG WITH STEM, cage (wherever applicable)
TC9755018832	1" 300RF-USPCV-PACKING MATERIAL
TC9755018840	1.5" 300RF USPCV-SPARE GASKET, DIAPHRAGM
TC9755018859	1.5" 300RF USPCV-TRIM SET consisting of seat, seatring/seal ring, PLUG WITH STEM, cage (wherever applicable)
TC9755018867	1.5" 300RF-USPCV-PACKING MATERIAL
TC9755018875	2" 300RF USPCV-SPARE GASKET, DIAPHRAGM
TC9755018883	2" 300RF USPCV-TRIM SET consisting of seat, seatring/seal ring, PLUG WITH STEM, cage (wherever applicable)
TC9755018891	2" 300RF-USPCV-PACKING MATERIAL
TC9755018921	3"300RF-USPCV-PACKING MATERIAL
TC9755018930	3" 300RF-USPCV-GASKET, DIAPHRAGM
TC9755018948	3" 300RF-USPCV-TRIMSET consisting of seat, seatring/seal ring, PLUG WITH STEM, cage (wherever applicable)
TC9755018964	4" 300 RF-USPCV- GASKET, DIAPHRAGM
TC9755018972	4" 300 RF-USPCV- PACKING MATERIAL
TC9755018980	3"300RF USPCV-ORIFICE,SPRING,O-RING
TC9755018999	4" 300RF USPCV TRIM SET consisting of seat, seatring/seal ring, PLUG WITH STEM, cage (wherever applicable)
TC9755018808	4"300RF USPCV-ORIFICE,SPRING,O-RING

STANDARD SPECIFICATION FOR SELF ACTUATED PRESSURE CONTROL VALVES

LUBE OIL DOWNSTREAM PRESSURE CONTROL VALVE

1. SCOPE:

This specification covers design, manufacturing, assembling & testing of lube oil down stream pressure control valve.

2. TECHNICAL SPECIFICATIONS:

The valve and accessories shall be designed & fabricated in accordance with latest instrumentation code of practices.

2.1 Service parameters. Table 1.

SERVICE CONDITION		
1.	Ambient temperature °C	Min 3 max 50
2.	Fluid	Lube oil
3.	Sp. Gravity at operating condition	0.87
4.	Viscosity	20 CST
5.	Noise level dB	≤ 85
6.	Seat tightness	ANSI B16.104 class IV
BODY		
7.	Type	Globe
8.	Material	SS316
9.	Bonnet	Standard
10.	Packing material	Teflon
TRIM		
11.	Flow characteristics	Quick Open/ Linear
12.	Plug material	AISI 316 +Stellited
13.	Seat ring or cage material	AISI 316 +Stellited
ACTUATOR		
14.	Type	Diaphragm/ Piston (Pilot actuated Type not acceptable).
15.	Flow action	Close
16.	Online pressure failure	Open
17.	Connection	½ " NPT

2.2 No copper or its alloys are allowed.

2.3 Silver, Zinc, Mercury and their alloys have to be excluded from components in contact with any process fluid.

2.4 Vendor to offer following spares:

2.4.1. Diaphragm

2.4.2. Seal ring

2.4.3. Gland Packing

2.4.4. Complete trim including seating plug & stem assembly.

2.5 Control valve sizing for non compressible fluids shall be as per ISA S39.1-1972 & for compressible fluids shall be as per ISA 39.3-1973.

2.6 Face to face dimensions of control valve shall be as per ANSI B16.10.

2.7 Design pressure and temperature shall be 19 KG/SQ.CM (G) and 100 deg.cen.

2.8 Impulse tapping shall be taken from piping depending on system requirement. Tapping from valve body is not acceptable.

3. TEST & INSPECTION CERTIFICATES:

3.1 Material certificates

3.2 Hydrostatic test

3.3 Leakage test for actuator

3.4 Seat leakage test

3.5 Operating test.

3.6 Optional price for TPI like Lloyds, DNV, TUV or equivalent in case the valves are supplied from other than Indian origin.

3.7 Optional price for CV test to be provided along with offer. If vendors have Cv type test certificate for the offered valves, then conducting Cv test specifically is not required.

3.8 Pressure regulation on test (By varying downstream pressure and flow rate).

3.9 Test for setpoint adjustment throughout settable range (At least at two points corresponding to minimum and maximum of range by varying downstream pressure and flow rate).

3.10 Deviation in measured pressure with reference to actual set pressure shall not exceed +/- 0.2 Kg/cm^2 (+/- 0.1 Kg/cm^2 preferable) throughout the flow range.

3.11 The above requirement shall be included in purchase order based on inspection categorisation plan approved by the customer for the project.

4. O & M MANUALS & DATASHEETS.

4.1 The project specific valve datasheets/ sizing calculation shall be furnished along with offer. Sizing Parameters are provided vide Annexure -1 enclosed.

4.2 4 copies required after placement of order.

4.3 All documents indicated in clause 3, 4.1&4.2 shall be furnished in soft copy (CD).

5. VARIANT TABLE:

MATERIAL CODE	DESCRIPTION
TC9755017011	NOM. SIZE 2"X2" PR.CLASS ANSI150 FLANGED RF CV47 SPRING1.4-3.16 FISHER-MODEL|
TC9755017020	NOM. SIZE 2 1/2"X2 1/2" PR. CLASS ANSI150 FLANGED RF CV58 SPRING 1.4-3.16 |
TC9755017038	NOM.SIZE 3"X3" PR.CLASS ANSI150 FLANGED RF CV90 SPRING 1.4-3.16 FISHER-MODEL|
TC9755017046	NOM. SIZE 4"X4" PR.CLASS ANSI150 FLANGED RF CV120SPRING1.4-3.16 FISHER-MODEL|
TC9755017054	NOM. SIZE 1"X1" PR.CLASS ANSI300 FLANGED RF CV18 SPRING1.4-3.16 FISHER-MODEL|
TC9755017062	NOM.SIZE 1 1/2"X1 1/2" PR.CLASS ANSI300 FLANGED RF CV27 SPRING 1.4-3.16 |

TC9755017070	NOM.SIZE 1 1/2"X1 1/2" PR.CLASS ANSI300 FLANGED RF CV39 SPRING 1.4-3.16 |
TC9755017089	NOM. SIZE 2"X2" PR.CLASS ANSI300 FLANGED RF CV47 SPRING 1.4-3.16FISHER-MODEL|
TC9755017097	NOM.SIZE 2 1/2"X2 1/2" PR.CLASS ANSI300 FLANGED RF CV58 SPRING 1.4-3.16 |
TC9755017100	NOM.SIZE 3"X3" PR.CLASS ANSI300 FLANGED RF CV90 SPRING 1.4-3.16 FISHER-MODEL|
TC9755017119	NOM.SIZE 4"X4" PR.CLASS ANSI300 FLANGED RF CV120SPRING 1.4-3.16 FISHER-MODEL|
TC9755017127	NOM.SIZE 2"X2" PR.CLASS ANSI150 FLANGED RF CV127 SS BODY SPRING 1.8-5.5 |
TC9755017135	NOM.SIZE 1 1/2" PR.CLASS ANSI 300 FLANGED RF CV 27 SPRING RANGE 1.4 -4.6 |
TC9755017143	NOM.SIZE 1",PR.CLASS 300 FL-RF,CV 3.5,SPRING 1.8-5.5 |
TC9755017151	NOM.SIZE 1",PR.CLASS 300FL-RF,CV14.7,SPRING 4.6-10.25|
TC9755017216	NOM.SIZE 1"X1" PR.CLASS 300 FLAGED RF FISHER-MODEL |
TC9755017224	NOM.SIZE 1"X1" PR.CLASS 300 FLAGED RF FISHER-MODEL |
TC9755017232	NOM. SIZE 1"X1" PR. CLASS ANSI300 FLANGED RF FISHER |
TC9755017240	NOM. SIZE 1"X1" PR. CLASS ANSI300 FLANGED RF FISHER |
TC9755017259	NOM. SIZE 1"X1" PR. CLASS ANSI300 FLANGED RF FISHER |
TC9755017267	SPARE SPRING FOR CONTROL VALVENOM. SIZE 1"X1" PR. CLASS ANSI300 FLANGED RF FISHER |
TC9755017275	SPARE SET OF GASKETSS FOR CONTROL VALVE NOM. SIZE 1"X1" PR.CLASS ANSI300 FLANGED RF FISHER|
TC9755017305	SPARE ACTUATOR DIAPHRAGM FOR CONTROL VALVE NOM.SIZE 2"X2"PR.CLASS ANSI300FLANGED RF FISHER|
TC9755017313	SPARE GLAND PACKING FOR CONTROL VALVE NOM.SIZE 2"X2" PR.CLASS ANSI300 FLANGED RF FISHER |
TC9755017321	SPARE PLUG FOR CONTROL VALVE NOM. SIZE 2"X2" PR. CLASS ANSI150 FLANGED RF FISHER |
TC9755017330	SPARE SEAT RING FOR CONTROL VALVE NOM. SIZE 2"X2" PR. CLASS ANSI150 FLANGED RF FISHER |
TC9755017348	SPARE SEAT GASKET FOR CONTROL VALVE NOM. SIZE 2"X2" PR. CLASS ANSI150 FLANGED RF FISHER |
TC9755017356	SPARE SET OF GASKETS FOR CONTROL VALVE NOM. SIZE 2"X2" PR. CLASS ANSI150 FLANGED RF FISHER|
TC9755017364	SPARE GUID BUSHING FOR CONTROLVALVE NOM. SIZE 2"X2" PR. CLASS ANSI150 FLANGED RF FISHER |
TC9755017372	SPARE STEM FOR CONTROL VALVE NOM. SIZE 2"X2" PR. CLASS ANSI150 FLANGED RF FISHER |
TC9755017380	SPARE UPPER WIPER FOR CONTROL VALVE NOM. SIZE 2"X2" PR. CLASS ANSI150 FLANGED RF FISHER |
TC9755017399	SPARE SPRING FOR CONTROL VALVENOM. SIZE 2"X2" PR. CLASS ANSI150 FLANGED RF FISHER |
TC9755017402	SPARE DIAPHRAGM FOR CONTROL VALVE NOM.SIZE 2 1/2"X2 1/2"PR.CLASS ANSI150 FLANGED RF FISHER|
TC9755017410	DIAPHRAGM FOR DOWNSTREAM PR CONTROL VALVE M/S FISHER MODEL 2.1/2"-655-A |
TC9755017500	SPARE DIAPHRAGM FOR CONTROL VALVE NOM.SIZE 1 1/2"X1 1/2"PR.CLASS ANSI300 FLANGED RF FISHER|
TC9755017518	SPARE PLUG FOR CONTROL VALVE NOM.SIZE 1 1/2"X1 1/2"PR.CLASS ANSI300 FLANGED RF FISHER |
TC9755017526	SPARE SEAT FOR CONTROL VALVE NOM.SIZE 1 1/2"X1 1/2"PR.CLASS ANSI300 FLANGED RF FISHER |
TC9755017534	SPARE SPRING FOR CONTROL VALVENOM.SIZE 1 1/2"X1 1/2"PR.CLASS ANSI300 FLANGED RF FISHER |

TC9755017542	SPARE SET OF GASKETSS FOR CONTROL VALVE NOM.SIZE 1 1/2"X1 1/2"PR.CLASS ANSI300 FLANGED RF |
TC9755017615	CV=9.4 TO 15, 1" 300RF : Set point 2 to 5 KG/SQ.CM (G)
TC9755017623	CV=20 TO 23, 1.5" 300RF : Set point 2 to 5 KG/SQ.CM (G)
TC9755017631	CV=30 TO 40, 2" 300RF : Set point 2 to 5 KG/SQ.CM (G)
TC9755017640	CV=9.4 TO 15, 1" 300RF : Set point 8 to 9 KG/SQ.CM (G)
TC9755017658	CV=30 TO 40, 3" 300RF : Set point 2 to 5 KG/SQ.CM (G)
TC9755017666	CV= 41 TO 75, 3" 300RF : Set point 2 to 5 KG/SQ.CM (G)
TC9755017674	CV= 80 TO 94, 3" 300RF : Set point 2 to 5 KG/SQ.CM (G)
TC9755017682	CV= 9 TO 15, 1.5" 300RF : Set point 8 to 9 KG/SQ.CM (G)
TC9755017690	CV = 60 TO 110, 4" 300RF: Set Point 2 to 5 Kg/cm^2(g)
TC9755017810	1" 300RF DSPCV-GASKET, DIAPHRAGM
TC9755017828	1" 300RF DSPCV-TRIM SET CONSISTING OF SEAT, SEALRING/SEAT RING, PLUG WITH STEM, CAGE (WHEREVER APPLICABLE)
TC9755017836	1" 300RF-PACKING MATERIAL
TC9755017844	1.5" 300RF DSPCV-GASKET, DIAPHRAGM
TC9755017852	1.5" 300RF DSPCV-TRIM SET CONSISTING OF SEAT, SEALRING/SEAT RING, PLUG WITH STEM, CAGE (WHEREVER APPLICABLE)
TC9755017860	1.5" 300RF-DSPCV PACKING MATERIAL
TC9755017879	2" 300RF DSPCV-GASKET, DIAPHRAGM
TC9755017887	2" 300RF DSPCV-TRIM SET CONSISTING OF SEAT, SEALRING/SEAT RING, PLUG WITH STEM, CAGE (WHEREVER APPLICABLE)
TC9755017895	2" 300RF-DSPCV PACKING MATERIAL
TC9755017909	3" 300RF DSPCV-GASKET, DIAPHRAGM
TC9755017917	3" 300RF DSPCV-TRIM SET CONSISTING OF SEAT, SEALRING/SEAT RING, PLUG WITH STEM, CAGE (WHEREVER APPLICABLE)
TC9755017925	3" 300RF-DSPCV PACKING MATERIAL
TC9755017950	1.5" 300RF –DSPCV SEAT RING
TC9755017976	2" 300RF-DSPCV ORIFICE, SPRING, O-RING
TC9755017984	3"300RF DSPCV-ORIFICE,SPRING,O-RING

nozzle length.

For Vessels / Columns, special attention shall be paid to the thermowell length, to avoid clash with internal parts.

Other sizes and immersion lengths may be considered based on special condition / actual requirements subject to prior approval from PMC/OWNER.

Thermowell shall be design suitably for the stream velocity condition. The wake frequency shall be checked as per PTC 19.3, latest edition. Wherever flanged thermowell fails wake frequency calculations following steps shall be considered subject to approval of PMC/OWNER. 3

- Increasing Tip Thickness
- Increase in stem diameter
- Increasing Nozzle Size

3

It may be note that insertion length of thermowell shall not be decreased in any case. 3

Pipe line below 4” nominal bore shall be blown to 4” NB size to install thermowell.

Only thermowell (test well) when specified, shall be provided with the element entry plugged with SS plug and SS chain.

All the thermowells shall be offered for hydro testing at site to PMC/OWNER before installation.

Thermowell design shall be verified with the process connection nozzle internal diameter to achieve proper insertion. Special care shall be taken for high pressure application. Piping nozzle internal diameter shall be clearly mentioned in temperature element/gauge datasheet.

9. CONTROL VALVES

9.1 General

Generally single seated globe bodied control valves are preferred with stem or cage guided trims. When large volumes at low DP or process condition dictate, other valve designs, such as butterfly valves, may be considered.

Angle valves shall be used where necessary to prevent the accumulation of solids (e.g. hydrocarbon services where coke may form), slurry service, or in piping schemes where space is at a premium, flashing service, and for unusually high differential

pressures.

Plug valves may be used for special applications such as throttling control in slurry service.

All valves shall have the direction of the flow through the valve stamped or cast on the valve body.

Control valves shall not be used for ESD service.

Control valve bodies shall be NPS 1" as minimum, with reduced trim as necessary. Valve body sizes of NPS 1¼", 2½", 3½" and 5" shall not be used under any circumstances.

The minimum nominal sizes of butterfly valves shall be 4" (100mm). Butterfly valves shall comply with API 609.

Self-acting regulator valves shall be used for local, fixed gain control of utilities, clean fluids such as fuel systems and Nitrogen blanketing. The maximum size shall be 1½" (40 mm).
Control valve body size shall not be less than half the nominal pipe size in which it is installed.

All valves shall have removable seat rings and plugs.
Generally valves of 4" or greater shall be fitted with lugs to allow vertical lifting.

9.2 Valve Sizing

Control valves size shall be calculated using the ISA-75.01.01 or VENDOR's formulae. Valve sizing shall normally be based on the maximum flow x 1.3, at the coincident temperature, pressure and pressure drop conditions. Range-ability shall be checked for the anticipated minimum flow rate, which should be ≥ 20% of full stroke.

The maximum flow shall be between 60 to 80% of full stroke for equal percent trims and 50 to 80% for linear trims.

- In general Control Valve % opening shall be as below
- At min flow : typically 15% or greater
- At Normal flow : typically upto 75%
- At Maximum Flow : typically
- 85% or less.

3

Butterfly valve sizing shall be based on a maximum opening of 60º, except where they

are fitted with characterized vanes, in which case a 90º maximum opening shall be utilized.

The effect of reduced inlet and outlet pipe sizes shall be taken into account when sizing control valves.

9.3 Valve Trim

For each valve, the appropriate valve trim shall be selected to achieve the required control characteristic. Offered valve trim shall be suitable for specified process conditions.

When 50% or more of the system dynamic pressure drop is to be sustained by the control valve at normal flow conditions, the valve shall have a linear characteristic; otherwise it shall have equal percentage characteristic.

Series/parallel labyrinth trims shall not be used on fluids that have solids in suspension with particle size > 3 microns. Where multistage trims are necessary in services where particle size is > 3 microns, a valve having a high resistance multistep axial flow trim shall be utilized. To avoid solids build-up the use of angle valves shall be given serious consideration.

Cage-guided valves, balanced-type valves shall not be used for fluids that contain solid particles (e.g. coke). Any other special trim design which will have functional problems due to solid particles shall not be used for fluids that contain solid particles.

Where possible, the effects of cavitation shall be minimized by selection of suitable trim designs.

Where cavitation cannot be avoided the valve trim and facing shall be selected to minimize damage. Butterfly valves shall not be used were cavitation is predicted.
Valve maximum exit velocity shall be ≤ Mach 0.33. Calculations shall be submitted to verify compliance.

In flashing service, wherever necessary, the body size shall be increased to achieve this. In addition valve trim and facing shall be selected to minimize damage.

For ease of maintenance, all valve trims shall be of the quick-change type, with no internal components screwed or welded into the valve bodies or bonnets.

For valves with welded type online replaceable type trims shall be considered. VENDOR manual shall include detailed online trim replacement procedure.

Trim design shall provide equal pressurization around the plug in order to minimize vibration and prevent the potential for binding.

For on-off valves, ball support shall be by one of two methods, i.e. via trunnions or via the seats (floating). Generally, ball valves used on dirty services shall be trunnion mounted. However CONTRACTOR shall select the method of ball support to suit the applicable piping classes and process conditions.

9.4 Valve Noise

All control valves shall have their predicted aerodynamic / hydrodynamic noise level calculated. The calculations should be in accordance with IEC 534-8-3 for aerodynamic noise and IEC 534-8-4 for hydrodynamic noise. However VENDOR's Standard calculation based on construction and experience shall be considered paramount in line with good engineering practice.

The predicted aerodynamic noise level at a 1m radius from the valve discharge flange shall not be greater than 85 dBA.

Noise abatement shall in the first instance be achieved by judicious selection of the valve trim design. Where this cannot be achieved by trim design alone, path treatment e.g. heavy wall pipe / external insulation / silencers may be considered for localized abatement.

Because noise is propagated over long distances via the fluid stream, effectiveness of path treatment ceases where treatment ends this method of abatement shall therefore be subject to PMC/OWNER approval.

9.5 Control Valve Leakage

The degree of seat leakage shall be in accordance with IEC 60534.4 Class IV, unless specified on the valve data sheet to the contrary. Valve trim seating to meet the classification "TSO" shall be class V or VI dependent on the process, valve design and pressure drop.

For all the control / block and bleed valves connected to flare shall be of leakage class V or better.

9.6 End Connections

All valves shall be flanged. Valves shall be of one-piece cast construction i.e. flanged connections integral with the body. Valves up to NPS 600 mm shall be flanged to ANSI B16.5 and to ANSI B16.47 for valves larger than NPS 600 mm.

The pressure rating of all control valves shall be 300# as minimum.

On-Off valves shall be piping class valves complying with API 6D, but with a minimum flange rating of 300#. 3

In case flanged end connection is not suitable i.e. high pressure valves, butt-weld or socket weld connections shall be considered.

Butterfly valves shall be double flanged. Short pattern flange and wafer design butterfly valves shall not be used.

All flanges shall be drilled for through bolting. Flanges which are drilled and tapped for studs are not acceptable.

Gasket surface finish for raised face flanges shall be in accordance with ANSI B16.5 Para 6.4.4.

9.7 Valve Body / Trim Materials

The selection of body material for valves shall follow the associated piping material specification as a minimum.

Generally, each valve trim shall be constructed from SS 316, unless process conditions require higher grade material. However, the use of trim materials such as Stellite faced SS 316, 17-4 PH or Tungsten Carbide, etc. should be considered in the following applications:

- Flashing service
- Cavitating service
- Erosive service and choked flow
- Slurry service
- Wet Gas or Steam service
- Pressure drops that exceed 10 kg/cm2

Materials for sour service shall conform to the requirements of NACE International Standard MR0103 / ISO 15156.
All butterfly valves shall, as a minimum, be fitted with stainless steel vanes and shafts in a precipitation hardened material (e.g. 17-4 PH). 3

9.8 Bonnets and Packing

Generally, stem seals shall have comprise 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.

Low emission packing shall be utilized for all control valves. Valve packing containing asbestos in any form is strictly prohibited.

Where process streams containing Toxic / Volatile Organic Compounds (VOCs) are specified the valve may require special low emission valve packing and / or bellows sealing. They shall be fitted with a monitor for bellows leakage, e.g. small pressure gauge and excess flow valve.

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 Range	Packing Material
-40 to +230 deg C	PTFE V-Rings
Above +230 deg C	Graphite in pre-formed rings (non-asbestos).

Where the temperature range exceeds limit of graphite, suitable packing material shall be used as per VENDOR's recommendation.

Extension bonnets shall be considered for design temperatures below 0 deg C and above 230 deg C.

Packing which require external lubrication or grease shall not be used.

9.9 Actuators, Valve Positioners & Accessories

All accessories shall be fully tubed/wired as part of the valve assembly and shall be suitably terminated. All instrument air tubing and fittings shall be SS 316. Compression fittings shall be double ferrule type. Tubing sizes shall be metric, 6mm OD minimum, and sized in accordance with the stroking times to be achieved.

Actuator housing material shall be steel or anodized aluminum.

Limit switches shall be of Proximity NAMUR type as per DIN 19234.

All valves shall be provided with air filter regulators to prevent the actuator from maximum design pressure of Instrument air.
All electrical accessories shall be provided with terminals housed in enclosure with proper terminal identification.

The other auxiliary devices such as lock up valve, pilot relay, booster, quick exhaust valve, etc. shall be provided as parts of the actuating system in order to achieve the required stroke-speed, fail safe action etc.

All brackets, fixings and fittings shall be constructed from SS 316.

Prefabricated FRP Canopy shall be provided for all Solenoid valves, positioners and limit switch box, exposed to direct sun rays. Canopy shall be design in such a way that instrument access and maintenance shall be possible without removing canopy.

All the control/ shutdown valves actuator diaphragm vent ports shall be provided with necessary rain protection. In order to achieve this 1/4" SS tube formed to inverted U shape with necessary fitting shall be provided for all diaphragm vent ports.

9.9.1 Pneumatic Actuators

Spring Return Diaphragm actuators are preferred for modulating control valves. The normal operating range shall be 0.2 to 1.0 kg/cm2 but shall not exceed 3.5 kg/cm2.

Spring shall be designed to bring valve to the required valve action in the event of instrument air failure.

Valve actuators shall be sized for the design pressure upstream of the valve with the downstream pressure taken as zero. Pneumatic actuators shall be sized for minimum instrument air pressure of 3.5 kg/cm2g. Bench setting is unacceptable.

Actuators for on-off valves shall be sized as per requirements given for ESD valve actuator sizing. Stroke speed requirement for on-off valves shall be same as ESD valves.
Actuators shall be equipped with a travel position indicator for along with mark for open & close position.

Control valve actuator shall be sized considering safety factor of 1.5.

Pneumatic piston actuators shall be used on all on-off, ESD and Depressurization valves.
They may also be used, where necessary on control valves, to provide longer strokes or greater thrust than is available from spring diaphragm units. Pneumatic piston actuators shall preferably be the single acting spring return design and sized for minimum instrument air pressure of 3.5 kg/cm2g.

Double-acting piston actuators may only be used with PMC/OWNER approval.

<Security Level 2>

IBCE

POSITIVE MATERIAL IDENTIFICATION (PMI)

DOC. NO.: IBCE-6373-C00-ISP-QMS-000-0002

PROJECT NAME: BR-9 EXPANSION PROJECT

TOYO JOB NO.: 6373

OWNER: INDIAN OIL CORPORATION LIMITED.

PMC: TOYO ENGINEERING INDIA PRIVATE LIMITED.

2	01.03.2019	Addition comments	LPL	LPL	MP
1	21.03.2018	Issued after incorporating comments	LPL	LPL	MP
0	27.02.2018	Issued for Information	LPL	LPL	MP
REV	**DATE**	**DESCRIPTION**	**MADE BY**	**REVIEWED BY**	**APPROVED BY**

REVISION HISTORY	
REV.	**REVISION DESCRIPTION**
0	First Issue
1	Second Issue
2	Third issue

Table of Contents

1 Scope

1.1 This specification applies to the requirements for Positive Material Identification (PMI) to be performed at the vendor's works on all Metallic Alloy Materials (Ferrous and Non Ferrous) and welds procured either directly by the EPCC Contractor / Vendor or indirectly through the sub vendor.

1.2 This specification covers the procedures and methodology to be adopted to assure that the chemical composition of metallic alloy material and weld is consistent with the material specification as specified in the purchase document using a 'Alloy Analyzer' at the time of final inspection before dispatch.

1.3 The scope of this specification shall include but shall not be limited to PMI to be performed on Metallic Alloy Material as listed below.

- Bulk Piping Material as Pipes, Fittings, Flanges, Valves, Fasteners etc.
- Gaskets (for ring type joints)
- Instrumentation items as Control valves, Safety valves etc.
- Materials for fabricated equipment & rotating equipment
- welds in equipment, piping etc.

Following items shall be excluded from the scope of PMI examination

- Gaskets other than for ring type joints
- Internal components of Valves

1.4 All grades of Metallic alloy materials & welds shall be subject to a PMI test at site. In case of any defective materials being found at site, the EPCC Contractor shall be responsible to effect replacement of such defective materials at project site without any delays to the satisfaction PMC / Owner.

2 Definitions

2.1 Vendor – Any supplier or Manufacturer on whom an order is placed by EPCC Contractor for the supply of referred items. This definition shall also include any sub vendor or manufacturer on whom a sub order is placed by vendor.

2.2 Alloy Material – Any metallic material of Ferrous or Non Ferrous grade (including welding filler material) that contains alloying elements such as chromium, nickel, molybdenum, vanadium etc., which are intentionally added to enhance mechanical or physical properties and / or corrosion resistance.

2.3 Inspection lot – A group of items offered for inspection covered under the same size, heat and heat treatment lot.

3 Codes and Standards 

The following standards are referenced herein and form part of the Order. Current editions of the industry standards including all mandatory addenda in effect at the time of the order shall apply unless otherwise indicated.

AMERICAN PETROLEUM INSTITUTE (API)

API 578,(Latest Edition) "Material Verification Program for New and Existing Alloy Piping Systems"

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
ASME Boiler and Pressure Vessel Code, including all mandatory addenda in effect on the date of the Order
Section II "Material Specifications"
Part A - "Ferrous Material Specifications"
ASME SA-751, "Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products"
Part B - "Nonferrous Material Specifications"
Part C - "Specifications for Welding Rods, Electrodes and Filler Metals"

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
ASTM A193/A193M, "Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications"
ASTM A751, "Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products"
ASTM E62, "Chemical Analysis of Copper and Copper Alloys (Photometric Methods)"
ASTM E322, "X-Ray Emission Spectrometric Analysis of Low-Alloy Steels and Cast Irons"
ASTM E350, "Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron"
ASTM E352, "Chemical Analysis of Tool Steels and Other Similar Medium and High-Alloy Steels"
ASTM E353, "Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys"
ASTM E354, "Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys"
ASTM E478, "Chemical Analysis of Copper Alloys"
ASTM E527, "Numbering Metals, and Alloys (UNS)"
ASTM E572, "Analysis for Stainless and Alloy Steels by X-ray Fluorescent Spectrometry"
ASTM E1086, “Test Method for Optical Emission Vacuum Spectrometric Analysis of Stainless Steel by the Point-to-Plane Excitation Technique”

4 PMI Examination

4.1 The EPCC Contractor shall submit a procedure of PMI to comply with the requirements of this specification for approval by PMC / Owner.

4.2 PMI examination of alloy materials is independent of any certification, markings or color coding that may exist and is aimed at verifying that the alloy used are as per specified grades.

4.3 The EPCC Contractor & Vendor shall identify all incoming alloy materials and maintain full traceability of all alloy materials, including all off-cuts. Transfer of identification marks shall be undertaken prior to cutting to ensure maintenance of identification on off cuts.

4.4 The EPCC Contractor and vendor shall ensure that all alloy materials are segregated & stored in separately identified locations to prevent mix up of materials of different alloy specifications or alloy materials with carbon steel. Non ferro magnetic materials shall be segregated at all times from ferro magnetic materials.

4.5 PMI Examination is subject to witness inspection by TPIA / PMC / Owner.

5 Acceptable Methods for PMI

5.1 The method used for PMI examination shall provide a quantitative determination of the alloying elements like chromium, molybdenum, nickel, vanadium etc. in metallic alloy materials.

5.2 Instruments or methods used for PMI examination shall be able to provide quantitative, recordable, elemental composition results for positive identification of alloying elements present.

5.3 The acceptable instruments for alloy analyzer shall be either "Portable X-Ray Fluorescence" or "Optical Emission" type each capable of verifying the percentage of alloy elements within specified range. The following methods / instruments are acceptable.

(a) Portable X-Ray Fluorescence Analyzers

TN Technologies Alloy Analyzer 9266, 9277 (The Metallurgist XR) or Metallurgist Pro, Metorex – X – MET 880, X-MET 960 or X-MET 2000

(b) Portable optical emission Analyzer

Spectro Port Model TP-07 or TFO-02, Spectro Test F, Metorex ARC-MET 900, or ARC-MET 930.

5.4 Chemical spot testing, magnets, alloy sorters and other methods using eddy current or triboelectric testing methods are not acceptable for PMI examination.

5.5 The PMI instrument used shall have the sensitivity to detect the alloying elements in the specified range

5.6 All PMI instruments shall have been serviced within a 6 month period of the time of use to verify the suitability of batteries, sources etc. The data of the last service shall be stated on the PMI report form.

5.7 Each analyzer must be calibrated according to the manufacturer's specification at the beginning and end of each shift. Instrument must be checked against known standard for each alloy type to be inspected during the shift.

5.8 Certified samples with full traceability of a known alloy material shall be available for use as a random spot check on the instrument calibration.

5.9 The surfaces to be examined shall be prepared by light grinding or abrasive paper and solvent cleaner. Evidence of arc burn resulting from examination shall be removed by light grinding or abrasive paper. No permanent marks, which are injurious to the usage of product in service, are acceptable.

5.10 Ring type joint Gasket of alloy material shall be inspected by using portable X-Ray Fluorescence instrument.

5.11 Testing shall be done as per procedures outlined by the manufacturer of alloy analyzer being used. Modification of these procedures if any must be approved by the manufacturer of the alloy analyzer.

5.12 The persons performing PMI shall demonstrate their capabilities to the satisfaction of the visiting TPIA representative. If the vendor has qualified operator on their rolls, he may perform the examination. Otherwise PMI examination shall be sub – contracted to an independent testing agency approved by PMC / Owner.

6 Extent of PMI Examination

2

Positive Material identification (PMI) check shall be done at all three stages for fabrication jobs (1) At Sub vendors Shop (2) After Receipt at Shop (3) Final Stage before Hydro.

Following sampling plans shall be applicable for PMI examination of various alloy material items.

A) Flanges, Fittings, Valves, RTJ Gaskets - 100 %

B) Pipes - 100 %

C) Fabricated / Rotating Equipment - All pressure retaining parts & welds

1

1) Piping and Fired Heater Tubing Bulk Materials	
Random length seamless and ERW pipe, and seamless heater tubing:	Each component part
Random length fusion welded pipe (ERW pipe excluded):	Each component base material part (1). Refer to Section 2 below for tests on welds
Forged fittings (e.g. flanges, branch fittings, weldolets, blinds, plugs, etc.):	Each component part
Seamless and ERW pipe, and seamless heater tube fittings:	Each component part
Fusion welded pipe fittings:	Each component base material part (1). Refer to Section 2 below for tests on welds
Valves, including body, bonnets, plugs, vents, drains etc.:	Each pressure retaining component part. Refer to Section 2 below for tests on welds & Section 3 for tests on bolting.
Permanent strainers, traps, including blind flanges, plugs etc.:	Each pressure retaining component part. Refer to Section 2 for tests on welds and Section 3 for tests on bolting
2) Pressure Retaining Welds	
Circumferential welds, including valve body-to-flange and valve body-to-bonnet welds; Longitudinal welds	Each weld, with 1 test per weld seam for automatic and semi-automatic welding processes, and 1 test per weld seam and 1 test per 450mm weld length thereafter for manual welding processes(2)

Repair welds:	1 test on excavated weld to ensure incorrect material fully removed; thereafter 1 test per 450mm repair weld length
3) Bolting	
External pressure retaining bolting for flange rating Classes<900:	Sample basis per Table 3
External pressure retaining bolting for flange rating Classes >=900:	Each bolt and nut
Valve bonnet bolting for flange rating Classes >=900:	Each bolt and nut
Valve bonnet bolting for flange rating Classes <900	Sample basis per Table 3
4) Gaskets	
Solid metal or jacketed metallic gaskets for flange rating Classes >=900:	100%
Alloy rings associated with ring-type joints (RTJ'):	100%
Gaskets, other than above:	PMI is not required

Notes:

(1) PMI on these components may be undertaken in conjunction with PMI of the deposited weld metal per Note 2.

(2) For all welds, PMI shall be performed on the completed weld capping pass (both internal and external, where access permits) and the base material on either side.

△1

TABLE 3

Number of Units in a Lot	Representative Sample
1 -5	100% of all units
6 - 199	5 units or 5%, whichever is greater
>=200	10 units or 3%, whichever is greater

Notes:

(1) If all units of the representative Sample are acceptable, the inspection Lot shall be acceptable.

(2) If any unit from the representative Sample is found to be unacceptable, the remainder of the Lot shall be examined 100%. If the remainder of the Lot is found acceptable, the sampling technique in Table 3 shall be resumed. The unacceptable unit(s) shall be replaced and the replacements examined 100%.

(3) If a Lot is found unacceptable, the next two Lots, of the same material product and from the same source, shall be examined 100%. If both Lots are acceptable, the sampling technique in Table 3 shall be resumed.

(4) If any of the Lots examined in (3) above is found unacceptable, the remaining material product from the same source shall be examined 100%. Any unacceptable unit(s) shall be replaced and the replacements examined 100%.

(5) When the material markings are incomplete, preventing positive correlation between the material requisition, purchase order and a material test certificate, the materials shall be rejected.

7 Recording and Documentation

The results of PMI examination shall be recorded in a Report Format enclosed with this specification.

8 Acceptance Criteria 

Materials tested by an approved analysis method shall contain the amounts of alloying elements specified in the requisite material grade / Material specification

9 Marking

All alloy materials tested by PMI shall be identified using either of the following methods by indicating “AV”.

a) Bar code / Hologram sticker
b) A low stress stamp marking
c) Color coding as per Appendix -2 of Painting specification: IBCE-6373-C00-FQC-PRC-000-0003

Failed Components 

Materials, items, and welds which are found to be unacceptable during identification testing shall be immediately marked with a red 'R', rejected, removed and segregated from the lot, pending Purchaser's acceptance of the Supplier's corrective action plan.

ELEMENTS TO BE DETERMINED DURING PMI 1

MATERIALS (1)	ELEMENTS TO BE DETERMINED
1 Cr - 0.5 Mo	Cr, Mo, V
1.25 Cr - 0.5 Mo	Cr, Mo, V
2.25 Cr - 1 Mo	Cr, Mo, V
5 Cr - 0.5 Mo	Cr, Mo, V
9 Cr - 1 Mo	Cr, Mo, V
12 Cr (Type 410S/405)	Cr
12 Cr	Cr
17 Cr	Cr
304 (L)	Cr, Ni, Mo, Nb(Cb), Ti
310	Cr, Ni, Mo, Nb(Cb), Ti
309 (L)	Cr, Ni, Mo, Nb(Cb), Ti
309 Nb	Cr, Ni, Mo, Nb(Cb), Ti
316 (L)	Cr, Ni, Mo, Nb(Cb), Ti
321	Cr, Ni, Ti, Nb(Cb)
347	Cr, Ni, Nb(Cb), Ti
Inconel 182/82	Ni, Cr
Inconel 625	Ni, Cr, Mo, Nb(Cb) + Ta, Ti
Inconel 600	Ni, Cr
Incoloy 800	Cr, Ni, Al, Ti, Cu
Incoloy 825	Cr, Ni, Mo, Ti
Admiralty Brass	Cu, Sn, As
Aluminium Brass	Cu, Al, Zn
Cupro-nickel (70-30)	Cu, Ni
Cupro-nickel (90-10)	Cu, Ni
Monel 400	Cu, Ni
Titanium	Ti

Note: (1) List of materials is not exhaustive, and shall not be construed as limiting the alloy materials subject to PMI

POSITIVE MATERIAL IDENTIFICATION REPORT
BULK MATERIALS

Page of

Project	Client							Job No.
PMI Report No.	Vendor / sub-vendor :							
Purchase Order No.	Testing Agency							
Purchase Requisition No.	PMI Location							
Bulk Item Type (as per Requisition)	Method of Examination._ 1							
Material Specification / Grade Number of items in Lot.	Instrument Type_ 1							
Requisition Item No. / Description	Alloy content, Weight Percent							Remarks Accept/Reject
Element	Cr.	Mo	Ni	V	Nb	Ti	Cu	
Specified Range								
Actual Observation 1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
Instrument Type / ID Last Service Date	Inspection Agency							Witnessed By

<Security Level 2>

IBCE

INSPECTION AND TEST REQUIREMENTS FOR INSTRUMENTATION

DOC. NO.: IBCE-6373-C00-INC-SPC-000-0003

PROJECT NAME: BR-9 EXPANSION PROJECT

TOYO JOB NO.: 6373

IndianOil

OWNER: INDIAN OIL CORPORATION LIMITED.

TOYO ENGINEERING

PMC: TOYO ENGINEERING INDIA PRIVATE LIMITED.

1	06.04.2018	For Bid Enquiry	HJT	SCP	ANA
0	27.02.2018	Issued for Review	HJT	SCP	ANA
REV	**DATE**	**DESCRIPTION**	**MADE BY**	**REVIEWED BY**	**APPROVED BY**

REVISION HISTORY	
REV.	**REVISION DESCRIPTION**
0	First Issue
1	Second Issue

CONTENTS

1. PURPOSE

This document covers basic requirements for inspection and test for instrumentation items of all process plants of BR-9 Expansion Project of IOCL, Barauni, Bihar State, India.

This document is applicable for all package items also.

2. ABBREVIATION

FAT	:	Factory Acceptance Test
IBR	:	Indian Boiler Regulations
ITP	:	Inspection Test Plan
MT	:	Magnetic Particle Test
NDE	:	Non Destructive Examination
PMI	:	Positive Material Identification
PT	:	Liquid Penetrant Test
PWHT	:	Post Weld Heat Treatment
RT	:	Radiographic Test
SAT	:	Site Acceptance Test
TPIA	:	Third Party Inspection Agency
UT	:	Ultrasonic Test

3. INSPECTION AND TEST

3.1 General Requirements

All instruments and system oriented items shall undergo factory testing and inspection by authorized Third Party Inspection Agency (TPIA) Representatives / PMC / OWNER unless specified otherwise.

Wherever inspection at VENDOR's shop is waived by because of any reason, the sub VENDOR's own testing reports shall be before despatch. In no case items shall be released without proper inspection verification.

Items for which 'Witness Inspection' is specifically exempted, VENDOR shall forward the test certificates as desired for review.

The inspection and testing shall be carried out as per related specifications, international codes and practices/standards, approved documents and/or any other documents attached along with specifically suggesting testing to be carried out at VENDOR's shop.

Manufacturing data and records, such as material test reports or certificates, results of non-destructive examinations, records of visual inspection and dimensional inspection, etc. shall be submitted for PMC/OWNER review.

Inspection, FAT/SAT requirement for all instruments and system items shall be as indicated in Doc. No.: IBCE-6373-C00-INC-DES-000-0001, Engineering Design Basis for Instrumentation, Doc. No.: IBCE-6373-C00-INC-SPC-000-0001, Engineering Specifications for Instrumentation and Doc. No.: IBCE-6373-C00-INC-SPC-000-0002, Engineering Specifications for Control System. The testing procedures shall be detailed out based on testing requirements and submitted for PMC/OWNER approval.

All Inspection activities shall be in-line with Doc. No.: IBCE-6373-C00-ISP-QMS-000-0001, Shop Inspection Methodology.

No system or system oriented item shall be dispatched without integrated factory testing witnessed by representatives of TPIA/PMC/OWNER. VENDOR must certify that the system is actually ready before calling the PMC/OWNER for FAT. Also all the necessary documents and literature are to be submitted before calling for FAT.

Inspection and Testing for all instrument items shall be carried out as per approved ITP, FAT and SAT procedures. Copies of all necessary approved documents shall be available at place of Inspection.

CONTRACTOR shall consider VENDOR's presence at site till successful completion of SAT and handover.

Performance specifications must be detailed out on each time which shall be verified by TPIA/PMC/OWNER during factory testing.

Acceptable criteria for Radiography and other NDE requirements for instruments / instrument forgings shall be in line with those specified elsewhere in contract document.

Verification of set point of rupture disc shall be part of witness inspection. Testing shall be carried out on the rupture disc, which is part of the actual rupture disc batch of VENDOR. This shall be in addition to spare rupture discs already indicated in the Spare Parts Philosophy attached elsewhere in contract document. The testing, in general, shall be as per ASME section VIII.

The examining personnel shall have requisite qualification and experience.

PMC/OWNER reserves the right to carry out additional inspection if deemed necessary.

For any test witnessed by PMC/OWNER at VENDOR locations, PMC/OWNER shall be informed, at least 10 working days ahead of inspection date.

Minimum inspection and testing items, witness inspection items for each kind of instrument / system items during each Inspection / FAT / SAT shall be as shown in Table A.

Each ITP shall identify the inspection level and detail all witness, hold and certification review points as indicated in referenced specifications and standards.

As a minimum, each ITP shall include the following information:

- Test description
- Quality control requirements
- Responsibilities
- Applicable procedures
- Acceptance criteria
- Verifying documents
- Inspection points
- Hold points

For special testing requirements like NACE (Sour Service), Hydrogen Service, Impact Testing, Post Weld Heat Treatment (PWHT), Ferrite Number Test, Hardness check, etc. refer Piping material specification (Doc. No.: IBCE-6373-C00-PIP-SPC-000-0001) attached in contract document. CONTRACTOR to identify such requirements and include in ITP.

3.2 Visual Inspection

3.2.1 Conformation Items

- Instrument Type
- Make / Manufacturer's Name
- Model Number
- Serial Number
- Tag Number
- Connection Type, Size, Rating, Flange Facing, Flange Finish
- Range, Scale and Unit of Measurement
- Set Pressure and Capacity of Safety Valves
- Valve Characteristics and CV Value of Control Valves
- Material of Construction
- Flow Direction
- Quantity / Bill of Material
- Accessories & Orientation
- Die Marking / Flange Marking (nominal size, material of flange, flow direction, etc.)
- Nameplate
- Painting

3.2.2 Harmful Defects

- Defect such as cracks, deformation and flaws shall not be found in the casting, forging and machined surface of the pressure rating part.
- Defect such as inside surface weld protrusion, lack of fusion and incomplete penetration shall not be found in welded places of pressure retaining part.
- All sharp edges shall be burred.
- Painting of instrument's surface shall be such that there is no defect or lack of uniformity.

3.3 Dimensional Inspection

Dimensional check of all instrument items alongwith its accessories shall be carried out as per approved drawings or applicable code and standards.

3.4 Material Inspection

3.4.1 Mill Test Certificates

VENDOR shall submit the mill test certificates for the following parts.

1. ANSI class 900# or above (All material used at the P.T. ratings)

2. Following parts made of steel for:

- High temperature service (Alloy steel above C-Mo steel used at temperature of 400 deg C or over)
- Low temperature service (Iron and steel material of design temperature below minus 11 deg C containing Al-killed steel)
- Corrosion Resistant Materials

  - Temperature Detective Parts : Flange and Thermowell
  - Orifice Assembly : Flange
  - Venturi Tube, Flow Nozzle and Low-Loss Tube : Body
  - Positive Displacement Flowmeter and Turbine Flowmeter : Body, Strainer and Straightener
  - Variable Area Flowmeter : Body and Flange
  - Displacement Type Level Transmitter : Chamber and Flange
  - Glass Gauge : Body and Flange
  - Control Valve, On-Off Valve : Valve Body, Bonnet, Plug, Seat and Vane
  - Safety Valve : Valve Body, Nozzle and Disc
  - Condensate Pot : Body
  - Gas Eliminator : Body

3.4.2 Material Test Certificates

VENDOR shall submit the material test certificates as per following:

- Material test reports or certificates including all special process such as heat treatment etc. shall be submitted by VENDOR.
- Material test reports submitted shall be according to EN10204 unless otherwise specified.

3.5 Non Destructive Examination

- Control Valve, On-Off Valve and Safety Valve:

  NDE shall be performed as per following para. 3.5.2 and 3.5.3.

- Other Instruments:

  NDE shall be carried out in accordance with VENDOR's standards approved by PMC/OWNER.

3.5.1 Ultrasonic Test (UT)

Forging material on Orifice Flange and Flow Nozzle:

[X] ANSI class 900 or above

3.5.2 Radiography Test (RT)

[X] Pressure retaining casting parts

Applicable Material and Quantity (Refer Table 1)

- Welded parts: ASME VIII Division 1 uw-51 "Radiographic & Radioscopic Examination of Welded Joints"

Acceptance Standards and Grade:

- Casting: ASTM E 446-9 or 186-93
-

Table 1 Radiography Test

Materials			Quantity
Casting	class 1500 or over	C-steel	One out of total quantity of the same type, size and rating for pressure retaining critical parts(a).
	class 900 or over	C-Mo steel	
	class 600 or over	Cr-Mo steel Stainless steel	
	class 300 or over	Al-killed steel 2.5 Ni steel 3.5 Ni steel	

Pressure Retaining Welded Parts	class 1500 or over	C-steel C-Mo steel	One spot on each welded parts per same material and same welder. All welded crossing parts.
	class 300 or over	Cr-Mo steel Stainless steel	
	class 150 or over	Al-killed steel 2.5 Ni steel 3.5 Ni steel	

a. Following parts are critical parts:

- Groove-welded parts of cast body
- Flange neck and valve seat's vicinity of cast body
- Other welded parts included in pressure retaining parts

Notes:

1. In case of practical difficulty to perform Radiography Test, VENDOR shall notify CONTRACTOR in advance, and for such case, magnetic particle test (MT) or liquid penetrant test (PT) may be used in accordance with Para. 3.5.3 with PMC/OWNER approval.

2. For the welded parts having nominal size of 1 1/2" or below, magnetic particle test (MT) or liquid penetrant test (PT) in Para. 3.5.3 may be used.

3.5.3 Magnetic Particle Test (MT) or Liquid Penetrant Test (PT)

[X] Pressure retaining casting parts

Applicable Material and Quantity (Refer Table 2)

Table 2 Magnetic Particle Test or Liquid Penetrant Test

Materials			Quantity
Casting	class 900 or over	C-steel	20% of total quantity of the same type, size and rating for pressure retaining critical parts (a)
	class 600 or over	Cr-Mo steel Cr-Mo steel Stainless steel	
	class 150 or over	Al-killed steel 2.5 Ni steel 3.5 Ni steel	
Pressure Retaining Welded Parts (b)	class 150 or over	All materials	20% of total welded parts

a. Following parts are critical parts:

- Groove-welded parts of cast body
- Flange neck and valve seat's vicinity of cast body
- Other welded parts included in pressure retaining parts

b. Including butt groove-welded parts at site.

3.6 Pressure Test

3.6.1 Control Valve and On-Off Valve:

- Body and Bonnets

  [X] Hydrostatic test with Applicable codes and standards

- Body of Special Type

  [X] Hydrostatic test

  Test pressure and Hold time

  [X] 1.5 times of max. Operating pressure / min. 2 kgcm2g
  [X] Minimum 5 minutes.

- Permanent distortion or Leakage

  [X] shall not be found

3.6.2 Safety Valve

- Pressure retaining parts

  [X] Hydrostatic test before assembling

  Test Pressure and Hold Time

  [X] 2.2 times of Maximum Operating Pressure.
  [X] Minimum 5 minutes.

  Distortion or Leakage

  [X] Shall not be found

- The outside parts of enclosed type

  [X] Hydrostatic test after assembling

Test Pressure and Hold Time

[X] 1.5 times. Nominal Pressure of Flange
[X] Minimum 5 minutes

Defects

[X] Shall not be found

- Special Type Valves

[X] Hydrostatic test with the VENDOR's standards approved by PMC/OWNER, where above conditions are not applicable

3.6.3 Pressure retaining parts of Instruments

Hydrostatic test or Pneumatic test as per applicable codes and standards.

` Test pressure and Hold Time

[X] 1.5 times of Maximum Operating pressure / Minimum 2 kg/cm2 g
[X] Minimum 5 minutes

Permanent Distortion or Leakage

[X] Shall not be found

If the above mentioned test is technically difficult, the test shall be carried out in accordance with the VENDOR's standards approved by PMC/OWNER.

3.7 Pneumatic Test

Pneumatic test as per applicable codes and standards.

Test pressure and Hold Time

[X] Maximum Operating Pressure (Design pressure)
[X] Minimum 5 minutes

Permanent Distortion or Leakage

[X] Shall not be found

3.8 Seat Leakage Test

3.8.1 Control Valve and On-Off Valve

- Allowable leakage for control valve shall be as per ANSI B16.104 (FCI 70-2).
- Allowable leakage for on-off valve shall be as per API 598.

3.8.2 Safety Valve

Seat leakage test (closing property) as follows.

- Safety Valve for Steam:

  Test Pressure: 90% of set pressure

  Leakage: Shall not be found

- Safety Valve for Gas:

  Test Pressure: 90% of set pressure

  Allowable Leakage: (Refer Table 3)

Table 3 - Allowable Leakage Value of Safety Value

Type	Orifice Area (mm)	Number of Bubbles (min)	Leakage Value (cm3/min)
General	16.0 and less 20.5 and over	40 20	11.80 5.90
Balance bellows	16.0 and less 20.5 and over	50 30	14.75 8.85

3.8.3 Relief Safety Valve, Vacuum Breaker, Breather Valve and Atmospheric Valve

For relief safety valve, vacuum breaker and atmospheric valve seat leak test shall be as per VENDOR's standards approved by PMC/OWNER.

3.9 Performance Test / Functional Check

For each instrument items and its accessories, performance test or functional check shall be carried out in accordance with approved ITP or FAT / SAT procedures.

Acceptance standard shall be in accordance with applicable codes & standards, ITP or FAT / SAT procedures, and / or VENDOR's standards approved by PMC/OWNER.

3.10 Steam Test

Steam test shall be performed on valves used for steam service having temperature of 450 deg C or more, and the body ratings of class 600 and above.

Steam test shall be performed attaining the steady surface temperature same as temperature of the service with the pressure of service condition.
In the case, when steam test has been performed and the report is submitted for the valve of same type, same bore size and material from the same lot, the steam test for the other valves may be omitted.

Body Leakage: Shall not be found

Seat Leakage: As per specified leakage value

After steam test, pressure test and seat leakage test shall be carried out.

3.11 Insulation Resistance Test

- Power supply & alarm circuit: 10M Ω or over
  (Instrument panel: 3 MΩ or over per panel)

- Signal circuit: 5M Ω or more
  (Instrument panel: 3 MΩ or over per panel)

The test shall be carried out in accordance with the applicable codes & Standards. Due to any technically constraint this test can be omitted obtaining PMC/OWNER approval.

3.12 High Voltage Test

- AC power supply and alarm circuits:

  Voltage level less than 250V AC - 1500V AC

  Voltage level 250V AC and above - 2E + 1000V AC (‘E’ is the rated voltage)

- DC power supply circuits: 500V AC

Due to any technically constraint this test can be omitted obtaining PMC/OWNER approval.

3.13 PMI Test

For PMI testing requirements refer Doc. No.: IBCE-6373-C00-ISP-QMS-000-0002, Positive Material Identification procedure attached elsewhere in contract document.

3.14 IBR Certification

IBR certifications shall be provided in the appropriate format duly signed by IBR authority or their authorized agency as applicable. IBR stands for Indian Boiler Regulation. For steam services, it is statutory obligation to meet IBR requirements.

For items under IBR, composition restrictions, test reports, painting, etc. shall be as per IBR's latest stipulations.

3.15 Cryogenic Test

For valves to be used under cryogenic conditions, Cryogenic test to be performed as per BS 6364.

Cryogenic test shall be applied for one valve of each type, size, rating after pressure test.

3.16 Fire Safe Test

For valves with fire safe requirement, offered valves should have type fire test certificate as per BS EN ISO10497 / API 6FA / API 607.

For valves with fire proof box requirement, offered fire proof boxes should have type fire test certificate as per UL1709/ASTM E1529.

Type testing should have been carried out/witnessed either by any recognized testing authority or test house such as Under Writers Lab, etc.

Table A - Table of Inspection and Test for Instrumentation Items

Sr. No.	Kind of Instrument	Inspection and Test										
		Visual Inspection	Dimensional Inspection	Material Inspection	Non Destructive Examination	Pressure Test	Pneumatic Test	Seat Leakage Test	Performance Test	Insulation Resistance Test	High Voltage Test	Steam Test
1	Temperature Element - Thermocouple	○●T	○●T	—	—	—	—	—	□●T	□●T	□●T	—
2	Temperature Element - RTD	○●T	○●T	—	—	—	—	—	□●T	□●T	□●T	—
3	Temperature Element - Skin, Flexible, Multipoint Thermocouples	○●T	○●T	—	—	—	—	—	□●T	□●T	□●T	—
4	Temperature Gauges - Bimetallic	○●T	○●S	—	—	—	—	—	□●S	—	—	—
5	Temperature Gauges - Gas Filled or Liquid Filled	○●T	○●S	—	—	—	—	—	□●S	—	—	—
6	Thermowell	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	—	—	—	—
7	Orifice Plate	○●T	□ ○●T	□ ○●T	—	—	—	—	—	—	—	—
8	Orifice Flange Assembly	○●T	○●T	□ ○●T	□ ○●T	—	—	—	—	—	—	—
9	Restriction Orifice	○●T	□ ○●T	□ ○●T	—	—	—	—	—	—	—	—
10	Multistage - Restriction Orifice	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	—	—	—	—
11	Flow Nozzle Low-Loss Tube	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	—	—	—	—
12	Venturi Tube	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	—	—	—	—
13	Positive Displacement Flowmeter	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	□ ○●S	□ ○●T	□ ○●T	—
14	Variable Area Flowmeter	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	□ ○●T	□ ○●T	□ ○●T	—
15	Thermal Mass Flowmeter	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	□ ○●S	□ ○●T	□ ○●T	—
16	Turbine Flowmeter	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	□ ○●S	□ ○●T	□ ○●T	—
17	Averaging Pitot Tube	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	—	—	—	—
18	Electronic Transmitters (F,L,P,DP,T)	○●T	○●T	□ ○●T	—	□ ○●T	—	—	□ ○●T	□ ○●T	□ ○●T	—

Sr. No.	Kind of Instrument	Inspection and Test										
		Visual Inspection	Dimensional Inspection	Material Inspection	Non Destructive Examination	Pressure Test	Pneumatic Test	Seat Leakage Test	Performance Test	Insulation Resistance Test	High Voltage Test	Steam Test
19	Magnetic Flowmeter	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	□ ○●S	□ ○●T	□ ○●T	—
20	Ultrasonic Flowmeter	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	□ ○●S	□ ○●T	□ ○●T	—
21	Pressure Gauges	○●T	○●S	□ ○●T	—	□ ○●S	—	—	□ ○●S	—	—	—
22	Draft Gauges	○●T	○●S	□ ○●T	—	—	—	—	□ ○●S	—	—	—
23	Differential Pressure Gauges	○●T	○●S	□ ○●T	—	□ ○●S	—	—	□ ○●S	—	—	—
24	Displacer Type Level Transmitter	○●T	○●S	□ ○●T	□ ○●T	□ ○●S	—	—	□ ○●S	□ ○●S	□ ○●T	—
25	Chamber for Displacer Type Level Transmitter	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	—	—	—	—
26	Level Gauges	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	—	—	—	—
27	Float & Tape Type Level Transmitter	○●T	○●S	□ ○●T	□ ○●T	□ ○●S	—	—	□ ○●S	□ ○●S	□ ○●T	—
28	Purge Type Level Transmitter	○●T	○●T	□ ○●T	—	—	—	—	○ □●T	—	—	—
29	Capacitance / RF Type Level Transmitter	○●T	○●T	□ ○●T	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
30	Conductivity Type Level Transmitter	○●T	○●T	□ ○●T	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
31	Servo Type Level Transmitter	○●T	○●T	□ ○●T	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
32	Radar /Guided Wave Radar Type Level Transmitter	○●T	○●T	□ ○●T	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
33	Nucleonic Level Transmitter	○●T	○●S	□ ○●T	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
34	Neutron Back Scattering Level Transmitter	○●T	○●S	□ ○●T	—	—	—	—	□ ○●S	□ ○●S	□ ○●T	—
35	Ultrasonic Level Transmitter	○●T	○●S	□ ○●T	—	—	—	—	□ ○●S	□ ○●S	□ ○●T	—
36	Control Valves	○●T	○●S	□ ○●T	□ ○●T	□ ○●S	—	□ ○●S	□ ○●S	□ ○●T	□ ○●T	
37	On-Off Valves	○●T	○●S	□ ○●T	□ ○●T	□ ○●S	—	□ ○●S	□ ○●S	□ ○●T	□ ○●T	
38	Motor Operated Control Valves	○●T	○●S	□ ○●T	□ ○●T	□ ○●S	—	□ ○●S	□ ○●S	□ ○●S	□ ○●S	

Sr. No.	Kind of Instrument	Inspection and Test										
		Visual Inspection	Dimensional Inspection	Material Inspection	Non Destructive Examination	Pressure Test	Pneumatic Test	Seat Leakage Test	Performance Test	Insulation Resistance Test	High Voltage Test	Steam Test
39	Pressure Control Valve (Self Actuating Control Valves)	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	□ ○●T	—	—	—
40	Indicator	○●T	○●T	—	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
41	Recorder Unit	○●T	○●T	—	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
42	Controller Unit	○●T	○●T	—	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
43	Integrator Unit	○●T	○●T	—	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
44	Alarm Setting Unit	○●T	○●T	—	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
45	Computing Unit	○●T	○●T	—	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
46	Converter Unit	○●T	○●T	—	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
47	Limiter Unit	○●T	○●T	—	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
48	Power Source Unit	○●T	○●T	—	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
49	Instrument Panel	○●T	○●S	—	—	□ ○●T	□ ○●S	—	□ ○●S	□ ○●T	□ ○●T	—
50	Instrument Desk	○●T	○●S	—	—	—	—	—	□ ○●S	□ ○●T	□ ○●T	—
51	Printers	○●T	○●S	—	—	—	—	—	□ ○●T	□ ○●T	□ ○●T	—
52	Gauge Board	○●T	○●S	—	—	—	—	—	—	—	—	—
53	Safety Valves	○●T	○●S	□ ○●T	□ ○●T	□ ○●T	—	□ ○●S	□ ○●S	—	—	—
54	Vacuum Breaker	○●T	○●S	□ ○●T	□ ○●T	□ ○●T	—	□ ○●S	□ ○●S	—	—	—
55	Atmospheric Valve	○●T	○●S	□ ○●T	□ ○●T	□ ○●T	—	□ ○●S	□ ○●S	—	—	—
56	Rupture Disc	○●T	○●S	□ ○●T	□ ○●T	□ ○●T	—	□ ○●S	□ ○●S	—	—	—
57	Breather Valve	○●T	○●S	□ ○●T	□ ○●T	□ ○●T	—	□ ○●S	□ ○●S	—	—	—
58	PRDS / Desuperheater	○●T	○●S	□ ○●T	□ ○●T	□ ○●S	—	□ ○●S	□ ○●S	□ ○●T	□ ○●T	
59	Gas Chromatograph	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●S	□ ○●S	□ ○●TL	—

Sr. No.	Kind of Instrument	Inspection and Test										
		Visual Inspection	Dimensional Inspection	Material Inspection	Non Destructive Examination	Pressure Test	Pneumatic Test	Seat Leakage Test	Performance Test	Insulation Resistance Test	High Voltage Test	Steam Test
60	Mass Spectrometer	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●S	□ ○●S	□ ○●T	—
61	Infrared Type Gas Analyser	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●S	□ ○●S	□ ○●T	—
62	Magnetic Type Gas Analyser	○●T	○●T	□ ○●T	—	—	□ ○●T		□ ○●S	□ ○●S	□ ○●T	—
63	Conductivity Type Analyser	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●S	□ ○●S	□ ○●T	—
64	Combustion Type Gas Analyser	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●S	□ ○●S	□ ○●T	—
65	Density Type Gas Analyser	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●S	□ ○●S	□ ○●T	—
66	Photo-Electric Type Analyser	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●T	□ ○●T	□ ○●T	—
67	Moisture Analyser	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●T	□ ○●T	□ ○●T	—
68	pH Analyser	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●T	□ ○●T	□ ○●T	—
69	Turbidity Analyser	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●T	□ ○●T	□ ○●T	—
70	Sampling System	○●T	○●T	□ ○●T	—	—	□ ○●T	—	□ ○●S	—	—	—
71	Flame detector	○●T	○●T	—	—	—	—	—	□ ○●S	□ ○●S	□ ○●T	—
72	Coriolis Mass Flowmeter	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	□ ○●S	□ ○●T	□ ○●T	—
73	Vortex Flowmeter	○●T	○●T	□ ○●T	□ ○●T	□ ○●T	—	—	□ ○●S	□ ○●T	□ ○●T	—
74	Gas Detector	○●T	○●T	—	—	—	—	—	□ ○●S	□ ○●S	□ ○●T	—
75	Hooters	○●T	○●T	—	—	—	—	—	□ ○●S	□ ○●S	□ ○●T	—
76	Beacons	○●T	○●T	—	—	—	—	—	□ ○●S	□ ○●S	□ ○●T	—
77	Manual Call Points	○●T	○●T	—	—	—	—	—	□ ○●S	□ ○●S	□ ○●T	—
78	Solenoid Valves	○●T	○●S	—	—	□ ○●S	—	—	□ ○●S	□ ○●T	□ ○●T	
79	Junction Boxes	○●T	○●S	□ ○●S	—	—	—	—	□ ○●S	□ ○●S	□ ○●S	—
80	Cables	○●T	○●S	□ ○●S	—	—	—	—	□ ○●S	□ ○●S	□ ○●S	—

Sr. No.	Kind of Instrument	Inspection and Test										
		Visual Inspection	Dimensional Inspection	Material Inspection	Non Destructive Examination	Pressure Test	Pneumatic Test	Seat Leakage Test	Performance Test	Insulation Resistance Test	High Voltage Test	Steam Test
81	Cable Glands	○●T	○●S	□ ○●S	—	—	—	—	□ ○●S	□ ○●S	□ ○●S	—
82	Cable Duct / Tray	○●T	○●S	□ ○●S	—	—	—	—	□ ○●S	—	—	—
83	MCT Block	○●T	○●S	—	—	—	—	—	□ ○●S	—	—	—
84	Air Manifold	○●T	○●S	□ ○●S	—	□ ○●S	□ ○●S	—	□ ○●S	—	—	—
85	Valve Manifolds	○●T	○●S	□ ○●S	—	□ ○●S	□ ○●S	—	□ ○●S	—	—	—
86	Pipes & Pipe Fittings	○●T	○●S	□ ○●S	—	□ ○●S	□ ○●S	—	□ ○●S	—	—	—
87	Tubes & Tube Fittings	○●T	○●S	□ ○●S	—	□ ○●S	□ ○●S	—	□ ○●S	—	—	—

○ : Tested by VENDOR
● : Tested by VENDOR & Witnessed by TPIA and/or PMC/OWNER
□ : VENDOR shall submit Inspection & Test Records and Certificates
T : Total Inspection by TPIA and/or PMC/OWNER
S : Sample Inspection by TPIA and/or PMC/OWNER
(10% of total quantity of same type, size, range & rating subjected to minimum quantity of 10 nos.)

Notes:

1) PMC/OWNER may witness any or all testing in stages during manufacturing or at final stage before shipment.

2) Sample Inspection Quantity of 10% may be increased depending upon the performance of subject item.

3) Based on this document, Instrument / System wise detailed ITP shall be prepared and to be submitted for PMC/OWNER approval.

4) For any Instrument / System items not covered in the above table, detailed ITP shall be prepared and to be submitted for PMC/OWNER approval.

Sub-Vendor List

6.1	TUBE FITTINGS	
A	INDIAN BIDDERS	
6.1.1	ARYA CRAFTS & ENGINEERING PVT LTD	INDIA
6.1.2	ASTEC VALVES & FITTINGS PVT. LTD.	INDIA
6.1.3	CIRCOR INSTR. TECHNOLOGIES INC-	INDIA
6.1.4	COMFIT & VALVES PVT. LTD.	INDIA
6.1.5	EXCEL HYDRO PNEUMATICS PVT LTD	INDIA
6.1.6	EXCELSIOR ENGG. WORKS	INDIA
6.1.7	FLUID CONTROLS PVT LTD	INDIA
6.1.8	MULTIMETAL INDUSTRIES	INDIA
6.1.9	PANAM ENGINEERS	INDIA
6.1.10	PARKER HANNIFIN CORPORATION	INDIA
6.1.11	PRIME ENGINEERS	INDIA
6.1.12	RELIANCE ENGINEERING & ELECTRICALS CORPN	INDIA
6.1.13	SEALEXCEL (INDIA) PVT. LTD.	INDIA
6.1.14	SWAGELOK CO.	INDIA
6.1.15	SWASTIK ENGINEERING WORKS	INDIA
6.1.16	TK FUJIKIN CORPORATION	INDIA
6.1.17	WESMEC ENGINEERING PVT. LTD	INDIA
6.1.18	PRECISION ENGINEERING INDUSTRIES	INDIA
B	FOREIGN BIDDERS (FOR GLOBAL TENDERING AS APPLICABLE)	
6.1.19	AUTOCLAVE ENGINERS FLUID COMPONENTS	USA
6.1.20	SSP FITTINGS CORPORATION	USA
6.1.21	HAM-LET (ISRAEL-CANADA) LTD	ISRAEL
6.1.22	FITOK INCORPORATED	CHINA

6.2	INSTRUMENT TUBING	
A	INDIAN BIDDERS	
6.2.1	HEAVY METALS & TUBES LIMITED(MEHSANA)	INDIA
6.2.2	JINDAL SAW LTD	INDIA
6.2.3	RATNAMANI METALS AND TUBES LTD	INDIA
6.2.4	REMI EDELSTAHL TUBULARS LTD	INDIA
6.2.5	TK FUJIKIN CORPORATION	INDIA
6.2.6	NUCLEAR FUEL COMPLEX	INDIA

6.16	INSTRUMENT VALVES & MANIFOLDS	
A	INDIAN BIDDERS	
6.16.1	ANDERSON GREENWOOD CROSBY SANMAR Ltd.	INDIA
6.16.2	ARYA CRAFTS & ENGINEERING PVT LTD	INDIA
6.16.3	ASTEC VALVES & FITTINGS PVT. LTD.	INDIA
6.16.4	BAUMER TECHNOLOGIES INDIA PVT.LTD(W058)	INDIA
6.16.5	CIRCOR INSTR. TECHNOLOGIES INC	INDIA
6.16.6	COMFIT & VALVES PVT. LTD.	INDIA
6.16.7	EXCEL HYDRO PNEUMATICS PVT LTD	INDIA
6.16.8	EXCELSIOR ENGG. WORKS	INDIA
6.16.9	FLUID CONTROLS PVT LTD	INDIA
6.16.10	MICRO PRECISION PRODUCTS PVT LTD	INDIA
6.16.11	PANAM ENGINEERS	INDIA
6.16.12	PARKER HANNIFIN CORPORATION	INDIA
6.16.13	PRIME ENGINEERS	INDIA
6.16.14	SWAGELOK CO.	INDIA
6.16.15	SWASTIK ENGINEERING WORKS	INDIA
6.16.16	TK FUJIKIN CORPORATION	INDIA
6.16.17	WESMEC ENGINEERING PVT LTD.	INDIA
6.16.18	CHEMTROLS INDUSTRIES LTD	INDIA
6.16.19	PRECISION ENGINEERING INDUSTRIES	INDIA
6.16.20	ANDERSON GREENWOOD CROSBY	INDIA
6.16.21	TECNOMATIC INDIA PVT LTD	INDIA
B	FOREIGN BIDDERS (FOR GLOBAL TENDERING AS APPLICABLE)	
6.16.22	AUTOCLAVE ENGINERS FLUID COMPONENTS	USA
6.16.23	ANDERSON GREENWOOD CROSBY	USA
6.16.24	HAM-LET (ISRAEL-CANADA) LTD	ISRAEL

UNIT : 701

PROJECT : BR-9 RFCC Revamp Project

LOCATION : IOCL, BARAUNI REFINERY.

OWNER	EPCM
IndianOil — INDIAN OIL CORPORATION LIMITED.	TechnipFMC — TECHNIP INDIA LTD. NOIDA, INDIA.

JOB SPECIFICATION FOR CONTROL VALVES

Document Category	Document Review Status (by Client)
(Use "X" Mark) ☐ Approval ☐ Review ☒ Information	

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DOCUMENT REVISIONS

JOB SPECIFICATION FOR CONTROL VALVES

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JOB SPECIFICATION FOR CONTROL VALVES

1 INTRODUCTION

Indian Oil Corporation Ltd. (IOCL), the Owner, With the objective of enhancing flexibility in operation and profitability of the Refinery, it is planned to augment capacity of Refinery from 6.0 MMTPA to 9.0 MMTPA along with feasibility for production of Petrochemical products at its Barauni Refinery in the State of Bihar, India.

IOCL currently operates a 1.4 MMTPA two-stage RFCC unit at its Barauni refinery in the state of Bihar, India. The Unit was originally licensed by Stone & Webster Corporation (now Technip S&W) and was commissioned in 2002.

The proposed revamp is employing joint INDMAX Technology of IOCL R&D and Lummus Technology LLC The INDMAX FCC Technology utilizes the proprietary INDMAX Catalyst and innovative process concepts developed by its partner IOCL R&D, India, in concert with Lummus Technology LLC. The following are objectives of the RFCC Unit Revamp:

- Maximize the Propylene Yield for producing Polypropylene in downstream petrochemicals production.
- Increase fresh feed processing capacity from 1.4 MMTPA to 1.7 MMTPA

1.1 TERMINOLOGY

The following terminology shall be referred to wherever stated in the documents which the following terminology shall be referred to wherever stated in the documents which form part of the Material Requisition.

OWNER/CLIENT	: M/s Indian Oil Corporation Ltd.(IOCL)
LICENSOR	: INDMAX Technology of IOCL R&D & Lummus Technology LLC
EPCM CONSULTANT	: M/s Technip India Limited,
VENDOR/SUPPLIER	: Supplier of Main equipment
SUB VENDOR/SUB SUPPLIER	: Supplier of sub-equipment to Vendor / Supplier

1.2 SCOPE

1.2.1 This specification along-with enclosed documents covers minimum requirements for design, engineering, manufacturing, assembly, supply, documentation, testing at manufacture's works, packing and shipping of the Control Valves for the Revamp of RFCC unit at Barauni refinery.

1.2.2 This document is applicable for all package items also.

1.2.3 The scope includes supply of the spare and spare parts as under:

a) As per Mandatory spares philosophy.

b) Start-up and commissioning spares as per manufacturer's recommendation.

c) Vendor shall quote for their recommended two years' operation and maintenance spares along-with the unit prices. These will be selected and ordered by IOCL separately. Price should be valid for 2 years.

1.2.4 Control Valves shall be supplied complete with all accessories and associated equipment / accessories necessary for safe and trouble free continuous operation under all the operating and ambient conditions specified in the enclosed documents / attachments.

1.2.5 In case of any conflict between this specification, enclosed documents with related Codes and Standards etc., Vendor shall refer the matter in writing to the Client/EPCM and shall obtain clarification in writing before starting the manufacturing of the valves.

1.2.6 Vendor must specify in writing specific requirements, if any, to ensure the safe and satisfactory operation of the equipment under all the operating and ambient conditions specified in the enclosed documents/attachments.

1.2.7 Deviations, if any, from the enclosed documents, relevant codes & standards, and/or alternative designs, materials etc. must be clearly highlighted in the offer under 'deviation list' submitted by Vendor in their bid which shall be subjected to owner's approval. In absence of any written deviation specified in the deviation list, it will be considered that the offer is in full compliance with all the requirements.

1.2.8 Vendor datasheets shall contain all the requirement as specified in Job specification and other documents attached.

1.2.9 Vendor is responsible for the complete design, construction, testing, packing and delivery of the control valves and its accessories for the services and conditions specified in the requisition.

1.2.10 In general, order of priority of the documents shall be as follows,

a) Local regulatory and statutory requirement.

b) Licensor Requirements (where applicable).

c) Project specification and datasheets, wherever applicable.

d) This specification and relevant equipment/system specification.

e) Codes and standards.

2 GUARANTEE AND WARRANTY

2.1 Vendor shall warranty the supply against defective materials, design and workmanship as specified in the general purchase conditions.

2.2 Vendor shall guarantee the performance of the control valves & its accessories at site, for the time specified elsewhere.

2.3 Control Valves performance shall be guaranteed in accordance with requirements of applicable specifications and codes at conditions indicated in relevant equipment datasheets.

2.4 If the stated performances are not achieved, Vendor shall, at his own expenses, make necessary repairs, modifications and replacements to the supply to enable the performance to be achieved.

3 REFERENCE CODES & STANDARDS

The following codes and standards shall be applied minimum as a part of the design and manufacturing of Control Valves. Latest edition of code/standard shall be referred.

ANSI B 16.5	Pipe Flanges and Flanged Fittings
ANSI B16.10	Face-to-Face and End–to-End Dimensions of Valves
ANSI B16.11	Forged Fittings, Socket-Welding and Threaded
ANSI B 16.34	Valves - Flanged, Threaded and Welding End.
ANSI B 16.47-B	Large Diameter Steel Flanges
ANSI B16.104/FCI 70-2	Control Valve Seat Leakage
ANSI/ISA S75.08	Face-to-Face dimension
API RP 553	Refinery Control Valves
API 609	Butterfly Valves: Double Flanged, Lug and Wafer Type
IBR	Indian Boiler Regulations
IEC 60529	Degree of Protection Provided by Enclosures (IP Code)
IEC 60534.1	Control valve terminology and general considerations
IEC 60534.2	Industrial Process Control Valves-Flow capacity
IEC 60534.3	Face-to-face dimensions for control valves
IEC 60534-8	Noise Prediction for Industrial Process Control Valves
IEC 60079-0	General requirements
IEC 60079-1	Flameproof enclosures “d”
IEC 60079-7	Increased safety “e”
IEC (EN) 60079-14	Electrical installations in hazardous areas
IEC (EN) 60079-15	Electrical apparatus with type of protection “n”
IEC 60079-18	Encapsulation “m”
IEC 61000-6-2	Electromagnetic compatibility, generic standards, immunity for industrial environments
IEC 61000-6-4	Electromagnetic compatibility, generic standards, emission standard for industrial environments
IEC 61326 Section 1	Electrical Equipment for Measurement, Control and Laboratory use – EMC requirements
IEEE C37.90.1	Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
IEEE/ASTM SI 10	Standard for use of the international system of units (SI)

	Processing and Handling Facilities
ISA 71.04	Environmental Conditions for Process Measurement and Control Systems: Airborne Contaminants
ISA S75.01	Flow equation for sizing control valves.
ISA S75.02	Control valve capacity test procedure.
ISA 75.03 & ISA 75.04	Face to Face Dimension for Control Valve Body
ISA S75.05	Control Valve terminology
ISA S75.13	Method of evaluating the performance of positioners with analogue input signals and pneumatic output.
ISA S75.17	Control valve aerodynamic noise prediction.
ISA S75.25	Test Procedure for Control valve response measurement for step inputs
ISO 5208	Pressure Testing of Valves
ISO 9001	Quality Management Systems- Requirements
DIN 19234	NAMUR Standard
NACE MR0103	Materials Resistant to Sulphide stress cracking in Corrosive Petroleum Refinery Environments
OISD-STD-113	Classified Areas for Electrical Installations at Hydrocarbon
National and Local authority regulations in India	

To demonstrate compliance with the above referenced specifications, the vendor shall submit a 'Technical Construction File' (TCF) or a 'Declaration of Compliance.

4 AMBIENT CONDITIONS

Ambient Air Design Dry Bulb Temperature	:46 °C
Ambient Air Design Wet Bulb Temperature	:29 °C
Ambient Temperature (C), Min/Max	:5 °C / 46 °C
Relative Humidity (%), Max/Avg.	:65 / 70 (min) & 90 (max)

5 HAZARDOUS AREA PROTECTION

5.1 The valve and its accessories shall be suitable for Zone-I Gr. IIA & IIB, T3 and Instruments with Hydrogen Service shall be suitable for Zone-1 Gr. IIC, T3 as minimum.

5.2 All the instruments and accessories shall be EEx'ia' certified with an IP protection as minimum of IP-65 as in IEC-60529 / IS 2147, unless otherwise specified.

5.3 Following certificates shall be supplied by Vendor for final submission to end user:

a. Certificate from statutory authority like ATEX, BASEEFA, FM, PTB, CENELEC etc. for Items of foreign origin and from CMRI, ERTL etc. for items of Indian origin.

b. All the indigenous equipment shall confirm to Indian Standards & shall have been tested and certified by Indian testing agencies.

c. Approval certificates from Petroleum and Explosives Safety Organization (PESO / CCOE) or any other applicable statutory authority for items to be installed in India, irrespective of country of origin.

d. All indigenous flameproof equipment shall have valid BIS license and corresponding marking as required by statutory authorities.

6 DESIGN REQUIREMENTS

6.1 General

6.1.1 Control Valves shall normally be single seated top guided Globe valves with stem or cage guided trims wherever feasible. When large volumes at low DP or process condition dictate, other valve designs, such as butterfly valves, may be considered.

6.1.2 Angle valves may be used where necessary to prevent the accumulation of solids (e.g. hydrocarbon services where coke may form), slurry service, or in piping schemes where space is at a premium, flashing service, and for unusually high differential pressures.

6.1.3 Plug valves may be used for special applications such as throttling control in slurry service.

6.1.4 All valves shall have the direction of the flow through the valve stamped or cast on the valve body. Control valves shall not be used for ESD service.

6.1.5 Control valve bodies shall be NPS 1 as minimum, with reduced trim when necessary. Valve body sizes of NPS 1¼, 2½, 3½ and 5" shall not be used under any circumstances Valve body size shall not be less than half of the line size.

6.1.6 All valves shall be flanged. Valves shall be of one-piece cast construction i.e. flanged connections integral with the body. Valves up to NPS 600 mm shall be flanged to ANSI B16.5 and to ANSI B16.47 for valves larger than NPS 600 mm.

6.1.7 The pressure rating of all control valves shall be 300# as minimum.

6.1.8 The minimum nominal sizes of butterfly valves shall be 4" (100mm). Butterfly valves shall comply with API 609.

6.1.9 In case flanged end connection is not suitable i.e. high pressure valves, butt-weld or socket weld connections shall be considered.

6.1.10 Butterfly valves shall be double flanged. Short pattern flange and wafer design butterfly valves shall not be used.

6.1.11 All flanges shall be drilled for through bolting. Flanges which are drilled and tapped for studs are not acceptable.

6.1.12 Gasket surface finish for raised face flanges shall be in accordance with ANSI B16.5.

6.1.13 Valve Trim Design-

- Control valve trim design shall suit the type of guiding specified in the datasheet. For each valve, the appropriate valve trim shall be selected to achieve the required control characteristic. Offered valve trim shall be suitable for specified process conditions.
- When 50% or more of the system dynamic pressure drop is to be sustained by the control valve at normal flow conditions, the valve shall have a linear characteristic; otherwise it shall have equal percentage characteristic.
- Series/parallel labyrinth trims shall not be used on fluids that have solids in suspension with particle size > 3 microns. Where multistage trims are necessary in services where particle size is > 3 microns, a valve having a high resistance multistep axial flow trim shall be utilized. To avoid solids build-up the use of angle valves shall be given serious consideration.
- Cage-guided valves, balanced-type valves shall not be used for fluids that contain solid particles (e.g. coke). Any other special trim design which will have functional problems due to solid particles shall not be used for fluids that contain solid particles. Where possible, the effects of cavitation shall be minimized by selection of suitable trim designs.
- Where cavitation cannot be avoided the valve trim and facing shall be selected to minimize damage. Butterfly valves shall not be used were cavitation is predicted. Valve maximum exit velocity shall be ≤ Mach 0.33. Calculations shall be submitted to verify compliance.
- In flashing service, wherever necessary, the body size shall be increased to achieve this. In addition, valve trim and facing shall be selected to minimize damage.
- For ease of maintenance, all valve trims shall be of the quick-change type, with no internal components screwed or welded into the valve bodies or bonnets.
- For valves with welded type online replaceable type trims shall be considered. VENDOR manual shall include detailed online trim replacement procedure.
- Trim design shall provide equal pressurization around the plug-in order to minimize vibration and prevent the potential for binding
- The selection of body / bonnet / bolting / nut etc. material for valves shall follow the associated piping material specification as a minimum.
- Generally, each valve trim shall be constructed from SS 316, unless process conditions require higher grade material. However, the use of trim materials such as Stellite faced SS 316, 17-4 PH or Tungsten Carbide, etc. should be considered in the following applications:

a) Flashing service
b) Cavitating service
c) Erosive service and choked flow
d) Slurry service
e) Wet Gas or Steam service
f) Pressure drops that exceed 10 kg/cm2

- Materials for sour service shall conform to the requirements of NACE International Standard MR0103 / ISO 15156. All butterfly valves shall, as a minimum, be fitted with stainless steel vanes and shafts in a precipitation hardened material (e.g. 17-4 PH).

- All control valves shall have their predicted aerodynamic / hydrodynamic noise level calculated & Supplier shall select a special low noise trim for that application. The calculations should be in accordance with IEC 534-8-3 for aerodynamic noise and IEC 534-8-4 for hydrodynamic noise. However, VENDOR"s Standard calculation based on construction and experience shall be considered paramount in line with good engineering practice.

- The predicted aerodynamic noise level at a 1m radius from the valve discharge flange shall not be greater than 85 dBA. For vent services, noise up-to 105dBA shall be acceptable after CLIENT / EPCM approval.

- Noise abatement shall in the first instance be achieved by judicious selection of the valve trim design. Where this cannot be achieved by trim design alone, path treatment e.g. heavy wall pipe / external insulation / silencers may be considered for localized abatement.

- Because noise is propagated over long distances via the fluid stream, effectiveness of path treatment ceases where treatment ends this method of abatement shall therefore be subject to CLIENT/EPCM approval.

6.1.14 Trim Characteristics-

- Equal percentage plugs shall normally be used when there are large variations in valve pressure drop, with very high pressure drops at minimum flow with greatly reducing pressure drops as the flow increases.

- Linear characteristic plug shall be selected for

a) Constant or small variations in valve pressure drop
b) Level control
c) Over pressure control in steam or gas service
d) Operation by remote hand controller
e) Split control and parallel control by two valves
f) Small CV and low noise valves as designated by Manufacturer.

NOTE: Whenever the trim characteristics are specified in the specification that shall be followed.

6.1.15 Trim material-

- Whenever stellited trim is specified in the datasheets following material of construction for trim parts shall be acceptable.

  a) Plug and seat — Stellite sheathing/coating or solid stellite
  b) Cage — Stellite sheathing/stellite coating or solid stellite
  c) Guide bushing — Stellite coating/sheathing or solid stellite
  d) Valve stem — Hardened SS/Inconel X-760

  Special material requirements, if specified in the datasheets, shall supersede the above-mentioned requirements.

- Whenever hardened SS trim is specified in the datasheet, following material of construction for trim parts shall be acceptable provided same are compatible with the specified process conditions;

  a) Plug and seat — Stellite sheathing/coating or 17-4PH SS or 440C
  b) Cage — Stellite sheathing/coating, solid stellite, ENC coating, 17-4PH SS
  c) Guide bushing — 440C, 316SS stellited, 17-4PH SS or solid stellite
  d) Valve stem — 17-4PH SS

- Trim shall be provided with partial or full stelliting in case of high pressure drops (greater than 10 kg/cm$^{2)}$, flashing, cavitation, erosive or slurry services and in general for all steam services.

6.1.16 Bonnets & Packing-

- Generally, stem seals shall be comprised 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.

- Low emission packing shall be utilized for all control valves. Valve packing containing asbestos in any form is strictly prohibited.

- Where process streams containing Toxic/Volatile Organic Compounds (VOCs) is specified, the valve may require special low emission valve packing and/or bellows sealing. Valve packing containing asbestos in any form is strictly prohibited. They shall be fitted with a monitor for bellows leakage, e.g. small pressure gauge and excess flow valve.

- 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 Range	**Packing Material**
-40 to +230 °C	PTFE V-Rings
Above +230 °C	Graphite in pre-formed rings(non-asbestos)

- Wherever environmental packing design is specified, vendor shall supply special packing design suitable to minimize fugitive emission.

- Where the temperature range exceeds limit of graphite, suitable packing material shall be used as per VENDOR"s recommendation.
- Extension bonnets shall be considered for design temperatures below 0 °C and above 230 °C.
- Packing which require external lubrication or grease shall not be used.

6.2 Valve Sizing

6.2.1 Control valves are to be sized in accordance with ISA-S75.01. Valve sizing shall normally be based on the maximum flow x 1.3, at the coincident temperature, pressure and pressure drop conditions. Range-ability shall be checked for the anticipated minimum flow rate, which should be ≥ 20% of full stroke.

6.2.2 Each control valve shall be sized for Min./Nor./Max. conditions as specified in the datasheets. The maximum flow shall be between 60 to 80% of full stroke for equal percent trims and 50 to 80% for linear trims. Supplier shall calculate this co-efficient as per the offered control valve and select the size considering valve openings as under:

At maximum flow	:	Less than 90% open
At normal flow	:	Typically 75% open
At minimum flow	:	More than 15% open

6.2.3 Valve opening and closing time shall be specified by the Supplier in the datasheets.

6.2.4 The fluid velocity at the valve's downstream shall be in general limited to around 7 m/s for liquids and less than 0.3 mach for gases / vapours.

6.2.5 Rangeability of valves shall be 30:1 unless otherwise specified.

6.2.6 Butterfly valves shall be sized assuming a 60º opening at maximum flow. Wherever high performance butterfly valves are specified, these shall be sized considering maximum opening of 90º at maximum flow.

6.2.7 Control valve seat leakage shall be as per ANSI/ FCI-70.2 and shall meet the requirements specified in the valve datasheet. Where no leakage class is specified, the same shall be considered as Class IV as minimum.

6.2.8 Valve trim seating to meet the classification "TSO" shall be class V or VI dependent on the process, valve design and pressure drop. For all the control / block and bleed valves connected to flare shall be of leakage class V or better.

6.2.9 The degree of seat leakage shall be in accordance with IEC 60534.4 Class IV, unless specified on the valve data sheet to the contrary.

6.2.10 Actuators and other accessories of control valves shall be designed/ selected considering Instrument air supply pressure of minimum 4 kg/cm^{2}g and shall withstand design pressure of 13 kg/cm2g suitable arrangement shall be provided for safeguarding of actuator from air design pressure.

6.2.11 The effect of reduced inlet and outlet pipe sizes shall be considered when sizing control valves.

6.2.12 All valves shall be provided with air filter regulators to prevent the actuator from maximum design pressure of Instrument air.

6.2.13 All electrical accessories shall be provided with terminals housed in enclosure with proper terminal identification.

6.2.14 The other auxiliary devices such as lock up valve, pilot relay, booster, quick exhaust valve, etc. shall be provided as parts of the actuating system in order to achieve the required stroke-speed, fail safe action etc. In event of instrument air failure, valve shall reach fail-safe position (i.e. fail open, fail close or fail lock) as per the process requirement / licenser's recommendation.

6.2.15 All brackets, fixings and fittings shall be constructed from SS 316.

6.2.16 Prefabricated FRP Canopy shall be provided for all Solenoid valves, positioners and limit switch box, exposed to direct sun rays. Canopy shall be design in such a way that instrument access and maintenance shall be possible without removing canopy.

6.2.17 All the control valves actuator diaphragm vent ports shall be provided with necessary rain protection. In order to achieve this 1/4" SS tube formed to inverted U shape with necessary fitting shall be provided for all diaphragm vent ports.

6.2.18 All accessories shall be fully tubed/wired as part of the valve assembly and shall be suitably terminated. All instrument air tubing and fittings shall be SS 316 & Swagelok/Parker make. Compression fittings shall be double ferrule type. Tubing sizes shall be metric, 6mm OD minimum, and sized in accordance with the stroking times to be achieved.

6.2.19 For Depressurization valves which are designed to fail open and valves where approval has been given for double acting piston actuators, a local air receiver shall be supplied of MOC SS/CS. This shall be sized to provide at least three strokes over the full travel of the valve. They shall be supplied complete with double non-return valves, pressure gauge and relief valve. They shall comply with ASME VIII requirements.

6.3 Actuators

6.3.1 Single acting & Spring Return Diaphragm actuators are preferred for modulating control valves. The normal operating range shall be 0.2 to 1.0 kg/cm2 but shall not exceed 3.5 kg/cm2.

6.3.2 Spring shall be designed to bring valve to the required valve action in the event of instrument air failure. Spring Material should also be selected as per suitable application.

6.3.3 Valve actuators shall be sized for the design pressure upstream of the valve with the downstream pressure taken as zero. Pneumatic actuators shall be sized for minimum instrument air pressure of 3.5 kg/cm2g. Bench setting is unacceptable.

6.3.4 Control valve actuator shall be sized considering safety factor of 1.5 at minimum air pressure.

6.3.5 Pneumatic piston may also be used, where necessary on control valves, to provide longer strokes or greater thrust than is available from spring diaphragm units. Pneumatic piston

actuators shall preferably be the single acting spring return design and sized for minimum instrument air pressure of 3.5 kg/cm2g.

6.3.6 Double-acting piston actuators may only be used with CLIENT/EPCM approval.

6.3.7 Actuator housing material shall be steel or anodized aluminium.

6.3.8 The actuator shall be painted as below:

Direct acting (open on air failure) valves - Green

Reverse acting (close on air failure) valves - Red

Fail-lock valves - Orange

6.4 Accessories

6.4.1 Control Valve Positioners

- Control Valves shall be provided with smart electronic positioners with latest HART 7 protocol as specified in the datasheet. The positioner shall be provided with necessary software/hardware for maintenance, remote calibration, advance diagnostics, programming etc. with valve signature, one license shall be provided for each Make/Model number of positioner.
- Each positioner shall be operable, configurable and accessible through HART compatible hand held configurator as applicable.
- The Supplier shall provide the valve's operating signature in the form of hard copy and soft copy for each control valve provided with smart positioners. The necessary software for advanced control valve diagnostics like seat ring condition, gland packing condition, actuator leakage, Audit log, performance diagnostics, dead band analysis, trending, positioner electronic alerts etc., shall also be included.
- The positioner shall be a two-wire device, which shall operate on two-way digital communication mode. All engineering, configuration, diagnostic and maintenance related data shall be provided by the positioner.
- All positioners shall be Intrinsically safe certified EEx'ia', suitable for mounting in hazardous area as specified in the datasheet. The enclosure material shall be Die-cast Aluminium and ingress protection class shall be minimum IP-65 as per IEC 60529.
- Every positioner shall have two pressure gauges mounted on it, one each for air supply and for positioner output to actuator.
- Positioners shall be side-mounted on the control valve and shall have corrosion resistant linkages and rugged brackets.
- High Flow Positioners with simple pneumatic accessories should be considered for ANTI-SURGE control valves of critical compressors. The Valves should have equal opening and closing speed i.e. < 2sec.

6.4.2 Solenoid valves

- Wherever solenoid valves are provided to override the modulating control; they shall be installed between the positioner and the actuator.
- The use of process line mounted solenoid valves should be avoided and their use is subject to owner's approval.
- Solenoid valve body shall be of SS316 and the coil enclosure shall be of die-cast aluminium. Solenoid valves, wherever used, shall be three-way universal type and shall be continuous rated type with class H coil insulation.
- B The solenoid valve operating voltage shall be 11[illegible]DC & Non-Intrinsically Safe with electrical certification EExd. Solenoid valve shall be SIL3 certified as min.
- Cable entry shall be ½" NPT-F. SS Cable gland shall be provided for cable entry. Cable gland shall be EExd certified and double compression type. Atmospheric vents shall be fitted with bug screens. Spare cable entries shall be closed with certified SS plugs.
- Pilot operated solenoid valves are not permitted. Positioners with inbuilt Solenoid valves shall not be considered.

6.4.3 Air Filter Regulator

- Supplier shall supply air filter regulator with each positioner complete with an integral output gauge.
- Air filter Regulator shall be sized considering the air supply pressure and flow required to meet the requirement mentioned in datasheet. The body of the filter shall be SS316.
- The air filter regulator shall have 1/4" NPT connection for air supply unless larger is required based on vendor recommendation.
- Air filter Regulator filter shall have 5 microns sintered bronze filter element and shall be provided with manual drain and 2" nominal size pressure gauge (pressure gauge sensor shall be of SS316 material in a casing of SS304 material as a minimum).

6.4.4 Hand Wheels

- Generally, hand wheels shall not be fitted. Hand operated bypass valves are preferred. Hand wheels if fitted shall be de-clutch-able and capable of stroking valve in both directions and locking valve in position.
- Bypasses shall be piping class globe valves except for the following conditions, in which case a control valve body / trim, identical to the automatic control valve but with manual actuators shall be considered: -
  - Flow / pressure drop conditions are producing cavitation or flashing
  - Control valve is fitted with a noise control trim
  - Where a standard globe valve through-put would exceed the associated relief valve capacity

Where a control valve is fitted with an override solenoid valve and has a fail closed action, a bypass valve shall not be fitted. “Balancing” and “warm-up” are excluded from this statement and must be considered on a case-by-case basis.

6.4.5 Limit Switches

- Limit switches wherever applicable shall be supplied by the Supplier to indicate open and close position the control 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 control valve stem or shaft must be adjustable and shall not be affected by the vibration.

- Limit Switches shall be intrinsically safe EEx(ia) certified. Limit switches shall be 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.

- 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. Cable gland shall be EEx’d’, double compression type. Spare cable entries shall be closed with certified SS plugs.

6.4.6 Limit Stop

- Wherever required as per control valve data sheets, limit stop shall be provided. The limit stops shall be adjustable and lockable (by means of lock nut or other device), without actuator disassembly. Hand-wheels shall not be used as limit stops.

7 SPECIAL INSTRUCTION TO VENDOR

7.1 Valve NDE & NDT Requirements

- All valves shall be subject to NDE/NDT in accordance with ASME B16.34.

- EPCM Piping specification as per be followed for NDE requirement like Radiography (RT), Ultrasonic Testing/magnetic Particle Testing (MT), Dye Penetration Test etc.

7.2 Hydrostatic Test

All control valves shall be subject to the following tests as a minimum:

- 100% hydrostatically tested with water not exceeding 50^0C in accordance with ANSI B16.5.

- Pneumatic piping bubble tested for leaks

- 100% full functionally checked.

- Seat leakage 10% of each type of Control Valves shall be leak tested against the FCI 70-2 rating as specified on the valve data sheet. Should any valve fail in this initial test then 100% of the valves shall be tested.

- Seat leakage for all control valves having TSO requirements.

7.3 Vacuum test for valves in vacuum service & Fugitive emission test 10% of each type of valve. In case of any valve fail in this initial test then 100% of the valves shall be tested. For valves to be used under cryogenic conditions, Cryogenic test to be performed as per BS 6364.

7.4 Sour and HIC Service / NACE Requirements

- If in the control valve datasheet Sour and HIC service is specified, the Supplier shall meet the specific material requirements such as hardness, radiography and other testing requirements as specified in the ITP, and shall also comply with the NACE MR-0103/ISO 15156.

7.5 PMI Requirements:

- PMI shall be performed for alloy metal valves.

7.6 Hydrogen Service Requirement

- If in the control valve datasheets Hydrogen Service is specified, the Supplier must certify the control valve for the use in Hydrogen service, specifically Hydrogen diffusion problems. Supplier shall furnish reference list, along-with performance feedback.

- For hydrogen service the control valve shall meet all the material and testing requirements such as Helium leak test etc.

7.7 Indian Boiler Regulation (IBR) Requirements

- If in the control valve datasheets IBR is specified, the Supplier must furnish the required IBR certification.

7.8 PTR Requirement

- Control valves selected for the unit shall be rugged in design and must be well proven in the hydrocarbon industry. Proto type design or equipment's of experimental nature or design undergoing testing etc. shall not be selected by Supplier. Following criteria must be applied before selecting a particular instrument item.

  "The Control valves as being offered/supplied should have been operating satisfactorily in a hydrocarbon industry like refinery, petrochemical and gas processing plant under similar process conditions for at least 8000 hours from the bid opening."

- Supplier shall furnish reference list along-with with performance feedback in support of the above requirement.

8 INSPECTION AND TESTING

8.1. Unless otherwise specified, purchaser reserves the right to test and inspect all the items at the vendor's works, in line with the Inspection and Test Plan (ITP) and other applicable documents attached with the Material Requisition.

8.2. Supplier shall submit all test records/test results for records to purchaser as bound volume along with the test procedure for each test carried out.

8.3. Supplier shall meet the following test certificates and test reports for purchaser's review:

- Material test certificate for body, trim etc.
- Certificate of Radiography/X-ray for valve castings.
- Post-weld heat treatment certificate for welds, as per datasheets and piping material specification.
- Pneumatic test certificates for all pneumatic actuators at a pressure not less than one and half (1.5) times the actuator working pressure.
- IBR certificate in form III C for all valves covered under IBR certification.
- Hydrostatic test reports for all valve bodies and functional test reports for all valves.
- Certificate from statutory body for Intrinsic safety/ explosion proof for Smart positioners, limit switches, solenoid valves etc., and type test certificate for weatherproof-ness for these items, as applicable.
- High temperature operational test with the measurement of actuator force, at vendors works.

9 NAME PLATE

Control Valves shall have a corrosion resistant stainless steel Nameplate with stamped or engraved tag number. The above information shall be in English language. Tag plate shall be Permanently fixed to the instrument by means of screws, rivets. The name plate shall include as a minimum;

- VENDOR's name or identity
- Model & Serial numbers
- Tag number
- Range
- Power Supply
- Area Classification & IP class
- Ex certification /Approval
- Size, Rating, Face finish, Material
- Year of Manufacture

Individual accessories shall also be tagged as defined on the unit specification. Wire tie-wrapped tags are not acceptable.

10 PACKING AND SHIPPING

10.1 All threaded and flanged openings, cable entry openings shall be suitably protected to prevent entry of foreign material.

10.2 Control valve and its accessories shall be supplied preassembled and pre-tubed.

10.3 Control valves with external lubricators shall be lubricated before shipment.

10.4 Instrument shall be supplied individually, in suitably sealed packing.

10.5 The consignment shall be packed and suitably labelled clearly indicating the following as minimum:

- Project Name and Location
- PO Number
- Packing List inside consignment (indicating Main Equipment Tag numbers, Accessories and Spares as applicable)
- Vendor Name and location of dispatch.

10.6 It is the responsibility of the Supplier 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.

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

10.8 All valves shall be provided with Plastic end caps at both end flanges and that plastic cap shall be tied with valve flange so that it does not come out during transport or storage.

10.9 Austenitic stainless steel and non-ferrous valves shall not be painted.

11 DOCUMENTATION

11.1 All the data, instrument calculations and drawings etc. shall be submitted to the purchaser in the manner and the time period stated against each document. The purchase order will not be considered complete until all the documentation has been submitted by the Supplier and has been accepted by the purchaser.

11.2 All the documents shall be A4 or A3 size only; all the document prints larger than A4 shall be folded to A4 size with identification data visible at the bottom right.

11.3 All the documents shall be checked and approved by the Supplier unchecked documents will be returned un-reviewed, and Supplier will responsible for the delay.

11.4 Any revision to a document after its first submission shall be clearly identified on the documents in the revision box at the right bottom.

11.5 All the documents submitted shall be clearly marked with following information-

- Purchaser's reference Purchase Requisition number & item no. and equipment identification tag no.

- Supplier Job No., Document no. and revision no.

11.6 Final documentation consisting of design data, installation manual, operation and maintenance manual etc., submitted by the vendor after placement of purchase order shall include the following, as a minimum; -

a) Specification sheet/ Data sheet/ Sizing Sheet for each Control valve with accessories. As built drawings for each Control valve with accessories, providing dimensional details (face-to-face and height of completely assembled valve), Dimensions of clearance space for maintenance work, weight of completely assembled valve, constructional details, connection details, orientation with respect to flow direction marked on the body and material of construction.

b) Copy of the type test certificates.

c) Copy of test certificates for all the tests as per MR and Documents along with TPI/ IRN.

d) Installation procedure for each control valve along with their accessories.

e) Calibration, configuration and maintenance procedures including replacement of its parts/ internals wherever applicable.

f) Control valve operating signatures whenever smart positioners are specified.

g) Deviation list/ compliance statement.

h) List of mandatory spares.

i) List of Start-up and commissioning spares.

j) List of recommended spares for two years' operation complete with full ordering reference part no. etc.

k) Product Catalogues of Main equipment and accessories/ bought-out.

l) Supplier document control index.

m) Documentation shall be as per Scope of Supply Document.

Other sizes and immersion lengths may be considered based on special condition / actual requirements subject to prior approval from EPCM /OWNER.

Thermowell shall be design suitably for the stream velocity condition. The wake frequency shall be checked as per PTC 19.3, latest edition. Wherever flanged thermowell fails wake frequency calculations following steps shall be considered subject to approval of EPCM /OWNER.

- Increasing Tip Thickness
- Increase in stem diameter
- Increasing Nozzle Size

It may be note that insertion length of thermowell shall not be decreased in any case.

Pipe line below 4" nominal bore shall be blown to 4" NB size to install thermowell.

Only thermowell (test well) when specified, shall be provided with the element entry plugged with SS plug and SS chain.

All the thermowells shall be offered for hydro testing at site to EPCM /OWNER before installation.

Thermowell design shall be verified with the process connection nozzle internal diameter to achieve proper insertion. Special care shall be taken for high pressure application. Piping nozzle internal diameter shall be clearly mentioned in temperature element/gauge datasheet.

6. CONTROL VALVES

6.1 General

Generally single seated globe bodied control valves are preferred with stem or cage guided trims. When large volumes at low DP or process condition dictate, other valve designs, such as butterfly valves, may be considered.

Angle valves shall be used where necessary to prevent the accumulation of solids (e.g. hydrocarbon services where coke may form), slurry service, or in piping schemes where space is at a premium, flashing service, and for unusually high differential pressures.

Plug valves may be used for special applications such as throttling control in slurry service.

All valves shall have the direction of the flow through the valve stamped or cast on the valve body.

Control valves shall not be used for ESD service.

Control valve bodies shall be NPS 1" as minimum, with reduced trim as necessary. Valve body sizes of NPS 1¼", 2½", 3½" and 5" shall not be used under any circumstances.

The minimum nominal sizes of butterfly valves shall be 4" (100mm). Butterfly valves shall comply with API 609.

Self-acting regulator valves shall be used for local, fixed gain control of utilities, clean fluids such as fuel systems and Nitrogen blanketing. The maximum size shall be 1½" (40 mm).
Control valve body size shall not be less than half the nominal pipe size in which it is installed.

All valves shall have removable seat rings and plugs.
Generally valves of 4" or greater shall be fitted with lugs to allow vertical lifting.

6.2 Valve Sizing

Control valves size shall be calculated using the ISA-75.01.01 or VENDOR's formulae. Valve sizing shall normally be based on the maximum flow x 1.3, at the coincident temperature, pressure and pressure drop conditions. Range-ability shall be checked for the anticipated minimum flow rate, which should be ≥ 20% of full stroke.

The maximum flow shall be between 60 to 80% of full stroke for equal percent trims and 50 to 80% for linear trims.

- In general Control Valve % opening shall be as below
- At min flow : typically 15% or greater
- At Normal flow : typically upto 75%
- At Maximum Flow : typically
- 85% or less.

Butterfly valve sizing shall be based on a maximum opening of 60º, except where they are fitted with characterized vanes, in which case a 90º maximum opening shall be utilized.

The effect of reduced inlet and outlet pipe sizes shall be taken into account when

sizing control valves.

6.3 Valve Trim

For each valve, the appropriate valve trim shall be selected to achieve the required control characteristic. Offered valve trim shall be suitable for specified process conditions.

When 50% or more of the system dynamic pressure drop is to be sustained by the control valve at normal flow conditions, the valve shall have a linear characteristic; otherwise it shall have equal percentage characteristic.

Series/parallel labyrinth trims shall not be used on fluids that have solids in suspension with particle size > 3 microns. Where multistage trims are necessary in services where particle size is > 3 microns, a valve having a high resistance multistep axial flow trim shall be utilized. To avoid solids build-up the use of angle valves shall be given serious consideration.

Cage-guided valves, balanced-type valves shall not be used for fluids that contain solid particles (e.g. coke). Any other special trim design which will have functional problems due to solid particles shall not be used for fluids that contain solid particles.

Where possible, the effects of cavitation shall be minimized by selection of suitable trim designs.

Where cavitation cannot be avoided the valve trim and facing shall be selected to minimize damage. Butterfly valves shall not be used were cavitation is predicted. Valve maximum exit velocity shall be ≤ Mach 0.33. Calculations shall be submitted to verify compliance.

In flashing service, wherever necessary, the body size shall be increased to achieve this. In addition valve trim and facing shall be selected to minimize damage.

For ease of maintenance, all valve trims shall be of the quick-change type, with no internal components screwed or welded into the valve bodies or bonnets.

For valves with welded type online replaceable type trims shall be considered. VENDOR manual shall include detailed online trim replacement procedure.

Trim design shall provide equal pressurization around the plug in order to minimize vibration and prevent the potential for binding.

For on-off valves, ball support shall be by one of two methods, i.e. via trunnions or via

the seats (floating). Generally, ball valves used on dirty services shall be trunnion mounted. However VENDOR shall select the method of ball support to suit the applicable piping classes and process conditions.

6.4 Valve Noise

All control valves shall have their predicted aerodynamic / hydrodynamic noise level calculated. The calculations should be in accordance with IEC 534-8-3 for aerodynamic noise and IEC 534-8-4 for hydrodynamic noise. However VENDOR's Standard calculation based on construction and experience shall be considered paramount in line with good engineering practice.

The predicted aerodynamic noise level at a 1m radius from the valve discharge flange shall not be greater than 85 dBA.

Noise abatement shall in the first instance be achieved by judicious selection of the valve trim design. Where this cannot be achieved by trim design alone, path treatment e.g. heavy wall pipe / external insulation / silencers may be considered for localized abatement.

Because noise is propagated over long distances via the fluid stream, effectiveness of path treatment ceases where treatment ends this method of abatement shall therefore be subject to EPCM /OWNER approval.

6.5 Control Valve Leakage

The degree of seat leakage shall be in accordance with IEC 60534.4 Class IV, unless specified on the valve data sheet to the contrary. Valve trim seating to meet the classification "TSO" shall be class V or VI dependent on the process, valve design and pressure drop.

For all the control / block and bleed valves connected to flare shall be of leakage class V or better.

6.6 End Connections

All valves shall be flanged. Valves shall be of one-piece cast construction i.e. flanged connections integral with the body. Valves up to NPS 600 mm shall be flanged to ANSI B16.5 and to ANSI B16.47 for valves larger than NPS 600 mm.

The pressure rating of all control valves shall be 300# as minimum.

On-Off valves shall be piping class valves complying with API 6D, but with a minimum

flange rating of 300#.

In case flanged end connection is not suitable i.e. high pressure valves, butt-weld or socket weld connections shall be considered.

Butterfly valves shall be double flanged. Short pattern flange and wafer design butterfly valves shall not be used.

All flanges shall be drilled for through bolting. Flanges which are drilled and tapped for studs are not acceptable.

Gasket surface finish for raised face flanges shall be in accordance with ANSI B16.5 Para 6.4.4.

6.7 Valve Body / Trim Materials

The selection of body material for valves shall follow the associated piping material specification as a minimum.

Generally, each valve trim shall be constructed from SS 316, unless process conditions require higher grade material. However, the use of trim materials such as Stellite faced SS 316, 17-4 PH or Tungsten Carbide, etc. should be considered in the following applications:

- Flashing service
- Cavitating service
- Erosive service and choked flow
- Slurry service
- Wet Gas or Steam service
- Pressure drops that exceed 10 kg/cm2

Materials for sour service shall conform to the requirements of NACE International Standard MR0103 / ISO 15156.
All butterfly valves shall, as a minimum, be fitted with stainless steel vanes and shafts in a precipitation hardened material (e.g. 17-4 PH).

6.8 Bonnets and Packing

Generally, stem seals shall have comprise 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.

Low emission packing shall be utilized for all control valves. Valve packing containing asbestos in any form is strictly prohibited.

Where process streams containing Toxic / Volatile Organic Compounds (VOCs) are specified the valve may require special low emission valve packing and / or bellows sealing. They shall be fitted with a monitor for bellows leakage, e.g. small pressure gauge and excess flow valve.

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 Range	Packing Material
-40 to +230 deg C	PTFE V-Rings
Above +230 deg C	Graphite in pre-formed rings (non-asbestos).

Where the temperature range exceeds limit of graphite, suitable packing material shall be used as per VENDOR's recommendation.

Extension bonnets shall be considered for design temperatures below 0 deg C and above 230 deg C.

Packing which require external lubrication or grease shall not be used.

6.9 Actuators, Valve Positioners & Accessories

All accessories shall be fully tubed/wired as part of the valve assembly and shall be suitably terminated. All instrument air tubing and fittings shall be SS 316. Compression fittings shall be double ferrule type. Tubing sizes shall be metric, 6mm OD minimum, and sized in accordance with the stroking times to be achieved.

Actuator housing material shall be steel or anodized aluminum.

Limit switches shall be of Proximity NAMUR type as per DIN 19234.

All valves shall be provided with air filter regulators to prevent the actuator from maximum design pressure of Instrument air.
All electrical accessories shall be provided with terminals housed in enclosure with proper terminal identification.

The other auxiliary devices such as lock up valve, pilot relay, booster, quick exhaust valve, etc. shall be provided as parts of the actuating system in order to achieve the required stroke-speed, fail safe action etc.

All brackets, fixings and fittings shall be constructed from SS 316.

Prefabricated FRP Canopy shall be provided for all Solenoid valves, positioners and limit switch box, exposed to direct sun rays. Canopy shall be design in such a way that instrument access and maintenance shall be possible without removing canopy.

All the control/ shutdown valves actuator diaphragm vent ports shall be provided with necessary rain protection. In order to achieve this 1/4" SS tube formed to inverted U shape with necessary fitting shall be provided for all diaphragm vent ports.

6.9.1 Pneumatic Actuators

Spring Return Diaphragm actuators are preferred for modulating control valves. The normal operating range shall be 0.2 to 1.0 kg/cm2 but shall not exceed 3.5 kg/cm2.

Spring shall be designed to bring valve to the required valve action in the event of instrument air failure.

Valve actuators shall be sized for the design pressure upstream of the valve with the downstream pressure taken as zero. Pneumatic actuators shall be sized for minimum instrument air pressure of 3.5 kg/cm2g. Bench setting is unacceptable.

Actuators for on-off valves shall be sized as per requirements given for ESD valve actuator sizing. Stroke speed requirement for on-off valves shall be same as ESD valves.
Actuators shall be equipped with a travel position indicator for along with mark for open & close position.

Control valve actuator shall be sized considering safety factor of 1.5.

Pneumatic piston actuators shall be used on all on-off, ESD and Depressurization valves.
They may also be used, where necessary on control valves, to provide longer strokes or greater thrust than is available from spring diaphragm units. Pneumatic piston actuators shall preferably be the single acting spring return design and sized for minimum instrument air pressure of 3.5 kg/cm2g.

Double-acting piston actuators may only be used with EPCM /OWNER approval.

6.9.2 Reserve Air Receivers

For Depressurization valves which are designed to fail open and valves where approval has been given for double acting piston actuators, a local air receiver shall be supplied of MOC SS/CS. This shall be sized to provide at least three strokes over the

full travel of the valve. They shall be supplied complete with double non-return valves, pressure gauge and relief valve. They shall comply with ASME VIII requirements.

6.9.3 **Control Valve Positioners**

All control valve actuators shall be provided with electro-pneumatic, SMART positioners, complete with air sets having 5 micron filters. All valve positioners shall be an intelligent design capable of transmitting full diagnostic and predictive maintenance data to the main DCS / Asset Management System. Positioners shall have an input signal of 4-20 mA, 24V DC with super imposed HART protocol. The control valve position feedback shall be configured in the DCS with trend recording.

All positioners shall be fitted with gauges for supply and output pressures.

VENDOR shall supply necessary software for the supplied make of positioner to for remote calibration / enabling advanced diagnostics with valve signature.

6.9.4 **Solenoid valves**

On-Off valves, Emergency shutdown (ESD) and Depressurising valves shall be provided with solenoid valves. Where solenoid valves (SOV) are provided to override the modulating control valve, they shall be installed between the positioner and the actuator.

The use of process line mounted solenoid valves should be avoided and their use is subject to EPCM /OWNER approval.

All solenoid valves shall be intrinsic safe type with operating voltage 110V AC ; and certified for use in specified hazardous area. Solenoid Valves for wired to ESD shall be SIL-3 certified as minimum.

Pilot operated solenoid valves are not permitted.

Manual reset on solenoid body shall not be provided, except for the cases where LICENSOR specifically ask for it.

Solenoid valves shall be universal type and shall be continuous rated type with class H coil insulation.

Solenoid valve shall be of SS body with SS 316 trim, as a minimum. Positioners with inbuilt Solenoid valves shall not be considered.

Critical solenoid valve, which lead to production loss in the event of trip actuation shall be provided with dual solenoid valves. This is to ensure that failure of one solenoid

does not trip the valve. Each of these dual Solenoid valve shall be wired to different cards, different multicore cables & Junction Boxes. Compact design type dual SOV without bypass valve (as a single item without need of external tubing to achieve redundancy) shall be provided. Dual SOVs should have mechanisms for online coil changeover facility.

ESD solenoid valve leading to trip of critical equipment like for Main Air Blower, Recycle Gas Compressor & Wet Gas Compressor, shall be provided with TMR solenoid valves. Each of these TMR Solenoid valve shall be wired to different cards, different multicore cables & Junction Boxes.

TMR SOVs should have 2oo3 operating mechanisms, with online coil changeover facility.

The cable entries in the SOVs shall necessarily be routed from the bottom of the SOV. All the possibilities of the water ingress inside the SOV shall be prevented.

Atmospheric vents shall be fitted with SS/Brass bug screens.

6.9.5 **Air Filter Regulators**

Instrument air filter regulator of suitable size, range and capacity shall be supplied for each pneumatic instrument.

The body of the filter shall be SS 316.

The filter shall have 5 micron sintered bronze/ceramic filter element and shall be provided with manual drain and 2" nominal size pressure gauge.

6.9.6 **Hand Wheels / Bypasses for Control Valves**

Generally hand wheels shall not be fitted. Hand operated bypass valves are preferred. Hand wheels if fitted shall be de-clutchable and capable of stroking valve in both directions and locking valve in position.
Bypasses shall be piping class globe valves except for the following conditions, in which case a control valve body / trim, identical to the automatic control valve but with manual actuators shall be considered:-

- Flow / pressure drop conditions are producing cavitation or flashing
- Control valve is fitted with a noise control trim
- Where a standard globe valve through-put would exceed the associated relief valve capacity

Where a control valve is fitted with an override solenoid valve and has a fail closed action, a bypass valve shall not be fitted. “Balancing” and “warm-up” are excluded

UNIT : 701

PROJECT : BR-9 RFCC Revamp Project

LOCATION : IOCL, BARAUNI REFINERY.

OWNER	EPCM
IndianOil — INDIAN OIL CORPORATION LIMITED.	TechnipFMC — TECHNIP INDIA LTD. NOIDA, INDIA.

INSPECTION AND TEST REQUIREMENTS FOR INSTRUMENTATION

Document Category	Document Review Status (by Client)
(Use "X" Mark) ☐ Approval ☒ Review ☐ Information	

Pages modified under this revision: Attachment-1

Rev	Date DD/MM/YYYY	STATUS	WRITTEN BY (name & visa)	CHECKED BY (name & visa)	APPROVED BY (name & visa)
B	14/10/2020	Issued For Implementation	VG	RIB	RJT
A	28/07/2020	Issued For Review	VG	RIB	RJT

DOCUMENT REVISIONS

TABLE OF CONTENTS

1. INTRODUCTION

Indian Oil Corporation Ltd. (IOCL), the Owner, With the objective of enhancing flexibility in operation and profitability of the Refinery, it is planned to augment capacity of Refinery from 6.0 MMTPA to 9.0 MMTPA along with feasibility for production of Petrochemical products at its Barauni Refinery in the State of Bihar, India.

IOCL currently operates a 1.4 MMTPA two-stage RFCC unit at its Barauni refinery in the state of Bihar, India. The Unit was originally licensed by Stone & Webster Corporation (now Technip S&W) and was commissioned in 2002.

The proposed revamp is employing joint INDMAX Technology of IOCL R&D and Lummus Technology LLC The INDMAX FCC Technology utilizes the proprietary INDMAX Catalyst and innovative process concepts developed by its partner IOCL R&D, India, in concert with Lummus Technology LLC. The following are objectives of the RFCC Unit Revamp:

- Maximize the Propylene Yield for producing Polypropylene in downstream petrochemicals production.
- Increase fresh feed processing capacity from 1.4 MMTPA to 1.7 MMTPA.

2. TERMINOLOGY

The following terminology shall be referred to wherever stated in the documents which the following terminology shall be referred to wherever stated in the documents which form part of the Material Requisition.

OWNER/CLIENT	:	M/s Indian Oil Corporation Ltd.(IOCL)
LICENSOR	:	INDMAX Technology of IOCL R&D and Lummus Technology LLC
EPCM CONSULTANT	:	M/s Technip India Limited,
VENDOR/SUPPLIER	:	Supplier of Main equipment
SUB VENDOR/SUB SUPPLIER	:	Supplier of sub-equipment to Vendor / Supplier

3. PURPOSE

This document covers basic requirements for inspection and test for instrumentation items of all process plants of BR-9 Expansion Project of IOCL, Barauni, Bihar State, India.

This document is applicable for all package items also.

4. ABBREVIATION

FAT	:	Factory Acceptance Test
IBR	:	Indian Boiler Regulations

ITP	:	Inspection Test Plan
MT	:	Magnetic Particle Test
NDE	:	Non Destructive Examination
PMI	:	Positive Material Identification
PT	:	Liquid Penetrant Test
PWHT	:	Post Weld Heat Treatment
RT	:	Radiographic Test
SAT	:	Site Acceptance Test
TPIA	:	Third Party Inspection Agency
UT	:	Ultrasonic Test

5. INSPECTION AND TEST

5.1 GENERAL REQUIREMENTS

All instruments and system oriented items shall undergo factory testing and inspection by authorized Third Party Inspection Agency (TPIA) Representatives / EPCM / Client unless specified otherwise.

Wherever inspection at Vendor's shop is waived off on account of any reason, the sub Vendor's own internal testing reports shall be made available for review and acceptance before dispatch. In no case items shall be released without proper inspection verification.

Items for which 'Witness Inspection' is specifically exempted, Vendor shall forward the test certificates as desired for review.

The inspection and testing shall be carried out as per related specifications, international codes and practices/standards, approved documents and/or any other documents attached along with specifically suggesting testing to be carried out at Vendor's shop.

Manufacturing data and records, such as material test reports or certificates, results of non-destructive examinations, records of visual inspection and dimensional inspection, etc. shall be submitted for EPCM/ Client review.

The testing procedures shall be detailed out based on testing requirements and submitted for EPCM/ Client approval.

All Inspection activities shall be in-line with Doc. No.: 081757C001-000-PP-502, Quality Control Surveillance (QCS) Requirements for Suppliers.

No system or system oriented item shall be dispatched without integrated factory testing witnessed by representatives of TPIA/EPCM/ Client. Vendor must certify that the system is actually ready before calling the EPCM/ Client for FAT. Also all the necessary documents, internal test report and literature are to be submitted before calling for FAT.

Inspection and Testing for all instrument items shall be carried out as per approved ITP, FAT and SAT procedures. Copies of all necessary approved documents shall be available at place of Inspection.

Contractor shall consider Vendor's presence at site till successful completion of SAT and handover.
Performance specifications must be detailed out on each time which shall be verified by TPIA/ EPCM/ Client during factory testing.

Acceptable criteria for Radiography and other NDE requirements for instruments / instrument forgings shall be in line with those specified elsewhere in contract document.

Verification of set point of rupture disc shall be part of witness inspection. Testing shall be carried out on the rupture disc, which is part of the actual rupture disc batch of Vendor. This shall be in addition to spare rupture discs already indicated in the Spare Parts Philosophy attached elsewhere in contract document. The testing, in general, shall be as per ASME section VIII.
The examining personnel shall have requisite qualification and experience.

EPCM/ Client reserves the right to carry out additional inspection if deemed necessary. For any test witnessed by EPCM/ Client at Vendor locations, EPCM/ Client shall be informed, at least 10 working days ahead of inspection date.

Minimum inspection and testing items, witness inspection items for each kind of instrument / system items during each Inspection / FAT / SAT shall be as shown in Attachment-1.

Each ITP shall identify the inspection level and detail all witness, hold and certification review points as indicated in referenced specifications and standards.

As a minimum, each ITP shall include the following information:

- Test description
- Quality control requirements
- Responsibilities
- Applicable procedures
- Acceptance criteria
- Verifying documents
- Inspection points
- Hold points

For special testing requirements like NACE (Sour Service), Hydrogen Service, Impact Testing, Post Weld Heat Treatment (PWHT), Ferrite Number Test, Hardness check, etc. refer Piping material specification (Doc. No.: 081757C001-701-JSD-1300-002) attached in contract document. Contractor to identify such requirements and include in ITP.

5.2 VISUAL INSPECTION

5.2.1 Conformation Items

- Instrument Type
- Make / Manufacturer's Name

- Model Number
- Serial Number
- Tag Number
- Connection Type, Size, Rating, Flange Facing, Flange Finish
- Range, Scale and Unit of Measurement
- Set Pressure and Capacity of Safety Valves
- Valve Characteristics and CV Value of Control Valves
- Material of Construction
- Flow Direction
- Quantity / Bill of Material
- Accessories & Orientation
- Die Marking / Flange Marking (nominal size, material of flange, flow direction, etc.)
- Nameplate
- Painting

5.2.2 Harmful Defects

The points indicated below are the general points that are to be taken care of. However vendor need to look into such other defects which have detrimental impact on the appearance, performance and life of the equipment.

- Defect such as cracks, deformation and flaws shall not be found in the casting, forging and machined surface of the pressure rating part.
- Defect such as inside surface weld protrusion, lack of fusion and incomplete penetration shall not be found in welded places of pressure retaining part.
- All sharp edges shall be burred.
- Painting of instrument's surface shall be such that there is no defect or lack of uniformity.

5.3 DIMENSIONAL INSPECTION

Dimensional check of all instrument items alongwith its accessories shall be carried out as per approved drawings or applicable code and standards.

5.4 MATERIAL INSPECTION

5.4.1 Mill Test Certificates

VENDOR shall submit the mill test certificates for the following parts.

1 ANSI class 900# or above (All material used at the P.T. ratings)
2 Following parts made of steel for:

- High temperature service (Alloy steel above C-Mo steel used at temperature of 400 deg C or over)
- Low temperature service (Iron and steel material of design temperature below minus 11 deg C containing Al-killed steel)
- Corrosion Resistant Materials

i)	Temperature Detective Parts	:	Flange and Thermowell
ii)	Orifice Assembly	:	Flange
iii)	Venturi Tube, Flow Nozzle and Low-Loss Tube	:	Body
iv)	Positive Displacement Flowmeter and Turbine Flowmeter	:	Body, Strainer and Straightener
v)	Variable Area Flowmeter	:	Body and Flange
vi)	Displacement Type Level Transmitter	:	Chamber and Flange
vii)	Glass Gauge	:	Body and Flange
viii)	Control Valve, On-Off Valve	:	Valve Body, Bonnet, Plug, Seat and Vane
ix)	Safety Valve	:	Valve Body, Nozzle and Disc
x)	Condensate Pot	:	Body
xi)	Gas Eliminator	:	Body

5.4.2 Material Test Certificates

VENDOR shall submit the material test certificates as per following:

- Material test reports or certificates including all special process such as heat treatment etc. shall be submitted by VENDOR.
- Material test reports submitted shall be according to EN10204 unless otherwise specified.

5.5 NON DESTRUCTIVE EXAMINATION

1. Control Valve, On-Off Valve and Safety Valve:

   NDE shall be performed as per following para. 5.5.2 and 5.5.3.

2. Other Instruments:

   NDE shall be carried out in accordance with Vendor's standards approved by EPCM/ Client.

5.5.1 Ultrasonic Test (UT)

Forging material on Orifice Flange and Flow Nozzle: ANSI class 900 or above

5.5.2 Radiography Test (RT)

- Pressure retaining casting parts: Applicable Material and Quantity (Refer Radiography Test Table)

- Welded parts: ASME VIII Division 1 uw-51 "Radiographic & Radioscopic Examination of Welded Joints"

- Acceptance Standards and Grade:

  Casting: ASTM E 446-9 or 186-93

Table- RadioGraphy Test

Materials			Test Quantity
Casting	class 1500 or over	C-steel	One out of total quantity of the same type, size and rating for pressure retaining critical parts (a).
	class 900 or over	C-Mo steel	
	class 600 or over	Cr-Mo steel Stainless steel	
	class 300 or over	Al-killed steel 2.5 Ni steel 3.5 Ni steel	
Pressure Retaining Welded Parts	class 1500 or over	C-steel C-Mo steel	One spot on each welded parts per same material and same welder. All welded crossing parts.
	class 300 or over	Cr-Mo steel Stainless steel	
	class 150 or over	Al-killed steel 2.5 Ni steel 3.5 Ni steel	

(a) Following parts are critical parts:

- Groove-welded parts of cast body
- Flange neck and valve seat's vicinity of cast body
- Other welded parts included in pressure retaining parts

Notes:

1. In case of practical difficulty to perform Radiography Test, Vendor shall notify Contractor in advance, and for such case, magnetic particle test (MT) or liquid penetrant test (PT) may be used in accordance with Para. 5.5.3 with EPCM/ Client approval.

2. For the welded parts having nominal size of 1 1/2" or below, magnetic particle test (MT) or liquid penetrant test (PT) in Para. 5.5.3 may be used.

5.5.3 Magnetic Particle Test (MT) or Liquid Penetrant Test (PT)

Pressure retaining casting parts: Applicable Material and Quantity (Refer Table- Magnetic Particle Test or Liquid Penetrant Test)

Table- Magnetic Particle Test or Liquid Penetrant Test

Materials			Test Quantity
Casting	class 900 or over	C-steel	20% of total quantity of the same type, size and rating for pressure retaining critical parts (a)
	class 600 or over	Cr-Mo steel Cr-Mo steel Stainless steel	
	class 150 or over	Al-killed steel 2.5 Ni steel 3.5 Ni steel	
Pressure Retaining Welded Parts (b)	class 150 or over	All materials	20% of total welded parts

(a) Following parts are critical parts:

- Groove-welded parts of cast body
- Flange neck and valve seat's vicinity of cast body
- Other welded parts included in pressure retaining parts

(b) Including butt groove-welded parts at site.

5.6 Pressure Test

5.6.1 Control Valve and On-Off Valve:

- Body and Bonnets : Hydrostatic test with Applicable codes and standards
- Body of Special Type : Hydrostatic test
- Test pressure : 1.5 times of max. Operating pressure / min. 2 kgcm2g
- Hold time : Minimum 5 minutes.
- Permanent distortion or Leakage : shall not be found

5.6.2 Safety Valve

a) Pressure retaining parts

- Hydrostatic test before assembling
- Test Pressure : 2.2 times of Maximum Operating Pressure.
- Hold Time: Minimum 5 minutes.
- Distortion or Leakage: Shall not be found

b) The outside parts of enclosed type

- Hydrostatic test after assembling
- Test Pressure : 1.5 times. Nominal Pressure of Flange
- Hold Time**:** Minimum 5 minutes
- Defects : Shall not be found

c) Special Type Valves

Hydrostatic test with the vendor's standards approved by EPCM/ Client, where above conditions are not applicable.

5.6.3 Pressure retaining parts of Instruments

Hydrostatic test or Pneumatic test as per applicable codes and standards.

- Test pressure : 1.5 times of Maximum Operating pressure / Minimum 2 kg/cm2 g
- Hold Time: Minimum 5 minutes
- Permanent Distortion or Leakage : Shall not be found

If the above mentioned test is technically difficult, the test shall be carried out in accordance with the vendor's standards approved by EPCM/ Client.

5.7 Pneumatic Test

Pneumatic test as per applicable codes and standards.

- Test pressure: Maximum Operating Pressure (Design pressure)
- Hold Time : Minimum 5 minutes
- Permanent Distortion or Leakage : Shall not be found

5.8 Seat Leakage Test

5.8.1 Control Valve and On-Off Valve

- Allowable leakage for control valve shall be as per ANSI B16.104 (FCI 70-2).
- Allowable leakage for on-off valve shall be as per API 598.

5.8.2 Safety Valve

Seat leakage test (closing property) as follows.

- Safety Valve for Steam:

  Test Pressure: 90% of set pressure
  Leakage: Shall not be found

- Safety Valve for Gas:

  Test Pressure: 90% of set pressure
  Allowable Leakage: As per table

Type	Orifice Area (mm)	Number of Bubbles (min)	Leakage Value (cm3/min)
General	16.0 and less 20.5 and over	40 20	11.80 5.90
Balance bellows	16.0 and less 20.5 and over	50 30	14.75 8.85

5.8.3 Relief Safety Valve, Vacuum Breaker, Breather Valve and Atmospheric Valve

For relief safety valve, vacuum breaker and atmospheric valve seat leak test shall be as per vendor's standards approved by EPCM/ Client.

5.9 Performance Test / Functional Check

For each instrument items and its accessories, performance test or functional check shall be carried out in accordance with approved ITP or FAT / SAT procedures.

5.10 Steam Test

Steam test shall be performed on valves used for steam service having temperature of 450 deg C or more, and the body ratings of class 600 and above.

Steam test shall be performed attaining the steady surface temperature same as temperature

of the service with the pressure of service condition.
In the case, when steam test has been performed and the report is submitted for the valve of same type, same bore size and material from the same lot, the steam test for the other valves may be omitted.

Body Leakage	:	Shall not be found
Seat Leakage	:	As per specified leakage value

After steam test, pressure test and seat leakage test shall be carried out.

5.11 Insulation Resistance Test

- Power supply & alarm circuit: 10M Ω or over
  (Instrument panel: 3 MΩ or over per panel)

- Signal circuit: 5M Ω or more
  (Instrument panel: 3 MΩ or over per panel)

The test shall be carried out in accordance with the applicable codes & Standards. Due to any technically constraint this test can be omitted obtaining EPCM/ Client approval.

5.12 High Voltage Test

- AC power supply and alarm circuits:
  Voltage level less than 250V AC - 1500V AC
  Voltage level 250V AC and above - 2E + 1000V AC ('E' is the rated voltage)

- DC power supply circuits: 500V AC
  Due to any technically constraint this test can be omitted obtaining EPCM/ Client approval.

5.13 PMI Test

For PMI testing requirements refer Doc. No.: 081757C001-000-PP-509, Positive Material Identification procedure attached elsewhere in contract document.

5.14 IBR Certification

IBR certifications shall be provided in the appropriate format duly signed by IBR authority or their authorized agency as applicable. IBR stands for Indian Boiler Regulation. For steam services, it is statutory obligation to meet IBR requirements.

For items under IBR, composition restrictions, test reports, painting, etc. shall be as per IBR's latest stipulations.

5.15 Cryogenic Test

For valves to be used under cryogenic conditions, Cryogenic test to be performed as per BS 6364.
Cryogenic test shall be applied for one valve of each type, size, rating after pressure test.

5.16 Fire Safe Test

1. For valves with fire safe requirement, offered valves should have type fire test certificate as per BS EN ISO10497 / API 6FA / API 607.

2. For valves with fire proof box requirement, offered fire proof boxes should have type fire test certificate as per UL1709/ASTM E1529.

3. Type testing should have been carried out/witnessed either by any recognized testing authority or test house such as Under Writers Lab, etc.

6. ATTACHMENT

Inspection and Test plan for Instrumentation Attachment-1

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INSPECTION AND TEST PLAN
FOR
INSTRUMENTATION
ATTACHMENT-1

CLIENT : Indian Oil Corporation Limited

PROJECT : BR-9 RFCC Revamp Project, Barauni

DOC NO : 081757C001-701-ITP-1500-001 Rev. B

		Inspection and Test Plan										
Sr. No.	**Kind of Instrument**	**Visual Inspection**	**Dimensional Inspection**	**Material Inspection**	**Non Destructive Examination**	**Pressure Test**	**Pneumatic Test**	**Seat Leakage Test**	**Performance Test**	**Insulation Resistance Test**	**High Voltage Test**	**Steam Test**
1	Temperature Element - Thermocouple (B)	VT TPIT T	VT TPIT T	–	–	–	–	–	TPIT TC T	TPIT TC T	TPIT TC T	–
2	Temperature Element - RTD	VT TPIT T	VT TPIT T	–	–	–	–	–	TPIT TC T	TPIT TC T	TPIT TC T	–
3	Temperature Element - Skin, Flexible, Multipoint Thermocouples	VT TPIT T	VT TPIT T	–	–	–	–	–	TPIT TC T	TPIT TC T	TPIT TC T	–
4	Temperature Gauges - Bimetallic	VT TPIT T	VT TPIT S	–	–	–	–	–	TPIT TC S	–	–	–
5	Temperature Gauges - Gas Filled or Liquid Filled	VT TPIT T	VT TPIT S	–	–	–	–	–	TPIT TC S	–	–	–
6	Thermowell	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	–	–	–	–
7	Orifice Plate	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	–	–	–	–	–	–
8	Orifice Flange Assembly	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	–	–	–	–	–	–	–
9	Restriction Orifice	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	–	–	–	–	–	–
10	Multistage - Restriction Orifice	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	–	–	–	–

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11	Flow Nozzle Low-Loss Tube	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	–	–	–	–
12	Venturi Tube	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	–	–	–	–
13	Positive Displacement Flowmeter	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–
14	Variable Area Flowmeter	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
15	Thermal Mass Flowmeter	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–
16	Turbine Flowmeter	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–
17	Averaging Pitot Tube	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	–	–	–	–
18	Electronic Transmitters (F,L,P,DP,T)	VT TPIT T	VT TPIT T	VT TPIT TC T	–	VT TPIT TC T	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
19	Magnetic Flowmeter	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–

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20	Ultrasonic Flowmeter	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–
21	Pressure Gauges	VT TPIT T	VT TPIT S	VT TPIT TC T	–	VT TPIT TC S	–	–	VT TPIT TC S	–	–	–
22	Draft Gauges	VT TPIT T	VT TPIT S	VT TPIT TC T	–	–	–	–	VT TPIT TC S	–	–	–
23	Differential Pressure Gauges	VT TPIT T	VT TPIT S	VT TPIT TC T	–	VT TPIT TC S	–	–	VT TPIT TC S	–	–	–
24	Displacer Type Level Transmitter	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC S			VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
25	Chamber for Displacer Type Level Transmitter	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	–	–	–	–
26	Level Gauges	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	–	–	–	–
27	Float & Tape Type Level Transmitter	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC S			VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
28	Purge Type Level Transmitter	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	–	–	VT TPIT TC T	–	–	–

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29	Capacitance / RF Type Level Transmitter	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
30	Conductivity Type Level Transmitter	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
31	Servo Type Level Transmitter	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
32	Radar /Guided Wave Radar Type Level Transmitter	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
33	Nucleonic Level Transmitter	VT TPIT T	VT TPIT S	VT TPIT TC T	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
34	Neutron Back Scattering Level Transmitter	VT TPIT T	VT TPIT S	VT TPIT TC T	–	–	–	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
35	Ultrasonic Level Transmitter	VT TPIT T	VT TPIT S	VT TPIT TC T	–	–	–	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
36	Control Valves	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC S		VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–
37	On-Off Valves	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC S		VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–

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38	Motor Operated Control Valves	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC S		VT TPIT TC S	VT TPIT TC S	VT TPIT TC S	VT TPIT TC S	–
39	Pressure Control Valve (Self Actuating Control Valves)	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	VT TPIT TC T	–	–	–
40	Indicator	VT TPIT T	VT TPIT T	–	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
41	Recorder Unit	VT TPIT T	VT TPIT T	–	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
42	Controller Unit	VT TPIT T	VT TPIT T	–	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
43	Integrator Unit	VT TPIT T	VT TPIT T	–	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
44	Alarm Setting Unit	VT TPIT T	VT TPIT T	–	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
45	Computing Unit	VT TPIT T	VT TPIT T	–	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
46	Converter Unit	VT TPIT T	VT TPIT T	–	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–

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47	Limiter Unit	VT TPIT T	VT TPIT T	–	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
48	Power Source Unit	VT TPIT T	VT TPIT T	–	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
49	Instrument Panel	VT TPIT T	VT TPIT S	VT TPIT S	–	VT TPIT TC T	VT TPIT TC S	–	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–
50	Instrument Desk	VT TPIT T	VT TPIT S	VT TPIT S	–	–	–	–	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–
51	Printers	VT TPIT T	VT TPIT S	–	–	–	–	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
52	Gauge Board	VT TPIT T	VT TPIT S	–	–	–	–	–	–	–	–	–
53	Safety Valves	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	VT TPIT TC S	VT TPIT TC S	–	–	–
54	Vacuum Breaker	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	VT TPIT TC S	VT TPIT TC S	–	–	–
55	Atmospheric Valve	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	VT TPIT TC S	VT TPIT TC S	–	–	–

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56	Rupture Disc	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	VT TPIT TC S	VT TPIT TC S	–	–	–
57	Breather Valve	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	VT TPIT TC S	VT TPIT TC S	–	–	–
58	PRDS / Desuperheater	VT TPIT T	VT TPIT S	VT TPIT TC T	VT TPIT TC T	VT TPIT TC S	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–
59	Gas Chromatograph	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T		VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
60	Mass Spectrometer	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T		VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
61	Infrared Type Gas Analyser	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T		VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
62	Magnetic Type Gas Analyser	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T		VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
63	Conductivity Type Analyser	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T		VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
64	Combustion Type Gas Analyser	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T		VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–

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INSPECTION AND TEST PLAN
FOR
INSTRUMENTATION
ATTACHMENT-1

CLIENT : Indian Oil Corporation Limited

PROJECT : BR-9 RFCC Revamp Project, Barauni

DOC NO : 081757C001-701-ITP-1500-001 Rev. B

		Inspection and Test Plan										
Sr. No.	**Kind of Instrument**	**Visual Inspection**	**Dimensional Inspection**	**Material Inspection**	**Non Destructive Examination**	**Pressure Test**	**Pneumatic Test**	**Seat Leakage Test**	**Performance Test**	**Insulation Resistance Test**	**High Voltage Test**	**Steam Test**
65	Density Type Gas Analyser	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
66	Photo-Electric Type Analyser	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
67	Moisture Analyser	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
68	pH Analyser	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
69	Turbidity Analyser	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T	–	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–
70	Sampling System	VT TPIT T	VT TPIT T	VT TPIT TC T	–	–	VT TPIT TC T	–	VT TPIT TC S	–	–	–
71	Flame detector	VT TPIT T	VT TPIT T	VT TPIT T	–	–	–	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
72	Coriolis Mass Flowmeter	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–
73	Vortex Flowmeter	VT TPIT T	VT TPIT T	VT TPIT TC T	VT TPIT TC T	VT TPIT TC T	–	–	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–

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INSPECTION AND TEST PLAN
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CLIENT : Indian Oil Corporation Limited

PROJECT : BR-9 RFCC Revamp Project, Barauni

DOC NO : 081757C001-701-ITP-1500-001 Rev. B

		Inspection and Test Plan										
Sr. No.	**Kind of Instrument**	**Visual Inspection**	**Dimensional Inspection**	**Material Inspection**	**Non Destructive Examination**	**Pressure Test**	**Pneumatic Test**	**Seat Leakage Test**	**Performance Test**	**Insulation Resistance Test**	**High Voltage Test**	**Steam Test**
74	Gas Detector	VT TPIT T	VT TPIT T	VT TPIT T	–	–	–	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
75	Hooters	VT TPIT T	VT TPIT T	VT TPIT T	–	–	–	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
76	Beacons	VT TPIT T	VT TPIT T	VT TPIT T	–	–	–	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
77	Manual Call Points	VT TPIT T	VT TPIT T	VT TPIT T	–	–	–	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC T	–
78	Solenoid Valves	VT TPIT T	VT TPIT S	VT TPIT S	–	–	–	–	VT TPIT TC S	VT TPIT TC T	VT TPIT TC T	–
79	Junction Boxes	VT TPIT T	VT TPIT S	VT TPIT TC S	–	–	–	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC S	–
80	Cables	VT TPIT T	VT TPIT S	VT TPIT TC S	–	–	–	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC S	–
81	Cable Glands	VT TPIT T	VT TPIT S	VT TPIT TC S	–	–	–	–	VT TPIT TC S	VT TPIT TC S	VT TPIT TC S	–

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CLIENT : Indian Oil Corporation Limited

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DOC NO : 081757C001-701-ITP-1500-001 Rev. B

		Inspection and Test Plan										
Sr. No.	**Kind of Instrument**	**Visual Inspection**	**Dimensional Inspection**	**Material Inspection**	**Non Destructive Examination**	**Pressure Test**	**Pneumatic Test**	**Seat Leakage Test**	**Performance Test**	**Insulation Resistance Test**	**High Voltage Test**	**Steam Test**
82	Cable Duct / Tray	VT TPIT T	VT TPIT S	VT TPIT TC S	–	–	–	–	VT TPIT TC S	–	–	–
83	MCT Block	VT TPIT T	VT TPIT S	VT TPIT S	–	VT TPIT TC S	VT TPIT TC S	–	VT TPIT TC S	–	–	–
84	Air Manifold	VT TPIT T	VT TPIT S	VT TPIT TC S	–	VT TPIT TC S	VT TPIT TC S	–	VT TPIT TC S	–	–	–
85	Valve Manifolds	VT TPIT T	VT TPIT S	VT TPIT TC S	–	VT TPIT TC S	VT TPIT TC S	–	VT TPIT TC S	–	–	–
86	Pipes & Pipe Fittings	VT TPIT T	VT TPIT S	VT TPIT TC S	–	VT TPIT TC S	VT TPIT TC S	–	VT TPIT TC S	–	–	–
87	Tubes & TubeFittings	VT TPIT T	VT TPIT S	VT TPIT TC S	–	VT TPIT TC S	VT TPIT TC S	–	VT TPIT TC S	–	–	–

VT: Tested by VENDOR
TPIT : Tested by VENDOR & Witnessed by TPIA and/or EPCM/ OWNER
TC : VENDOR shall submit Inspection & Test Records and Certificates
T : Total Inspection by TPIA and/or EPCM/OWNER
S : Sample Inspection by TPIA and/or EPCM/OWNER
(10% of total quantity of same type, size, range & rating subjected to minimum quantity of 10 nos.)

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INSPECTION AND TEST PLAN
FOR
INSTRUMENTATION
ATTACHMENT-1

CLIENT : Indian Oil Corporation Limited

PROJECT : BR-9 RFCC Revamp Project, Barauni

DOC NO : 081757C001-701-ITP-1500-001 Rev. B

		Inspection and Test Plan										
Sr. No.	**Kind of Instrument**	**Visual Inspection**	**Dimensional Inspection**	**Material Inspection**	**Non Destructive Examination**	**Pressure Test**	**Pneumatic Test**	**Seat Leakage Test**	**Performance Test**	**Insulation Resistance Test**	**High Voltage Test**	**Steam Test**

Notes:
1. EPCM/ Client may witness any or all testing in stages during manufacturing or at final stage before shipment.
2. Sample Inspection Quantity of 10% may be increased depending upon the performance of subject item.
3. Based on this document, Instrument / System wise detailed ITP shall be prepared and to be submitted for EPCM/ Client approval.
4. For any Instrument / System items not covered in the above table, detailed ITP shall be prepared and to be submitted for EPCM/ Client approval.
5. Certificates for Statutory Requirements to be submitted for all instruments:
Imported: Certificate from PTB / FM / BASEEFA + PESO/ DGMS
Indigeneous: Certificate from CMRS + BIS Certificate + PESO/ DGMS
IP Certificates as applicable

REV.	DATE	DESCRIPTION	PREP.	CHD.	APP.
B	14/10/2020	ISSUED FOR IMPLEMENTATION	VG	RIB	RJT
A	28/07/2020	ISSUED FOR REVIEW	VG	RIB	RJT

UNIT : **701**

PROJECT : **BR-9 RFCC Revamp Project**

LOCATION : **IOCL, BARAUNI REFINERY.**

OWNER	EPCM
IndianOil — **INDIAN OIL CORPORATION LIMITED.**	TechnipFMC — **TECHNIP INDIA LTD. NOIDA, INDIA.**

INSPECTION AND TEST PLAN
FOR
CONTROL VALVES

Document Category	*Document Review Status (by Client)*
(Use "X" Mark) ☐ Approval ☒ Review ☐ Information	

Pages modified under this revision: 2, 3

Rev	Date DD/MM/YYYY	STATUS	WRITTEN BY (name & visa)	CHECKED BY (name & visa)	APPROVED BY (name & visa)
B	18/02/2021	Issued For Enquiry	VG	RIB	RJT
A	19/11/2020	Issued For Enquiry	VG	RIB	RJT

DOCUMENT REVISIONS

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INSPECTION AND TEST PLAN
FOR
CONTROL VALVES

CLIENT : Indian Oil Corporation Limited

PROJECT : BR-9 RFCC Revamp Project, Barauni Refinery

DOC NO : 081757C001-701-ITP-1541-001

SL. NO.	STAGE DESCRIPTION	TYPE OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	VERIFYING DOCUMENT	INSPECTION BY			RECORD	REMARKS
						MANUFACTURER	THIRD PARTY INSPECTION AGENCY	IOCL/ TECHNIPFMC		
1	Review of MTC for Raw Material & Bought out items	Review of Material Test Certificate	Purchase Requisition/ Approved Data Sheet	Purchase Requisition/ Approved Data Sheet	Material Certificate EN10204-3.1	H	R		OR	NDT requirements to be complied
2	Hydrostatic test	Bench Hydrostatic test of Valve	Purchase Requisition/ Applicable Code / Approved data sheet	No leakage through Body & Bonnet	Test Report	H	R		OR	
3	Seat leakage test of valves	Seat leakage test of valves	Purchase Requisition/ Applicable Code / Approved data sheet	Purchase Requisition/ Approved data sheet	Test Report	H	W		OR	100% of each type & size to be witnessed during Final Inspection.
4	Actuator leakage test	Actuator leakage test	Approved drgs/Data sheet	Approved drgs/Data sheet	Test Report	H	R		OR	Actuator leak test shall be carried out at the pneumatic design pressure of the actuator assembly.
5	Calibration Test	Functional Check (Stroke Check, Opening/Closing Time Check etc.)	Approved Datasheet	Approved Datasheet	Calibration Report	H	W		OR	
6	Operational check for Accessories	Operational check for Accessories (Positioner, switch check,etc.)	Purchase Requisition/ Applroved Data Sheet	Smooth Operation	Test Report	H	W		OR	
7	Visual & Dimensional inspection	Visual & Dimensional inspection	Purchase Requisition/ Approved Datasheet/ Drawings	Purchase Requisition/ Approved Datasheet/ Drawings	Inspection Report	H	W		OR	
8	Positive Material Identification (if applicable)	PMI of all SS/AS Body and Bonnet	Purchase Requisition	Applicable material code	PMI Report	H	W		OR	
B 9	Intergranular Corrosion Test	IGC Test for SS Material	Purchase Requisition/ Applicable Code	Purchase Requisition/ Applicable code	IGC Test Reports	H	W		OR	
10	Statutory Certificate	Hazardous Area Certificates etc.	Purchase Requisition/ Data sheet	Purchase Requisition/ Data sheet	Statutory Certificate	H	R		OR	Certificates for Statutory Requirements to be submitted: **Imported:** Certificate from PTB / FM / BASEEFA + PESO/ DGMS **Indigenous:** Certificate from CMRS + BIS Certificate + PESO/ DGMS IP Certificates as applicable
11	Inspection of accessories and spares	Review of Manufacturers test certificates and verification of Name Plate/ Tag Plate	Purchase Requisition / Approved drgs	Purchase Requisition / Approved drgs	Inspection Report / Test Certificate	H	W		OR	Manufacturers certificates for all accessories and spares to be reviewed by TechnipFMC.
12	Examination of painting / coating	Verification of painting spec and random check of DFT	Purchase Requisition / Painting Spec.	Purchase Requisition / Painting Spec.	Inspection Report	H	W		OR	

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INSPECTION AND TEST PLAN
FOR
CONTROL VALVES

CLIENT : Indian Oil Corporation Limited

PROJECT : BR-9 RFCC Revamp Project, Barauni Refinery

DOC NO : 081757C001-701-ITP-1541-001

SL. NO.	STAGE DESCRIPTION	TYPE OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	VERIFYING DOCUMENT	INSPECTION BY			RECORD	REMARKS
						MANUFACTURER	THIRD PARTY INSPECTION AGENCY	IOCL/ TECHNIPFMC		
13	Completeness Verification	BOM verification including Bulk items	Purchase Requisition / Approved BOM	Full compliance to Purchase Requisition/ Approved BOM	Verification Report	H	H		OR	
14	Preservation & Packing	Preservation & Packing	Purchase Requisition/ Approved Procedure	Full compliance to Purchase Requisition	Preservation Report and Packing list	H	R		OR	Check of lifting arrangement, cleanliness, protection, marking, name plate, packing condition and quantity. Packing lists to be reviewed.
15	Inspection Record Book	Review of Inspection Record Book	Purchase Requisition	Full compliance to Purchase Requisition	Inspection Book	H	R		OR	
16	Final Inspection	Issue of Release Note	Purchase Requisition	Confirmation of completion of all required inspection	Inspection Record Book	H	H		OR	Spares to be mentioned in inspection release note

Notes

1) Requirements of Purchase Requisition shall govern, wherever more stringent than this QAP
2) The performance test of the valve shall necessarily include actuator thrust measurement, inclusive of verification of safety factor considered in actuator sizing.
3) All the requirements of the Purchase requisition specifically with respect to material, NDT testing to be fully complied.
4) All relevant test standards are applicable for Control Valves.
5) Manufacturer/ Vendor shall perform all specified and applicable testing on 100% items and TPIA/ Client/EPCM shall be involved in witness 100% items.
6) This is tentative ITP and mentioned tests are the minimum required test for given Instrumentation item .
   However, supplier to evaluate the need of additional tests based on the specific process service or conditions.
7) Client/EPCM comments, if any, shall be intimated and vendor to follow the same during inspection.
8) Please refer document no- 081757C001-701-ITP-1500-001 (Inspection and Test Requirements for Instrumentation) along with this document.
9) Please refer these documents - 081757C001-701-ITP-1350-001 (ITP for Flanges), 081757C001-701-ITP-1360-001 (ITP for Gaskets)
   & 081757C001-701-ITP-1370-001 (ITP for Fasteners) also

B

LEGEND: H - HOLD POINT; W - WITNESS; IW - INITIAL WITNESS;
R - REVIEW OF DOCUMENTS; S - SURVEILLANCE;
OR - OFFICIAL RECORD; IR - INTERNAL RECORD;

REF DOC.: QUALITY CONTROL SURVEILLANCE (QCS) REQUIREMENTS FOR SUPPLIERS
(Doc No.081757C001-000-PP-502)

DATE	REV.	PREP.	CHD.	APP.	DESCRIPTION
18/02/2021	B	VG	RIB	RJT	Issued For Enquiry
19/11/2020	A	VG	RIB	RJT	Issued For Enquiry

PROJECT : **BR-9 RFCC Revamp Project**

LOCATION : **IOCL, BARAUNI REFINERY.**

OWNER	EPCM
INDIAN OIL CORPORATION LIMITED.	

SPECIFICATION FOR POSITIVE MATERIAL IDENTIFICATION (PMI)

Document Category	*Document Review Status (by Client)*
(Use "X" Mark) ☐ Approval ☐ Review ☒ Information	

Page modified under this revision: 7 of 10.

Rev	Date DD/MM/YYYY	STATUS	WRITTEN BY (name & visa)	CHECKED BY (name & visa)	APPROVED BY (name & visa)
01	11/08/2020	ISSUED FOR IMPLEMENTATION	STSA	VKY	DEK
00	31/07/2020	ISSUED FOR IMPLEMENTATION	STSA	VKY	DEK

DOCUMENT REVISIONS

TABLE OF CONTENTS

1 SCOPE

1.1 This specification defines the minimum mandatory requirements for Positive Material Identification (PMI) of metallic materials. It is intended to ensure that the nominal composition of the metallic component and associated welds have been correctly supplied and installed, as specified.

1.2 This specification is applicable for PMI examination to be performed at the Supplier's/Manufacturer's works and Sub-supplier's works before dispatch of materials. This specification is also applicable to Site for field fabrication.

1.3 This specification shall apply to both new and repair or replacement of metallic component and associated welds.

1.4 This specification covers the procedures, methodology, instrument/analyzer to be used, calibration, extent of examination, acceptance criteria, rejection procedure & marking etc.

2 DEFINITIONS

2.1 **Alloy Material:** Any metallic material (including welding filler materials) that contains alloying elements such as Chromium, Nickel, Molybdenum or Vanadium, etc., which are intentionally added to enhance mechanical or physical properties and/or corrosion resistance. Alloy may be ferrous or non-ferrous.

2.2 **Inspection Lot:** A group of items or material of the same type from a common source offered for inspection covered under same size, Heat and Heat treatment lot.

2.3 **Lot size:** The number of items available in the inspection lot at the time a representative sample is selected.

2.4 **Owner/User:** Indian Oil Corporation Ltd. (IOCL).

2.5 **EPCM:** Here EPCM is "Technip India Ltd."

2.6 **Positive Material Identification (PMI):** A physical evaluation or test of a material performed to confirm that the material which has been, or will be placed into service is consistent with what is specified by the owner/user. These evaluations or tests may provide either qualitative or quantitative information that is sufficient to verify the composition.

2.7 **Random:** Selection process by which choices are made in an arbitrary and unbiased manner.

2.8 **Representative sample:** One or more items selected at random from the inspection lot that are to be examined to determine acceptability of the inspection lot.

2.9 **DCI:** Document Control Index, list of documents, as agreed with the contractor/supplier, indicating the documents requiring approval from PMC/OWNER, or submission for information of PMC/OWNER, ,or those requiring no formal submission to PMC/OWNER.

2.10 **Supplier/Manufacturer:** Any Supplier or Manufacturer on whom an order is placed for the supply of referred items. This definition shall also include any sub-Supplier or manufacturer on whom a sub-order is placed by the Supplier.

3 ACCEPTABLE METHODS FOR PMI

3.1 The method used for PMI examination shall provide a quantitative determination of the alloying elements like chromium, nickel, vanadium etc. in metallic alloy materials.

3.2 Instruments or methods used for PMI examination shall be able to provide quantitative, recordable, element composition results for positive material identification of alloying elements present.

3.3 The acceptable instruments for alloy analyser shall be either " Portable X-Ray Fluorescence " or " Optical Emission " type capable of verifying the percentage of alloy elements within specified range. The following methods / instruments are acceptable; - Portable X-Ray Fluorescence Analysers TN Technologies Alloy Analyser 9266, 9277 (The Metallurgist XR) or Metallurgist Pro, Metorex-X-MET 880, X-MET 960 or X-MET 2000, X-MET 5000, X-MET 5100, INNOVX – DELTA CLASSIC, DELTA PREMIUM, NITON – XL2T, XL2 800, XL 3T, XL 3T GOLDD. - Portable Optical Emission Analyser Spectro Port Model TP-07 or TFO-02, Spectro Test F, Metorex ARC-MET 900 or ARC-MET 930 - Similar Equipment may be used.

3.4 Chemical Spot Testing, Magnets, Alloy Sorters and other methods using eddy current testing methods are not acceptable for PMI examination.

3.5 The PMI instrument used shall have the sensitivity to detect the alloying elements in the specified range.

3.6 All PMI instruments shall have been serviced within a 6 months period of time of use to verify the suitability of batteries, sources etc. The data of last service shall be stated on the PMI Report.

3.7 Each analyzer must be calibrated according to the manufacturer's specification at the beginning and end of each shift. Instrument must be checked against known standard for each alloy type to be inspected during the shift.

3.8 Certified samples with full traceability of a known alloy material shall be available for use as a random check on instrument calibration.

3.9 The surface to be examined shall be prepared by light grinding or abrasive paper and solvent cleaner. Evidence of arc burn resulting from examination shall be removed by light grinding or abrasive paper.

3.10 No permanent marks, which are injurious to the usage of product in service, are acceptable.

3.11 RTJ Gaskets of alloy material shall be inspected by using portable X-Ray Fluorescent instrument.

3.12 Testing shall be done as per procedure outlined by the manufacturer of alloy analyser being used. Modification of these procedures must be approved by manufacturer of the alloy analyser.

3.13 The persons performing PMI shall demonstrate their capabilities to the satisfaction of visiting inspector. If the vendor has qualified operator on their rolls, he may perform the examination. Otherwise PMI examination shall be sub – contracted to an independent agency approved by PMC/ Owner.

4 EXTENT OF PMI EXAMINATION

4.1 PMI check shall be done at all three stages for fabrication jobs:

a) At Sub – Vendor Shop.
b) After receipt at Shop.
c) Final Stage before Hydro.

4.2 Following sampling plan in table 1 shall be applicable for PMI examination of various alloy material items: -

TABLE 1 – EXTENT OF PMI EXAMINATION	
Material	**Extent of Examination**
Piping	
Pipe including alloy lined/clad pipe	100 %
Flange/Forging	100 %
Fitting including clad fitting	100 %
Valves	100 %
Expansion Joints and special items	100 %
Pressure Vessel	
Shell	100 %
Heads	100 %
Nozzles	100 %
Flanges	100 %
Fittings	100 %
Alloy lined or Clad component	Min. 1 spot per component
All parts wetted with service fluid	100 %
All Non-pressure, Non-wetted components	Min. Two (2 Nos.) random samples drawn from each Size/Heat/Lot
Heat Exchanger, Heaters & Boilers	
Shell	100 %
Heads	100 %
Nozzles	100 %
Flanges/Forgings	100 %
Fittings	100 %
Tubes	100 %
Tube Sheet	100 %
Expansion Bellows	100 %
Alloy lined or Clad component	100 %
Baffle, Tie rods, Sealing strips etc.	Min. Two (2 Nos.) random samples drawn from each Size/Heat/Lot
All Non-pressure, Non-wetted components	Min. Two (2 Nos.) random samples drawn from each Size/Heat/Lot
Rotating Equipment	
Casing	100 %
Cylinder	100 %
Piston	100 %
Shaft/crank shaft	100 %
Impeller	100 %
All wetted parts with service fluid	100 %
All Non-pressure, Non-wetted components	Min. Two (2 Nos.) random samples drawn from each Size/Heat/Lot
Package	
All Pressure parts	100 %
Orifice Plate	100 %
All non-pressure parts	Min. Two (2 Nos.) random samples drawn from each Size/Heat/Lot

<table>
<tr><th>Material</th><th>Extent of Examination</th></tr>
<tr><td colspan="2">Table 1 contd.</td></tr>
<tr><td colspan="2">Instrumentation</td></tr>
<tr><td>Control Valve</td><td>100 %</td></tr>
<tr><td>Safety Valve</td><td>100 %</td></tr>
<tr><td>Valve Trim</td><td>100 %</td></tr>
<tr><td>All types of Gauges and Transmitters</td><td>100 %</td></tr>
<tr><td>Thermowell</td><td>100 %</td></tr>
<tr><td>Thermocouples</td><td>100 %</td></tr>
<tr><td colspan="2">Bulk material including Spares</td></tr>
<tr><td>Fasteners/ Bolting</td><td>For Flange Rating Classes >= 900 – 100%.
For Flange Rating Classes < 900 – Sample as per Table 2 below.
Valve Bonnet bolting for Flange rating classes >= 900 – 100%.
Valve Bonnet bolting for Flange rating classes < 900 – Sample as per Table 2 below.
<table>
<tr><td colspan="2">Table 2</td></tr>
<tr><td>Number of units in a lot</td><td>Representative Sample</td></tr>
<tr><td>1 - 5</td><td>100%</td></tr>
<tr><td>6 - 199</td><td>5 Units or 5%, whichever is greater</td></tr>
<tr><td>>= 200</td><td>10 Units or 3% whichever is greater.</td></tr>
<tr><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>RTJ Gaskets</td><td>100%</td></tr>
<tr><td>Solid metal or jacketed metallic gaskets for flange rating classes >= 900</td><td>100%</td></tr>
<tr><td colspan="2">Welding</td></tr>
<tr><td>Pressure retaining welds (Circumferential welds, including valve body to flange and valve body to bonnet welds, Longitudinal Welds)</td><td>Each Weld, with 1 test per weld seam for automatic and semi-automatic welding processes, and 1 test per weld seam 1 test per 450 mm weld length thereafter for manual welding processes. (Note 3)</td></tr>
<tr><td>Repair Welds</td><td>1 test on excavated weld to ensure incorrect material fully removed; thereafter 1 test per 450 mm repair weld length.</td></tr>
<tr><td>Weld overlay</td><td>Min. Two (2 Nos.) random spot on each weld overlaid component</td></tr>
<tr><td>Welding Consumable</td><td>Min. one (1 No.) random consumable/classification/Lot</td></tr>
</table>

Notes: -

1) For welded pipes and fittings, PMI shall be performed on base metal as well as weldments.
2) Whenever any sample drawn to PMI test on the basis of percentage selection above, fails to meet specification requirements, 100% of items of lot shall be tested for PMI.
3) For all welds, PMI shall be performed on the completed weld capping pass (both internal and external, where access permits) and the base material on either side.
4) If all units of the representative sample are acceptable, the inspection lot shall be acceptable.

5 ACCEPTANCE CRITERIA 1

5.1 Materials tested by an approved analysis method shall contain the amounts of alloying elements specified in the requisite material grade / Material specification

5.2 Elements to be determined during PMI shall be as per Table 3.

6 REJECTION PROCEDURE

6.1 If the PMI testing results fall outside the acceptable range as defined in cl. 5, below shall be complied:

a. NCR shall be issued by the concerned inspector to determine the root cause, corrective and preventive actions.

b. Replacement of the part/component which failed the PMI examination shall be replaced at Supplier's/Contractor's own cost.

c. After written approval by the PMC/Owner, the part which failed the PMI examination may be sent to an independent laboratory, for conducting detailed chemical analysis, at Supplier's/Contractor's own expense in a time bound manner (say within 15 days of rejection). The independent testing lab shall be accredited to respective suppliers country's statutory calibration body.

6.2 If any unit from the representative sample is found to be unacceptable, the remainder of the lot shall be examined 100%. If the remainder of the lot is found acceptable, the sampling technique in Table 2 shall be resumed. The unacceptable unit(s) shall be replaced and the replacements examined 100%.

6.3 If a lot is found unacceptable, the next two lots, of the same material product and from the same source shall be examined 100%. If both lots are acceptable, the sampling technique in table 2 shall be resumed.

6.4 If any of the lots examined in (6.3) above is found unacceptable, the remaining material product from the same source shall be examined 100%. Any unacceptable unit(s) shall be replaced and the replacements examined 100%.

6.5 When the material markings are incomplete, preventing positive correlation between the material requisition, purchase order and a material test certificate, the material shall be rejected.

6.6 If any component or weld is found unacceptable, supplier will replace it on his own cost and the replacement shall be verified in accordance with this specification.

6.7 There should be a proper procedure to ensure that rejected components are segregated and properly identified to prevent reuse.

7 MARKING

All alloy materials tested by PMI shall be identified using following methods:

A) Bar Code/Hologram Sticker
B) A low stress stamp marking
C) Vibro-etching
D) Color Coding

7.1 All verified materials with an acceptable method shall be marked with "PMI" using one of the above methods A,B & C. For all material having thickness less than 6 mm for ferrous material and less than 13 mm for non- ferrous material shall be marked by Bar Code/Hologram Sticker or Vibro-etching only.

7.2 All components and welds that are found unacceptable shall be marked (by method D) immediately with red color "X" or "R" , rejected, removed and segregated from the lot.

7.3 When heat treatment is performed after PMI, the identification marking must be recognizable after heat treatment also.

8 RECORDING AND DOCUMENTATION

8.1 The Result of PMI examination to be recorded in a Report Format (suggestive) enclosed with this procedure.

TABLE – 3: ELEMENTS TO BE DETERMINED DURING PMI

MATERIALS (Note – 1)	ELEMENTS TO BE DETERMINED
1 Cr - 0.5 Mo	Cr, Mo
1.25 Cr - 0.5 Mo	Cr, Mo
2.25 Cr - 1 Mo	Cr, Mo
5 Cr - 0.5 Mo	Cr, Mo
9 Cr - 1 Mo	Cr, Mo, V
12 Cr (Type 410S/405)	Cr
12 Cr	Cr
17 Cr	Cr
304 (L)	Cr, Ni, Mo, Nb (Cb), Ti
310	Cr, Ni, Mo, Nb (Cb), Ti
309 (L)	Cr, Ni, Mo, Nb (Cb), Ti
309 Nb	Cr, Ni, Mo, Nb (Cb), Ti
316 (L)	Cr, Ni, Mo, Nb (Cb), Ti
321	Cr, Ni, Nb (Cb), Ti
347	Cr, Ni, Nb (Cb), Ti
Inconel 182/82	Ni, Cr
Inconel 625	Ni, Cr, Mo, Nb (Cb) + Ta, Ti
Inconel 600	Ni, Cr
Incoloy 800	Cr, Ni, Al, Ti, Cu
Incoloy 825	Cr, Ni, Mo, Ti
Admiralty Brass	Cu, Sn, As
Aluminium Brass	Cu, Al, Zn
Cupro-nickel (70-30)	Cu, Ni
Cupro-nickel (90-10)	Cu, Ni
Monel 400	Cu, Ni
Titanium	Ti

Note: (1) List of Material is not exhaustive, and shall not be construed as limiting the alloy materials subject to PMI.

SUGGESTIVE REPORT FORMAT

POSITIVE MATERIAL IDENTIFICATION REPORT BULK MATERIALS							Page of
Project:	Client						Job No.
PMI Report No.	Supplier/Sub-Supplier						
Purchase Order No.	Testing Agency						
Purchase Requisition No:	Place of Inspection:						
Bulk Item Type (as per Requisition)							
Material Specification/Grade Number of items in Lot							
Requisition Item no. / Description	Major content, Weight Percent						Remarks Accept/Reject
Element	Cr	Ni	Mo	V	Ti	Cb / Nb	
Specified Range							
Actual observations 1.							
2.							
3.							
4.							
5.							
6.							
Instrument Type / ID Calibration standard block ID Last Service Date	Inspection Agency						Witnessed By

Note: Elements can be changed based upon the Material to be check.

SPECIAL CONTRACT CONDITIONS (SCC)
FOR ENQUIRY NO. D6A1V97666 DATED 11.03.2022

S NO	TERMS & CONDITIONS	BHEL REQUIREMENT	VENDOR 'S CONFIRMATION
I	**TECHNICAL TERMS**		
1	DESCRIPTION, SIZE & QUANTITY	<table><tr><th>Material Code</th><th>Description</th><th>Quantity</th></tr><tr><td>TC9765632169</td><td>UPSTREAM PRESSURE CONTROL VALVE</td><td>1 No.</td></tr><tr><td>TC9765632185</td><td>DOWNSTREAM PRESSURE CONTROL VALVE</td><td>1 No.</td></tr><tr><td>TC9765632177</td><td>USPCV - SPARES</td><td>1 Set</td></tr><tr><td>TC9765632193</td><td>DSPCV - SPARES</td><td>1 Set</td></tr></table>	
2	SPECIFICATION	Confirm complete compliance to BHEL Specification and submit duly filled in signed and stamped BHEL Spec.No: TC65632 Rev.1.	
3	DOCUMENT APPROVAL PROCESS	Vendor shall submit Drawings, Data Sheets, Quality Plan and Endorsement sheet, if any, for BHEL / BHEL End customer approval within 7 days of PO Receipt. BHEL shall revert with comments/approval within 10 days of document submission.	
4	INSPECTION & CERTIFICATION	**For Indian Vendors:** By BHEL TPIA (OR) BHEL TPIA and End Customer/Customer TPIA jointly as per Approved Quality Plan. **Note:** (a) Vendors are advised to raise Inspection Call in CQIR system (www.cqir.bhel.in) with Purchasing Unit as 'HPEP' at least 3 working days prior to the proposed date of inspection. (b) Advance intimation of 7 days shall be provided for arranging end customer inspection.	
		For Foreign Bidders: By Lloyd's/TUV/BV/DNV (Overseas Inspection Agency) / Customer as per Approved Quality Plan.	
5	PTR	Vendor shall submit credentials and PTR for review by BHEL Customer.	
II	**COMMERCIAL TERMS**		
1	TERMS OF DELIVERY	FOR BHEL RC Puram for Indian vendors	
		CIP Mumbai for Foreign vendors	
1A	FOR BHEL Price / Delivery implies	a) Freight & Insurance are in vendor's scope and price quoted is inclusive of F&I.	
		b) C-Note date or Date of submission of documents whichever is later shall be considered as delivery date incase documents are not submitted within 10 days from the dispatch of the material.	
1B	CIP Mumbai price / delivery implies (for Foreign suppliers)	a) As per Incoterm.	
		b) IGM date in Bill of Entry issued by customs shall be delivery date for the purpose of penalty.	
		c) Exchange rate for Foreign Currency to INR shall be as per SBI Exchange rate (TT Selling rate) as on Technical Bid Opening date. If the relevant day happens to be a bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken.	
2	PACKING & FORWARDING	P & F charges shall be inclusive in price.	
3	FRIEGHT & INSURANCE	By supplier up to delivery point.	

4	Third Party Inspection & Certification Charges	**For Indian Bidders:** By BHEL and vendor's offer will be loaded by appropriate percentage for evaluation of offers. Currently it is 0.26%.	
		For Foreign Bidders: Shall be inclusive in quoted price.	
5	DELIVERY	Within 16 Weeks from PO date.	
		Note: For any deviation in delivery period for each item and schedule as indicated above, quoted price shall be loaded by 0.5% per week for evaluation of offer. However, BHEL reserves the right to reject the offers with delivery period not meeting the project requirement.	
6	MSE CLAUSE	"MSE suppliers can avail the intended benefits only if they submit along with the offer, Udyam Registration Certificate. Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through E-Procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted Officer."	
7	TWO-PART BID	Offer shall be submitted in two part bid system thru' EPS. Part-I shall consists of Techno-Commercial bid with all required documents and Price shall be fed in Part-II (in BOQ format).	
7A	TECHNO-COMMERCIAL BID	Techno-Commercial Bid shall essentially consist of: (i) Duly filled in signed and stamped Special Contract Conditions (SCC). (ii) Duly filled in signed and stamped Instructions to Bidder (ITB). (iii) Duly filled in signed and stamped Pre-Qualification Criteria (PQC) along with its Annexure and supporting documents for qualification. (iv) Udyam Registration Certificate for MSE vendors (v) Local Content Certificate (Annexure-III), if applicable. (vi) Documents/declarations in compliance with Annexure-A,B (if applicable) (vii) Details as per Annexure-IV, if applicable (viii) Duly filled in Annexure-II (Non-Disclosure agreement) **Note:** Bid shall be complete in all respects including all the documents / information required for techno-commercial evaluation. Incomplete offers shall be liable to rejection.	
7B	PRICE BID	Quoted price shall be on firm basis. Vendor shall quote on prices strictly as per BOQ format.	
8	EVALUATION OF OFFERS	Offers shall be evaluated on individual overall L1 basis.	

9	GUIDELINES REGARDING DEALINGS WITH INDIAN AGENTS OF FOREIGN SUPPLIERS	It shall be incumbent on the Indian agent and the foreign principal to adhere to the relevant guidelines of Government of India, issued from time to time.	
		The Agency Agreement should specify the precise relationship between the foreign OEM / foreign principal and their Indian agent and their mutual interest in the business. All services to be rendered by agent/ associate, whether of general nature or in relation to the particular contract, must be clearly stated by the foreign supplier/ Indian agent. Any payment, which the agent or associate receives in India or abroad from the OEM, whether as commission or as a general retainer fee should be brought on record in the Agreement and be made explicit in order to ensure compliance to laws of the country.	
		Any agency commission to be paid by BHEL to the Indian agent shall be in Indian currency only.	
		Tax deduction at source is applicable to the agency commission paid to the Indian agent as per the prevailing rules.	
		In the absence of any agency agreement, BHEL shall not deal with any Indian agent (authorized representatives / associate / consultant, or by whatever name called) and shall deal directly with the foreign principal only for all correspondence and business purposes.	
		The "Guidelines for Indian Agents of Foreign Suppliers" enclosed at annexure –'A' shall apply in all such cases.	
		The supply and execution of the Purchase Order (including indigenous supplies/ service) shall be in the scope of the OEM/ foreign principal. The OEM/ foreign principal should submit their offer inclusive of all indigenous supplies/ services and evaluation will be based on 'total cost to BHEL'. In case OEM/ foreign principal recommends placement of order(s) towards indigenous portion of supplies/ services on Indian supplier(s)/ agent on their behalf, the credentials/ capacity/ capability of the Indian supplier(s)/ agent to make the supplies/ services shall be checked by BHEL as per the extant guidelines, before opening of price bids. In this regard, details may be checked as per Annexure-B (copy enclosed). It will be the responsibility of the OEM/ foreign principal to get acquainted with the evaluation requirements of Indian supplier/ agent as per SEARP available on www.bhel.com.	
		As per directives of CENTRAL VIGILANCE COMMISSION, GOVERNMENT OF INDIA, one agent can not represent two or more suppliers or quote on their behalf in a particular tender. If so found at any stage, BHEL Hyderabad is likely to cancel Enquiries / POs to such suppliers. Further, such Indian Agent is likely to be de-listed (Black listed for business from BHEL).	
10	GUARANTEE	Guarantee on the supplies for a period of 18 months from the date of dispatch or 12 months from the date of commissioning whichever is earlier.	

11	EARNEST MONEY DEPOSIT (EMD)	EMD charges not applicable for quoting against this tender.	
12	FINANCIAL STANDING	**Indian Bidders:** Vendor to submit annual Financial Turnover during the Past 3 Years along with copy of 3 years Audited Balance Sheet.	
		Foreign Bidders: Vendor to submit copy of latest D&B Report.	
13	PURCHASE PREFERENCE TO MSE SUPPLIER	If MSEs quoted price is within the price band of L1+15%, then L1 price shall be counter-offered to MSE vendor (if L1 is other than MSE) for supplying at least 25% of tendered value as per MSME Order dated 09.11.2018. In present case, full quantity shall be counter offered to MSE vendors whose price is within purchase preference of 15%.	
14	TERMS & CONDITIONS	Vendor is requested to furnish all details of the offer in this format. **In case of any discrepancy between information furnished here and those furnished elsewhere in the bid, the information furnished in this document only shall be considered, and those furnished else where shall be ignored.**	

(Attachment to Enquiry No. D6A1V97666 Due on Date 04.04.2022 for submission by 11.00 hrs to open from 14:00 hrs.)

INSTRUCTIONS TO BIDDER (ITB)

NOTE: Bidder to confirm in affirmative by typing "YES" or "Applicable Data" in the response column. Deviations , if any shall be recorded in deviations/comments column (Separate sheet can be attached if needed). Non-Deviatable clauses are indicated as "Non-Deviatable".

S. No.	DETAILED TERMS & CONDITIONS	VENDOR RESPONSE (YES/NO)	DEVIATIONS / COMMENT
1	**SCOPE OF SUPPLY:**		
	Signed & Sealed offers are invited for the Scope of Supply of goods and Services or both as detailed in the enquiry. Relevant enclosures/supporting documents / catalogue, if any shall be enclosed to the technical offer. Bidder can also submit offer through email at their own risk. The offer is to be submitted in two parts. Technical offer to be submitted to mail ID technicalbid_hyd@bhel.in, and price bid to be submitted to mail ID pricebid_hyd@bhel.in as an attachment only. Interchanging the information in the mails may lead to rejection of the offer. Supplier shall have no claim on e-mail offers sent on any other e-mail ID. In case of e-mail offers, the mail subject should contain Enquiry No. Due date and Supplier name,Supplier address including contact details shall be mentioned in the content of the mail. Without these details offer is liable for rejection.		
2	**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 / Hindi. All Pages of Techno Commercial Bids (Main Pages), ITB should be signed and Stamped. If there is a conflict in case of bilingual submission, the submission in English will be final.		**Non-Deviatable**
B	In case of Single-Part bid Tender, the complete bid shall be submitted in a single sealed cover super subscribing the Tender number and due date. Incomplete offers are liable for rejection. E mail bids shall be sent to mail ID pricebid_hyd@bhel.in as an attachment only.		**Non-Deviatable**
C	Bidders to please note that the Terms & conditions contained in this document and Special conditions, if any, are to be read fully before submission of quotations.		**Non-Deviatable**
D	Vendors are advised to comply with specific conditions of the enquiry, 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 or load the bid suitably for evaluation.		**Non-Deviatable**
E	Offers shall be submitted directly, only by the vendor or by their authorized representative / agent and the offer should be in line with the regulatory guidelines (i.e A valid Agency agreement between principal vendor and agent / representative shall be attached and the agreement shall cover the scope of services rendered by Agent, Agency Commission and any other information called for as per the regulatory guidelines). OEM / Mill details shall be provided if supplier is not a manufacturer. Bid envelops shall bear the name of Supplier. In case of submission through authorized representative/agent, the name of representative/agent should also be mentioned apart from supplier name.		**Non-Deviatable**
F	Offer received after the specified time and date of submission shall be rejected. No further correspondence shall be entertained.		**Non-Deviatable**
G	Unsolicited offers shall not be considered.		**Non-Deviatable**
3	**OTHER PARTICULARS (Please indicate applicable data)**		
A	Name of the Bid currency (freely tradable foreign currency for imports and Indian Rupees for indigenous purchase).		
B	Name of the Port of loading and Port of Discharge (applicable to imports).		
4	**BID SUBMISSION PROCEDURE:**		
A.	**For Single Part Bids:** Offers addressed to DGM/CMM, Vendor Complex, BHEL, Hyderabad must be sent in a sealed cover on which tender enquiry number and the due date shall be super subscribed and sent by appropriate mode to above address or dropped in tender box located at vendor complex on or before the specified time and date of submission of offers, preferably in the bidder's envelope. For e-mail offers please follow the procedure mentioned in 2 (B).		**Non-Deviatable**

Vendor's Signature with Seal

(Attachment to Enquiry No. D6A1V97666 Due on Date 04.04.2022 for submission by 11.00 hrs to open from 14:00 hrs.)			
INSTRUCTIONS TO BIDDER (ITB)			
S. No.	**DETAILED TERMS & CONDITIONS**	**VENDOR RESPONSE (YES/NO)**	**DEVIATIONS / COMMENT**
B.	**For two-Part Bids:**		
i	**Two part bid consisting of** i) Techno-commercial Bid - (Part-I), with all technical specification & scope including bill of material etc., EMD (where applicable) and unpriced bid with all applicable Commercial Terms and Conditions, rates of agency commission , duties, taxes and other charges, except the price, super scribing enquiry No. (Techno-Commercial Bid) and due date Signed and Stamped ITB and special conditions of contract, if any is required to be attached along with Techno-commercial Bid - (Part-1) AND ii) Price Bid (Part-II), containing ONLY the price (including agency commission, if any) and the applicable duties/taxes/other charges shall be kept in a separate sealed cover super subscribing Enquiry no. (Price bid) & due date. Both these covers shall be kept in a Third cover super subscribing Enquiry no. & due date. All techno commercial terms & conditions mutually agreed prior to price bid opening shall prevail and supersede any terms and conditions specified otherwise in price bid.		**Non-Deviatable**
ii	Techno-commercial Bid will be opened on the assigned date .Only the price bids of vendors whose techno commercial bids are accepted will be opened later on a specified date.		**Non-Deviatable**
iii	The bidders whose bids are techno commercially not accepted will be informed & EMD (Earnest Money Deposit) shall be returned wherever submitted.		
iv	Bidders will be allowed to submit the impact on their quoted prices due to changes in technical scope, specifications, and commercial terms/conditions as specified in NIT which in the opinion of BHEL warrant changes in prices.		**Non-Deviatable**
v	Bids shall be opened on due time and date in the presence of bidders who may like to be present. Only one representative of each bidder shall be permitted to attend the bid opening.		**Non-Deviatable**
5	**Delivery Instructions**		
A	Indigenous Purchase		
	Goods shall be delivered on FOR Destination basis to the named destination(s) or as specified in the enquiry, Insurance in the scope of supplier.		
B.	Imports		
	The goods shall be delivered on CIP-basis to port of discharge as mentioned in the purchase order.		
6	**Documentation:**		
A	Indigenous Purchase		
	Seller shall arrange to send to BHEL, Hyderabad along with all the required documents as detailed in Purchase Order, such as, Tax Invoice (Original for Recipient, Duplicate for Transporter), consignee copy of LR, Packing list , Pre-dispatch Inspection report, Test/ Guarantee/ Warranty certificate/ O&M manuals (as applicable) etc. immediately on dispatch of the goods. Any addition/ exclusion to such documents shall be as specified in the Purchase Order. In case of dispatches from vendor works to site, material receipt certified by site office / Customer shall be provided. Softcopies of the above documents shall be uploaded in Pradan portal **https://web.bhelhyd.co.in/mm/** immediately after dispatch of the material.		**Non-Deviatable**
B	Imports		
	i) Seller shall inform the purchaser the readiness of material along with packing details well in 30 days advance from the date of delivery. Seller shall also upload soft copy of the dispatch documents consisting of BL / AWB, Invoice, Shipping list & Test certificates and other documents as specifically indicated in the Purchase Order in PRADAN Portal (https://web.bhelhyd.co.in/mm/) within 3 days from the B/L date for sea shipment and 1 day from AWB date for Air shipment.		
	ii) In case of CIP shipments, seller shall also inform purchaser the information about discharge port agent details and ship arrival information within 7 working days from the date of Shipment		

(Attachment to Enquiry No. D6A1V97666 Due on Date 04.04.2022 for submission by 11.00 hrs to open from 14:00 hrs.)

INSTRUCTIONS TO BIDDER (ITB)

<table>
<tr><th>S. No.</th><th>DETAILED TERMS & CONDITIONS</th><th>VENDOR RESPONSE (YES/NO)</th><th>DEVIATIONS / COMMENT</th></tr>
<tr><td></td><td>iii) In case the material shipped in Full Containers(FCL), Seller shall ensure that the Bill of Lading should clearly spell out the following
1. Port of discharge -- "Nhavaseva"/chennai
2. Place of Delivery / Final Destination - "ICD Sanath Nagar".
3. For air consignment the port of discharge will be Hyderabad, India and consignee shall be BHEL.</td><td></td><td></td></tr>
<tr><td></td><td>iv) In case of Air shipment, the following dimensions of single package may be noted.
a). Dimension of the cargo(ODC) -- > 125" x 88" x 63"
b).Weight of the cargo -- >3.5 MT.
If any package dimension or weight crosses the above set limits, it will be treated as Over Dimension Cargo (ODC) or Over Weight Cargo and seller shall inform BHEL well in advance of 20 days prior to the delivery date to enable BHEL to finalize the freight forwarder</td><td></td><td></td></tr>
<tr><td></td><td>(v). Recovery charges for non-submission of documents :
Seller shall submit all the required documents to BHEL as prescribed in the Purchase order and NIT.
If BHEL incurs any charges such as Penalty, demurrage, container detention, wharf age, storage, Ground rent etc., due to non - compliance / non - submission of documents prescribed in Purchase Order/Tender Document/Letter of credit , the same shall be recovered from the seller as under:
1. EUROPE/USA/Black Sea/ Far East/Middle East/South East sector
A. For EX-WORKS / FCA/ FAS / FOB Sea Consignments:
Penalty for late submission / negotiation of documents beyond 14 days shall be as under:
<table>
<tr><th rowspan="2">Sl. No</th><th rowspan="2">Period (From Date of Bill of Lading)</th><th>Recoverable Charges</th><th colspan="2">Recoverable Charges per day per container</th></tr>
<tr><th>LCL per week/ Break bulk cargo per day</th><th>20FT Container</th><th>40FT Container</th></tr>
<tr><td>i</td><td>Upto 14th day</td><td>Nil</td><td>Nil</td><td>Nil</td></tr>
<tr><td>ii</td><td>15th dayonward</td><td>USD 10</td><td>USD 50</td><td>USD 105</td></tr>
</table>
B. For CIF / CFR / CIP / CPT Sea Shipments:
For CIF / CFR / CIP / CPT Sea Shipments, Vendor shall provide rates for detention charges after free period at the time of offer itself in case of engagement of 20FT Container and 40FT category. In case of late presentation of documents to the bank recovery will be effected from the Vendor as per the rates quoted by the Vendor at the time of offer in this regard.
In case of Break bulk cargo and LCL Demurrage/storage charges shall be recovered at rate of USD 10 per day and storage charges rate of USD 10 per week respectively shall be charged as late presentation charges.</td><td></td><td></td></tr>
<tr><td></td><td>(vi) Description of items in invoice, packing list, BL / AWB or LR shall be same as PO item description. Vendors shall ensure that invoice shall contain PAN nos. of both seller and buyer related numbers. BHEL PAN AAACB4146P and BHEL TAN HYDB00086C.
Any other additional documents sought by the statutory authorities, the same shall be produced by the seller on priority basis.</td><td></td><td></td></tr>
<tr><td></td><td>(vii) Seller shall provide package details including number of packages, gross weight, net weight etc.</td><td></td><td></td></tr>
<tr><td></td><td>(viii) The seller shall provide the following documents at the time of submission of offer :
a) No Business Connection in India declaration issued by the seller as per the format specified.
(or)
b) (i) No Permanent Establishment in India declaration issued by the seller as per the format specified.
(ii) Tax Residence Certificate issued by the seller’s tax authorities.
(iii) Form 10F issued by the supplier.
c) In case the seller has a Business Connection in India as per Section 9 of Income Tax Act or Permanent Establishment in India as per Article 5 of Double Taxation Avoidance Agreement India and the seller’s country, the seller shall provide a withholding tax order issued by the Indian Income Tax authority for recovery of applicable tax.</td><td></td><td></td></tr>
</table>

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INSTRUCTIONS TO BIDDER (ITB)			
S. No.	**DETAILED TERMS & CONDITIONS**	**VENDOR RESPONSE (YES/NO)**	**DEVIATIONS / COMMENT**
7	Delivery Schedule		
A	The tendered goods shall be delivered within the period stipulated in PO . Delivery **at BHEL** can be accepted at the earliest**,** 30 days prior to delivery date as mentioned in the Purchase order. Delivery **earlier than** 30 days of contractual delivery date may be accepted with the written permission of BHEL -Purchase department. Goods arriving after the delivery date will be accepted only with the prior written permission of BHEL otherwise they will not be allowed inside the factory. BHEL reserves the right to reject the material, if not delivered by scheduled Purchase Order Delivery Date. (In case of imports , the final entry date of Import General Manifest (IGM) will be reckoned as delivery completion date)		**Non-Deviatable**
B	Documents such as TC,GCs Inspection reports are to be submitted within 10 days of dispatch of these materials. C note date or Date of submission of documents whichever is later shall be considered as delivery date incase documents are not submitted within 10 days from the dispatch of the material. Supply of plant/ equipment/ stores shall not be considered complete until they have been inspected and accepted at the place and destination specified for delivery by the time stipulated under the terms & conditions of the Order/ Contract. Mere payment by itself shall not constitute acceptance of the goods or materials in any manner, whatsoever.		
8	**Pricing Terms** Prices once quoted shall remain firm and valid during the execution of PO. Offers with PVC will be rejected outright except in cases where specifically called for in the NIT.		**Non-Deviatable**
9	**PRICE VALIDITY :** Unless otherwise specified, offer shall be valid for a period of 90 days from the date of bid opening (Technical bid /part-I in case of two part bid). However the prices quoted for spare parts of the Main equipment shall be kept valid for a period of 1 year from the date of Placement of PO for the main equipment.		
10	**Taxes & Duties (RATE TO BE INDICATED by the bidder against the space provided)**		
A	Indigenous Purchase		
	The Taxes as applicable shall be quoted in the following manner.		
i	Vendor to indicate HSN of Goods or SAC of Services.		
ii	IGST/CGST/SGST/UTGST: Rate of Tax to be quoted as extra in %		
	NOTE: Bidders to ensure correct applicability of IGST/CGST/SGST/UTGST based on the Inter / Intra state movement of goods. Taxes prevalent on the contractual delivery date or the actual delivery date (in case of delay) which ever is lower shall be applicable paid. In case Bidder has opted for GST Composition Scheme, the same may be stated explicitly both in their technical and price bids.		
iii	Any other taxes & duties not covered anywhere above may be indicated separately.		
iv	Taxes deducted at source: TDS as per the extant statute shall be recovered. In case vendor does not provide PAN details/concessional certificates, the TDS deduction shall be at the maximum percentage stipulated as per the provisions of Income Tax Act.		**Non-Deviatable**
B.	Foreign Purchase (Imports)		
i	The offered price shall be inclusive of all the Taxes and duties as applicable in country of bidder / country of dispatch for the quoted CIP price.		**Non-Deviatable**
ii	Taxes deducted at source: TDS as per the extant statute shall be recovered. In case vendor does not provide PAN details/concessional certificates, the TDS deduction shall be at the maximum percentage stipulated as per the provisions of Income Tax Act.		**Non-Deviatable**

Vendor's Signature with Seal

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INSTRUCTIONS TO BIDDER (ITB)			
S. No.	**DETAILED TERMS & CONDITIONS**	**VENDOR RESPONSE (YES/NO)**	**DEVIATIONS / COMMENT**
11	**Payment Terms: Unless otherwise specified in Special Conditions, following shall be the terms of Payment.**		
A	Indigenous: 100% payment along with taxes, freight & insurance will be made within 75 days from the date of receipt of complete documentation as per PO. However payment would be done only after receipt of original documents, including site/ Customer acknowledgement on LR (MRC - Material Receipt Certificate at site) / GR clearance at BHEL Stores. For MSEs (covered under MSME Act) which are registered and periodically renewed with BHEL, this period will be 45 days* as prescribed in the relevant act. Adherence to the above time schedule of payment is contingent upon Vendor complying with GST provisions and availment of Input Tax Credit by BHEL before the date of payment. *The taxes that are reimbursed would be the ones applicable as on the contractual Purchase Order delivery date or the amount actually paid whichever is less. In case GST credit is delayed/ denied to BHEL, due to non/delayed receipt of goods and/or tax invoice or expiry of timeline prescribed in GST Law for availing such ITC, or any other reason not attributable to BHEL, GST amount shall be recoverable from Vendor along with interest levied/ leviable on BHEL.		
B	Imports:- i) 100% payment (less Indian Agency Commission, if any) shall be paid **through "Usance Letter of Credit / Cash Against Documents (CAD) / Wire Transfer" with a credit period of 60 days** ii) LC will be opened after successful completion of pre dispatch inspection prior to the scheduled / agreed delivery date **LC will be opened within 7 working days from the date of request.**		
C	Note: 1) No advance payment is acceptable. However, in exceptional/rare cases, BHEL at its discretion, may consider advance payment against Bank Guarantee valid up to receipt of material at BHEL for 110% of advance amount issued / confirmed by any of the BHEL consortium banks. 2) Wherever EMD (Earnest Money Deposit) is applicable, it may be noted that no interest will be paid on EMD and the EMD will be paid back to unsuccessful bidders within fifteen days after award of the contract. Successful bidder's EMD will be converted to SD (Security Deposit). **Tender Cost wherever applicable is not refundable**		**Non-Deviatable**
D	No interest shall be payable by BHEL on earnest money or security deposit or any money due to the contractor by BHEL.		
12	**Penalty clause:** In the event of delay in supply of goods, penalty of 0.5% per week or part there of shall be levied on the undelivered portion subject to a maximum of 10% of the order value. Penalty amount so determined along with applicable GST thereon shall be recovered.		
13	**Excess materials** supplied beyond tolerance limit as specified in PO, will not be accounted for.		**Non-Deviatable**
14	**Rejected materials**, if any, shall be collected by the vendor within 90 days of such communication to the vendor .Beyond 90 days a ground rent of 0.25 %of the value of the material per week will be levied for a maximum period of two weeks.. Beyond this period the supplier forfeits their right to the materials.		**Non-Deviatable**
15	**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**

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NOTE: Deviations (Commercial as well as Technical) from the tender specifications and conditions are generally not acceptable. However, deviation if any, shall be brought out clearly with proper justification in the offer. The deviation, if considered by BHEL, shall be loaded for comparison, while evaluating the offer. If a bidder unconditionally withdraws any deviation before price bid opening, the same shall not be loaded. Loading criteria in respect of major commercial conditions where deviations if any are accepted shall be as per clause No.16. **The Vendors may specifically note the following.**	
16	**Evaluation and Loading Criteria:**
A	Evaluation of prices shall be done item-wise unless otherwise specified in the enquiry. Evaluation shall be on the basis of delivered cost, i.e. "total cost to BHEL" w.r.t the finalized technical scope and commercial conditions (after considering incidence of applicable taxes and duties and loading). For evaluation, exchange rate (TT selling rate of State Bank of India) as on the date of bid opening (Part-I, in case of two-part bids) shall be considered. If the relevant day happens to be a bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken.
B	In case of foreign bidders, the quoted CIP price shall be loaded by the following factors to arrive at the Delivered Cost:
i	- Import duty as applicable at the time of Technical/ Part-I bid opening.
ii	- Port handling/ clearing charges & inland freight and insurance: @ 5% of CIP value (10% for plates, pipes & structurals).
iii	In other cases subject to acceptance by BHEL, loading for various factors (in addition to above) as the case may be will be done as follows: 0.5% for unloading at Port of Destination Marine Freight 4% and Marine Insurance 1% (9% and 1% towards Freight and Insurance respectively for Plates, Pipes, Rounds & Structurals)
C	Incase of Indigenous Bidders, Ex-works offers received (as against FOR Destination mentioned in enquiry) shall be loaded by 4% of Ex-works value (9% for plates, pipes, rounds & structurals) unless otherwise mentioned in enquiry.
D	Deviated Penalty: Any loading on penalty clause shall be 10% or to the extent to which the vendor has opted for deviation.
E	Deviated Payment Terms: Terms: In case BHEL considers any deviation in payment terms, the bids shall be loaded with 18% interest per annum to the extent of deviation.
17	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.
18	**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.
19	**INTEGRITY PACT** Vendors shall have to enter into Integrity Pact with BHEL as per attachment - for order value of rupees five crores and above and shall be signed by the competent authority before the issue of purchase order, failing which vendor's offer will be rejected.
20	**Public Procurement**
A	**Make in India** For this Procurement , the local content to categorize a supplier as a Class I local supplier / Class II local supplier / Non-Local supplier and purchase preference to Class I local supplier , is as defined in Public Procurement (Preference to Make in India) , Oct 2017 dated 04.06.2020 issued by DPIIT . In case of subsequent orders issued by the nodal ministry , changing the definition of local content for the items of the NIT , the same shall be applicable even if issued after issue of this NIT , but before opening of Part– II bids against this NIT. Proforma for self certification for minimum local content and auditor's certification is given in Annexure III .
B	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. Proforma for self certification for compliance is given in Annexure IV
21	**Benefits earmarked for Purchase from Micro & Small Enterprises (MSEs) – Indigenous Purchase**
21A	All Micro and Small Enterprises (MSEs) as defined in MSE Procurement Policy are exempt from Paying earnest money deposit . NSIC registered unit bidders shall submit NSIC Certificate along with bid documents. Date to be reckoned for determining the deemed validity will be the last date of Technical bid submission. Non- submission of such document will lead to consideration of their bid, at par with other bidders and MSE status of such bidders shall be shifted to Non- MSE Category till the supplier submits these documents
21B	In tender,if MSEs quoting price within price band of L1+15% shall also be allowed to supply a portion of requirement by bringing down their price to L1 price in a situation where L1 price is from someone other than a MSE and such MSE shall be allowed to supply up to 25% of total tendered value. In case of more than one such MSE, the supply shall be shared proportionately. Out of these 25% minimum 3% shall be earmarked for MSEs owned by women and 6.25% for MSEs owned by SC/STs who submit the bid along with relevant documents. This is applicable in case of item-level evaluation tenders and divisible tenders .

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21C	If an enterprise falling under MSME category as defined in the Act, graduates to a higher category from its original category or beyond the purview of the Act, it shall continue to avail all non-tax benefits of its original category notified by the Ministry of Micro, Small and Medium Enterprise for a period of three years from the date of such graduation to the higher category.
21D	BHEL HPEP is registered with RXIL (TReDS) platform. MSE bidders are requested to get registered with RXIL (TReDS) platform to avail the facility as per the GOI guidelines
22	Startups : For Startups Medium Enterprises, Condition of prior turnover and prior experience in Public Procurement may be relaxed subject to meeting of Quality and Technical Specifications . Startups are exempt from paying earnest money deposit.
23	For Claiming Payments **for goods** received at BHEL works / Site from Vendors' Works) a) Original of Invoice marked as ORIGINAL FOR RECIPIENT b) Duplicate of Invoice marked as DUPLICATE FOR TRANSPORTER c) Packing List - clearly showing number of packages, gross weight and net weight. d) Warranty/Guarantee certificates (If applicable as per PO terms) e) Insurance certificate f) Third Party Inspection Certificates. g) LR Copy signed & stamped by Site incharge / Customer for site deliveries) (For material received at BHEL payment will be made against GR for accepted quantity)
24	Inspection Measuring and Test Equipment (IMTE) whether used by the Seller/ Contractor or sub-contractor shall be calibrated, maintained and controlled. Calibration shall be valid and IMTE maintained in sound condition during usage.
25	ISO-9001, ISO14001 and OHSAS 18001 shall be complied
26	Applicable Conditions :These General conditions of Contract for Purchase apply to all enquiries, tenders, request for quotations, orders and agreements concerning the supply of goods and the rendering of related services (hereinafter referred to as "deliverables") to Bharat Heavy Electricals Limited, Ramachandrapuram , Hyderabad (hereinafter referred to as "BHEL" or the Purchaser) or its projects/customers. Any deviations from or additions to these General conditions of contract for Purchase' require Purchaser's express written consent. The general terms of business or sale of the Seller shall not apply to Purchaser. Orders, agreements and amendments thereto shall be binding if made or confirmed by the Purchaser in writing. Only the Purchasing department of the Purchaser is authorized to issue the Purchase order or any amendment thereof.
27	Being PMD Vendor, if you are not quoting against this tender enquiry, please send your regret letter positively for our reference with valid reasons for not participating in the tender enquiry. Repeated lack of response on the part of bidder may lead to deletion such PMD vendor from BHEL's approved vendor list. Vendor shall ensure that PAN details are available/updated with BHEL, else Vendor shall attach PAN details with enquiry failing which offer shall be liable for rejection.
28	Kindly quote your prices in figures and words both. In case of any discrepancy in value, the prices quoted in words shall be considered for evaluation and establishing L1 Status
29	Any discount / revised offer / bids submitted by a bidder on its own shall be considered, provided it is received on or before the due date and time of offer / bid submission (Part-1). Conditional discounts shall not be considered for evaluation of tenders.
30	The bidder whose bid is technically not accepted will be informed & EMD wherever submitted shall be returned after finalization of contract. EMD shall be forfeited in the event of bidder opting out after tender opening.
31	In case of abnormal delays (beyond the maximum late delivery period as per Penalty clause) in supplies / defective supplies or non-fulfillment of any other terms and conditions given in Purchase Order, BHEL may cancel the Purchase Order in full or part thereof, and may also make the purchase of such material from elsewhere / equivalent market price at the risk and cost of the supplier. BHEL will take all reasonable steps to get the material from alternate source at optimum cost. If bidder does not agree to the above Risk Purchase Clause, BHEL reserves the right to reject the offer. Nonperformance of contract attracts penal provisions inline with BHEL's Suspension of Business dealings.
32	Any other terms and conditions of the bidder attached / referred against the tender enquiry will not be considered.
33	All drawings as also all patterns and tool 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 only be used in the execution of BHEL's orders.
34	Any amount payable by the consignor / supplier under any of the condition of this contract shall be liable to be adjusted against any amount payable to the consignor / supplier under any other work / contract awarded to him. This is without prejudice to any other action as may be deemed fit by BHEL.
35	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, shall be rejected. The list of firms banned by BHEL is available on BHEL web site www.bhel.com
36	**Definitions**
Throughout these conditions and in the specifications, the following terms shall have the meanings assigned to them, unless the subject matter or the context requires otherwise.	

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INSTRUCTIONS TO BIDDER (ITB)	
36A	Purchaser' means BHEL-HPEP, Ramachandrapuram, Hyderabad-502 032 of Bharat Heavy Electricals Limited (A Govt. of India Undertaking) incorporated under the companies Act having its registered office at BHEL House, Siri fort, New Delhi-110049, India and shall be deemed to include its successors and assigns. It may also be referred to as BHEL.
36 B	'The seller' means the persons, firm, company or organization on whom the Purchase order is placed and shall be deemed to include the seller's successors, representatives, heirs, executors and administrator as the case may be. It may also be referred to as Contractor, supplier or vendor.
36C	'Contract' shall mean and include the Purchase order incorporating various documents viz., tender/offer, letter of intent/acceptance, the General Conditions of contract and special conditions of contract for Purchase, specifications, inspection/quality plan, schedule of prices and quantities, drawings, if any enclosed are to be provided by the Purchaser or his authorized nominee and the samples or patterns if any to be provided under the provision of the contract. In case of any inconsistency or contradiction between any of the documents, the order of precedence shall be Purchase Order, LOI/LOA followed by specific conditions, special conditions of contract and general conditions of contract for commercial conditions; and specific agreement on technical conditions, special technical conditions and general technical conditions, tender/ offer.
37	'Parties to the contract' shall mean the seller and the purchaser as named in the main body of the Purchase Order.
38	Ordering and confirmation of order
	The seller shall send the order acceptance in Toto within one week from the date of LOI/Purchase order or such other period as specified/agreed by the Purchaser. Purchaser reserves the right to revoke the order placed if the order confirmation differs from the original order placed. Purchaser shall only be legally bound if agreed explicitly in writing to be in agreement with the deviation. The acceptance of deliverables or supplies by Purchaser as well as payments made in this regard shall not imply acceptance of any deviations. The Purchaser order will be deemed to have been accepted if no communication to the contrary is received within one week (or the time limit as specified /agreed by the Purchaser) from the date of P.O. Purchaser, is at liberty to send signed P.O. through electronic media such as e-mail and the receipt of which shall be treated as receipt of order.
39	Execution
	The whole contract is to be executed in the most workman like manner, substantial and approved as per the contracted terms.
40	Progress Report
	The seller shall render such report as to the progress of work and in such form as may be called for by the Purchaser from time to time. The submission and acceptance of such reports shall not prejudice the rights of the purchaser in any manner. Seller shall communicate to BHEL immediately, change of address, ownership, contact person(s), the mobile numbers and e-mail of the dealing person concerned. Milestones shall be periodically updated by vendor/subcontractor through PRADAN Portal **(https://web.bhelhyd.co.in/mm/)**. Non updation will adversely affect service rating of vendor performance.
41	Product information, Drawings and documents / Non-disclosure and Information 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 seller 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 Purchaser to erect, commission, operate and maintain the product. Such information and drawings shall be supplied in the number of copies agreed upon or at least three copies of each. 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 seller shall provide Purchaser with all information pertaining to the delivery in so far as it could be of importance to Purchaser. The seller 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 Purchaser has agreed to this in writing beforehand. The seller shall not be entitled to use the Purchaser's name in advertisements and other commercial publications including website without prior written permission from Purchaser. 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.

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INSTRUCTIONS TO BIDDER (ITB)	
42	Inspection and Testing
42 A	The goods and stores shall be manufactured by approved quality system and each part/component may be inspected and tested by the Purchaser prior to shipment and shall fully comply with relevant requirements of Purchaser. Purchaser has the right to inspect at any stage during manufacture/ delivery. In the event of rejection, Purchaser shall inform the seller accordingly and Purchaser shall be entitled to replacement or repair at his discretion or may proceed to terminate or cancel the agreement. All this, does not affect Purchaser's right to recover compensation.
42 B	Purchaser or his authorized representative shall be entitled at all reasonable times during execution to inspect, examine and test at the seller'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 seller shall obtain for purchaser or his authorized representative permission to inspect, examine and test as if the said stores are being manufactured at the seller's premises. Such inspection, examination and testing, if made shall not release the seller from any obligation under the contract. For indigenous suppliers all costs related to first inspection request shall be borne by the purchaser and the cost of subsequent inspections due to non-readiness of material/rework/ rejections shall be borne by the seller. In case of imports all inspection charges including third party inspections if any shall be borne by the seller. The cost of inspection staff/third party specified by the Purchaser shall be borne by seller unless otherwise specifically agreed. Whether the contract provides for tests on the premises of the seller or any of his sub-contractor/s, seller 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 seller unless otherwise specifically agreed in the contract. The Seller shall give the authorized representative of the purchaser 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 be strictly be complied with for the time lines. Any delay in submission of the documents by the vendor will not alter the delivery date.
43	Quality and Condition of the Deliverables
	The seller shall be responsible for compliance with applicable technical, safety, quality, environmental requirements and other regulations in relation to his products, packaging and raw and ancillary materials.
44	Packaging and Dispatch
	The seller 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 enquiry shall be fully complied. Each package must be marked with consignee name, P.O. number Package No. gross weight & net weight, dimensions (LxBxH) and seller'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 of 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 confirm to relevant regulations.
45	Delivery:
	Except as otherwise indicated in the Purchase order, delivery shall be FOR (Destination) for indigenous orders and CIP for imported orders. The delivery date (s) or delivery period (s) as stipulated in the agreement shall be firm and binding and shall apply to the entire delivery for each P.O. item. Partial shipments may however, be permitted by the purchaser on prior intimation from the Seller. Unless specifically agreed otherwise, transit insurance coverage will only be within India for imported consignments by BHEL. Accordingly, the seller shall send an intimation to the Purchase officer/Manager giving Purchase Order No., shipping particulars, Invoice value etc., immediately on dispatch of goods.
46	Penalty
	The time or period of delivery as stipulated in the schedule of delivery shall be deemed to be the essence of the contract. Should circumstances arise whereby the deadline for an agreed delivery date(s) or period(s) is expected to be exceeded, the seller shall inform Purchaser hereof without delay. If delay in delivery is caused by any of the circumstances mentioned in clause 54 (Force Majeure) or which are caused exclusively by the acts of Purchaser, the Purchaser shall extend the time for delivery by a period which is reasonable having regard to all the circumstances in the case. If the Seller delays beyond any agreed delivery date(s) or period(s), Purchaser shall levy penalty for such delay @ 0.5% per week (7 days) or part thereof on delayed portion of the order value subject to a maximum of 10% of the value of the Purchase Order. However, penalty for delayed delivery will be calculated on 100% of the purchase order value if the material supplied cannot be put to intended use. The penalty will be charged on the value of the purchase order excluding statutory levies, freight and insurance wherever not included in the price. Penalty amount so determined along with applicable GST thereon shall be recovered. Imposition, recovery or settlement of this penalty shall not affect Purchaser's right to performance, compensation and termination of the agreement. For delay analysis, period referred in Annexure-I will be considered as standard time lines for various major activities.
47	Transfer of Ownership and Risk
	The risk for the delivery remains with the seller until the goods are delivered at the agreed place. However ownership shall get transferred as per terms of purchase order in line with INCOTERMS.

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INSTRUCTIONS TO BIDDER (ITB)	
48	Price, invoicing and payment
	The agreed prices are fixed prices in the currency as specified in the Purchase Order. They shall include packing, forwarding , loading and carriage to the place specified by the purchaser and are exclusive of all applicable taxes, duties etc., except for those specifically agreed by the Purchaser. Invoices shall be submitted bearing the Purchase Order number & date, item number/s and supporting documents as called for in the Purchaser order. The direct payments (including LC/documents through Bank on collection basis), shall be made by E-payment mode and not by cheque /bank drafts except in special circumstances. Vendors shall furnish the E-payment particulars in the prescribed formats duly authenticated by their respective Bankers, If not got registered earlier with the Buyer. Invoice has to be raised quoting HSN Code of Goods or Accounting Code of Services. Invoice should mention BHEL-HPEPHYDERABAD GSTIN: 36AAACB4146P1ZG or GSTIN of BHEL Nodal Agency as mentioned in PO. Indian Agency commission if payable and so specified in the Purchase order shall be paid in Indian Rupees, considering the SBI TT selling exchange rate prevailing on the date of tender opening (part 1 in case of two part bid), after successful completion of the contract. If so stipulated in the order, the seller shall furnish, on receipt of the Purchase Order or along with order acknowledgement, the billing break-up of prices (BBU) for approval by the purchaser in respect of the major items/components going into the equipment. This BBU is required by the Purchaser for admitting the claims of the seller if part shipments are contemplated and also to facilitate custom clearance after payment of duties in case of imports. In case of delay in receipt of supporting document details, consequential demurrage/wharf age /detention charges shall be to the account of the seller. Payment does not imply in any respect whatsoever a waiver of Purchaser's right to performance of the agreement. Purchaser is entitled to set off claimable debts against claimable liabilities with the seller by means of a setoff Note.
49	Contract variations; Increase or decrease in the scope of supply
	Purchaser may vary the contracted scope during execution due to exigencies of project requirement. If the seller is of the opinion that the variation has an effect on the agreed price or delivery period, Purchaser shall be informed of this immediately in writing along with technical details, and in the event of additional work, submit a quotation with regards to the price and period involved, as well as the effect this additional work will have on the other work to be performed by the seller. Provided, that if unit rates are available in the contract, the same shall be applied to such additional work. The seller shall not perform additional work before purchaser has issued written instructions/amendment to the purchase order to that effect. The work which the seller should have or could have anticipated in terms of delivering the service (s) and functionality (ies) as described in this agreement should be executed by the vendor without any price implication.
50	Short shipments/ warranty/guarantee replacements
	In case of any short shipment during initial supply which is subsequently dispatched by the seller 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. Taxes, if any paid by indigenous vendor for short supply, guarantee /warrantee replacement, repair activity shall be to vendor's account only. Vendor has to raise a credit note for short supplied quantity as per GST provisions.
51	Rejection/Replacement
	The seller shall arrange replacement / repair under its obligation under the contract within one month from the date of intimation or mutually agreed period. The rejected goods shall be taken away by the seller and replaced on DDP/FOR-BHEL Stores/designated destination basis within such period. In the event of the seller's failure to comply. Purchaser may take appropriate action including disposal of rejections, at the cost and risk of the seller. Vendor has to raise a credit note for rejected quantity as per GST provisions.
	In case defects attributable to seller are detected during processing of the goods at purchaser's / his subcontractor works, the seller shall be responsible for replacement /repair of the goods as required by the purchaser at seller's cost.
52	Export Administration Regulations
	If a delivery includes such technology and / or supply that is subjected to the export regulations the seller shall obtain due permissions, approvals, license etc.
53	Cancellation / Termination of contract and risk purchase
	Purchaser shall have the right to completely or partially terminate the agreement by means of written notice to that effect without prejudicing their other rights in the event that : - The seller is declared bankrupt, its business has been shut down or liquidated, a substantial part of its assets have been attached/destroyed, or the business has been transferred to a third party. - Any misrepresentation or hiding of material fact if detected at a later stage. - The delivery is rejected after inspection or re-inspection. - In the event of termination, the risk of the items already delivered but not of use to Purchaser, as determined by purchaser, remains with the seller. The items shall then be at the seller's disposal and they are to be collected by the seller. The seller shall refund any payments made by purchaser in terms of the terminated agreement immediately, not later than 30 days, - In the event of Cancellation/ termination of contract, BHEL reserves the right to procure the items which are not delivered as per PO and charge the excess cost from the defaulting seller. Incase the excess cost is not repaid by or recovered from the defaulting seller within 30 days, apart from legal recourse for effecting such recoveries, Penal action in line with BHEL's Suspension of Business dealings will be taken.

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	INSTRUCTIONS TO BIDDER (ITB)
54	**Force Majeure**
	The supplier shall not be considered in default if delay occurs due to causes beyond their control such as Acts of God, Natural calamities, Fire, Frost, Flood, Civil War, civil commotion, riot, Government Restrictions. Only those causes that have duration of more than seven days shall be considered cause of force majeure. Notification to this effect duly certified by local chamber of commerce/statutory authorities with supporting documents shall be given by the supplier to BHEL by registered letter/courier service immediately without loss of time. In the event of delay due to such causes the delivery schedule shall be extended for a length of time equal to the period of Force Majeure or at the option of BHEL the order may be cancelled. Such cancellation would be without any liability whatsoever on the part of BHEL. In the event of such cancellation the supplier shall refund any amount advanced or paid to the supplier by BHEL and deliver back any material issued to him by BHEL and release facilities, if any provided by BHEL.
55	Non-waiver of Defaults
	If any individual provision of the contract is invalid, the other provisions shall not be affected.
56	Settlement of Disputes
	(i) Except as otherwise specifically provided in the contract, all disputes concerning questions of the facts arising under the contract, shall be decided by the Purchaser, subject to written appeal by the seller to the purchaser, whose decision shall be final. (ii) 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. (iii) The seller shall continue to perform the contract, pending settlement of disputes(s).
57	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.
	ARBITRATION (WITH SOLE ARBITRATOR)
	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 57, 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.
	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)/2013-DPE(GM/FTS 1835 dated 22-05-2018
58	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.

(Attachment to Enquiry No. D6A1V97666 Due on Date 04.04.2022 for submission by 11.00 hrs to open from 14:00 hrs.)	
INSTRUCTIONS TO BIDDER (ITB)	
59	BHEL-Fraud prevention policy shall be adhered to.
	The Bidder along with its associate/ Collaborators/ Sub-contractors/ sub-vendors/ 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.
	Fraud prevention policy and list of nodal officers is hosted on BHEL Hyderabad website web.bhelhyd.co.in
60	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 nonsubmission 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 /