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|  | <b>PPX-BOI DEPARTMENT</b><br><b>BHARAT HEAVY ELECTRICALS LIMITED</b><br><b>HEEP: HARDWAR-249 403 (Uttarakhand)</b><br><b>FAX: +91 1334 226084/226462</b><br><b>TEL: +91 1334 28 1660/1690</b> | <b>ENQUIRY NO. B/4066/5/4562V1</b><br><b>PACKAGE: OIL PURIFICATION UNIT</b><br><b>PROJECT: 5X800MW YADADRI</b><br><b>ENQUIRY DUE DATE/ OPENING DATE:26/07/2018; 14.00 IST</b><br><b>Offer Submission Time : By 26/07/2018 -13.45 HRS IST</b> |
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**GENERAL MANAGER (PPX-BOI & DABG)**  
**BHARAT HEAVY ELECTRICALS LIMITED, Heavy Electrical Equipment Plant**  
Ranipur, Haridwar – 249 403 (UK), India



**Tender Enquiry No. B/4066/2015/4562V/1 for the requirement of Oil Purification Unit for Yadadri project**

The technical specifications/Drawings uploaded along with this Open Tender are as mentioned below. In case of non-receipt or non-clarity of any of these documents, you may contact undersigned. No Financial Implication on account of non-availability of documents would be entertained after opening of Techno-Commercial Offers.

**LIST OF ENCLOSURES**

| <b><u>Commercial Documents</u></b> |                                                                                    |                               |
|------------------------------------|------------------------------------------------------------------------------------|-------------------------------|
|                                    | <b><u>Document</u></b>                                                             | <b><u>Number of pages</u></b> |
| 1.                                 | INSTRUCTION TO BIDDERS OF ENQ No. B/4066/15/4562/V1 (ANNEXURE-1)                   | 08                            |
| 2.                                 | PRE-QUALIFICATION REQUIREMENT ( ANNEXURE-A)                                        | 01                            |
| 3.                                 | TERMS AND CONDITIONS Foreign Bidder (ANNEXURE-2)                                   | 09                            |
| 4.                                 | TERMS AND CONDITIONS Indigenous Bidders (ANNEXURE-3)                               | 09                            |
| 5.                                 | GENERAL INSTRUCTIONS & STANDARD TERMS & CONDITIONS (GISTC) FOR FOREIGN SUPPLIER    | 10                            |
| 6.                                 | GENERAL INSTRUCTIONS & STANDARD TERMS & CONDITIONS (GISTC) FOR INDIGINOUS SUPPLIER | 09                            |
| 7.                                 | Certificate by Chartered Accountant on Letter Head (MSME Annexure-1)               | 01                            |
| 8.                                 | Non –Disclosure and proprietary Information Agreement                              | 10                            |
|                                    | <b>TOTAL PAGES</b>                                                                 | <b>57</b>                     |

| <b><u>Technical Documents</u></b> |                                                                            |                               |
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|                                   | <b><u>Document</u></b>                                                     | <b><u>Number of pages</u></b> |
| 1.                                | Annexure-B to Specification ST39013 rev 08                                 | 40                            |
| 2.                                | Doc. No.:41192896000 Rev.05 (Addendum to specification No.:ST39013 Rev.08) | 1                             |
| 3.                                | Standard Quality Plan Format                                               | 1                             |
|                                   | <b>TOTAL PAGES</b>                                                         | <b>42</b>                     |

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ENQUIRY NO. B/4066//5/4562V1  
PACKAGE: OIL PURIFICATION UNIT  
PROJECT: 5X800MW YADADRI  
ENQUIRY DUE DATE :26/07/2018; 13.45 IST  
Enquiry Opening Time : 26/07/2018; 14.00 HRS IST

NIT: TENDER DETAILS AND INSTRUCTION TO BIDDERS (ANNEXURE-1)

## 1. SCOPE OF ENQUIRY

Sealed Bids are invited from bidders for the supply of Oil Purification Unit for 5X800MW Yadadri Project as per requirement mentioned below:

| Sl. No. | Material Code & Item Description                                      | Qty.   | Project                 | Delivery Date |
|---------|-----------------------------------------------------------------------|--------|-------------------------|---------------|
| 1       | W90311928412<br>Central Oil Purification System                       | 2 No.  | 800 MW Yadadri TPS Site | 17/10/2019    |
|         |                                                                       |        |                         | 04/12/2020    |
| 2       | W90311928404<br>Unit Oil Purification System                          | 5 No.  | 800 MW Yadadri TPS Site | 17/10/2019    |
|         |                                                                       |        |                         | 17/11/2019    |
|         |                                                                       |        |                         | 17/07/2020    |
|         |                                                                       |        |                         | 17/07/2020    |
|         |                                                                       |        |                         | 17/07/2020    |
| 3.      | W90318103290<br>Mandatory Spares for Flow Switch of Oil Purifier Unit | 4 NO   | 800 MW Yadadri TPS Site | 20/02/2020    |
| 4.      | W90318103192<br>Level Switch for Oil Purification Unit                | 4 No.  | 800 MW Yadadri TPS Site | 20/02/2020    |
| 5.      | W90318103150<br>Pressure Switch for Oil Purification Unit             | 4 No.  | 800 MW Yadadri TPS Site | 20/02/2020    |
| 6       | W90318103176<br>Pressure Indicators for Oil Purification unit         | 4 No.  | 800 MW Yadadri TPS Site | 20/02/2020    |
| 7       | W90318103168<br>RTDS for Oil Purification unit                        | 10 No. | 800 MW Yadadri TPS Site | 20/02/2020    |
| 8       | W90318103184<br>Temperature Indicator for Oil Purification Unit       | 10 No. | 800 MW Yadadri TPS Site | 20/02/2020    |

|                                                                                   |                                                                                                                                                                                                      |                                                                                                                                                                                                                              |
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**Note: Bidders are requested to quote their best possible minimum delivery period from the date of placement of PO.**

## 2. PROJECT INFORMATION:

|                          |                                                                                                                                          |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Project Name             | 5X800 MW YADADRI                                                                                                                         |
| Name of the End Customer | TELANGANA STATE POWER GEN CORP. LTD.                                                                                                     |
| Project Address          | <b>THE DIVISIONAL ENGINEER-STORES<br/>CONST.DIVI,5X800MW YADADRI TPS<br/>VEERLAPALEM VIL.DAMERCHERLA<br/>MANDAL,DIST-NALGONDA-508207</b> |

## 3. EARNEST MONEY DEPOSIT (EMD)

**3.1** Interested vendors must submit their offer along with the following Earnest Money Deposit (EMD) in a separate sealed envelope:

| Details | Amount In INR                                       | Amount in Foreign                             | Type       |
|---------|-----------------------------------------------------|-----------------------------------------------|------------|
| EMD     | INR 1,50,000/-<br>(INR ONE LACS<br>FIFTY THOUSANDS) | USD 2294 or<br>Equivalent<br>foreign currency | Refundable |

**3.2** The EMD should be submitted in the form of demand draft / Pay Order/ Cash (as permissible under Income Tax Act). The Drafts shall be drawn in favor of "BHEL Hardwar". In case of foreign bidders, E- payment is also acceptable. For E-Payment, the RTGS details are as mentioned below:

| Bank Details                                                                                                                             | SWIFT Details of bank                                                            | Contact Details of Banker                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| STATE BANK OF INDIA RANIPUR<br>BRANCH,<br>OPP: BHEL MAIN GATE,<br>SECTOR-5, RANIPUR, HARIDWAR,<br>UTTRAKHAND, INDIA PIN CODE :<br>249403 | SWIFT NO :SBININBB225<br>CC ACCOUNT<br>No.:10667995458<br>IFSC CODE: SBIN0000586 | Name: Sh. Sudhir Sharma<br>Design: Chief Manager<br>(IBD) Contact No. +91 1334<br>224201<br><br>+91 1334<br>226125 |

**3.3** Bidders already registered at BHEL Hardwar (i.e. PMD Vendors) for this package are exempted from submission of the EMD.

**3.4** MSE Suppliers/Central / State – PSUs / Government departments are exempted from submission of the EMD.

**3.5** Bids not accompanied with requisite EMD or bids accompanied with EMD of inadequate value shall not be considered for further evaluation. An opportunity may be given to the bidder for submitting the requisite EMD and the offers would be evaluated only in case, the requisite EMD is received within a time bound period.

|                                                                                   |                                                                                                                                                                                                      |                                                                                                                                                                                                                              |
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|                                                                                   | <b>NIT: TENDER DETAILS AND INSTRUCTION TO BIDDERS (ANNEXURE-1)</b>                                                                                                                                   |                                                                                                                                                                                                                              |

3.6 The bidder whose bid is technically not accepted will be informed & EMD wherever submitted shall be refunded after the finalization of the contract. EMD shall be forfeited in the event of bidder opting out after tender opening.

#### 4. PRE-QUALIFICATION REQUIREMENT (PQR)

The Pre Qualification Requirements have been compiled and enclosed **as per Annexure A** .All the bidders should ensure submission of complete details and documents as called for in these requirements. The Offers submitted by the bidders would be scrutinized with respect to Pre-Qualification Requirements first. Techno- Commercial offer of only those bidders shall be evaluated who meet the Pre-Qualification Requirements.

**Important Note:** Bidders should ensure completeness and correctness of all supporting documents of PQR along with their offer. Not more than 30 days (After Opening of Techno-commercial offers) will be allowed to bidders for completing PQR documents. PQR review will be closed within 30 days of opening of techno-commercial Bids. Offers of Bidder / Bidders, who do meet PQR i.e. do not complete the PQR documentation within 30 days of opening of techno-commercial bid, shall be ignored and no-further correspondence shall be entertained thereafter.

5. **END USER APPROVAL:** End User approval is mandatory requirement for considering your offer in this tender. The offers meeting pre-qualification requirement will be referred to the End User for approval. And supporting documents, if any, as sought by BHEL/ end user has to be submitted by participating bidders for arranging their approval. Price bid of the offer of only those bidders who meet pre-qualification requirement, technical requirement and approved by the End User will be considered for price bid opening.

#### 6. SUBMISSION OF OFFER

6.1 Only English version of all documents would be valid & binding.

6.2 Bidders are advised to study all the tender documents carefully. Any submission of tender by the bidder shall be deemed to have been done after careful study and examination of the tender documents and with full understanding of the implications thereof. The specifications/ Technical Requirements and terms & conditions shall be deemed to have been accepted unless otherwise specifically commented upon in 'Deviation' sheets by the bidder in his offer. Non-compliance with any of the requirements and instructions in the Tender Enquiry may result in rejection of the offer.

6.3 Name of vendor's dealing persons with Contact No(s), Email ID and Address of correspondence shall be provided in the bid.

6.4 Tenders are to be submitted in Two Parts and Part- I (Techno-Commercial Bid along with PQR, as detailed below) will be opened first. The offers are to be submitted on or before the Due Date and time, as detailed below:

**A. PART-I: PRE-QUALIFICATION REQUIREMENT (PQR) & TECHNO-COMMERCIAL BID:**  
Comprising of following documents:

- Earnest Money Deposit (EMD)/details of EMD in case of E-Payment.



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- Bidders are required to furnish requisite details in the formats specified in bidding documents for meeting the stipulated Pre-Qualification. Requirements (PQR) along with all supporting documents like copies of End User Certificates, Purchase Orders and Contract Agreements etc. The Pre- Qualification requirements are enclosed
- Complete Technical offer with relevant drawings/ documents etc.
- **"MATERIAL DETAILS AND INSTRUCTION TO BIDDERS"**-Annexure-1, **Special Conditions of Enquiry: Annexure-2 for Foreigner supplier & Annexure -3 for indigenous supplier** and "GISTC (General Instructions and Standard Terms & Conditions against Tender Enquiry)" are an integral part of this enquiry and endorsed copies of these documents (duly signed and stamped on each page, as a token of acceptance). Reply for each clause of **Annexure-2 for Foreigner supplier & Annexure -3 for indigenous supplier** (as applicable) are to be necessarily submitted along with the offer. Deviations if any are to be listed out separately. Please note that in case no- deviation sheet is received along with offer, it will be presumed that all terms and conditions mentioned in "INSTRUCTION TO BIDDERS, SPECIAL CONDITIONS OF ENQUIRY and "GISTC (General Instructions and Standard Terms & Conditions against Tender Enquiry)" is acceptable to bidder and your offer will be processed accordingly.
- Signed and endorsed QAP.
- Any Deviation with reference to technical requirements/specification to be laid down on separate sheet along with the cost of Withdrawal of such technical deviations (if any). Acceptance of such technical deviations would be at the discretion of BHEL.
- Un-Price replica of Price Bid
- **Supplier Registration Form (SRF)** : Online registration is operational in BHEL. Bidders not registered at BHEL, Haridwar for this item, have to apply through online registration portal, <https://supplier.bhel.in/>. All credentials and/or documents duly signed and stamped related to registration has to be uploaded on website and application submitted for registration.. One set of hard copy of filled up supplier registration form (SRF) downloaded from online registration portal duly signed and stamped has to be submitted alongwith the offer.

**B. PART-II: PRICE-BID:** Containing Prices and to be submitted in original with proper sign & stamp, strictly as per enquiry conditions for complete scope of tender enquiry

**6.5** Following shall be superscripted on the envelopes which shall be addressed by name and designation to the official inviting tender:

PART-I (refer clause 5.4 [A]) : 1. TENDER ENQUIRY NO. AND ITEM DESCRIPTION  
2. DUE DATE FOR OPENING  
3. "TECHNO-COMMERCIAL BID WITH PQR".

PART-II (refer clause 5.4 [B]) 1. TENDER ENQUIRY NO AND ITEM DESCRIPTION  
2. DUE DATE FOR OPENING  
3. "PRICE BID".

|                                                                                   |                                                                                                                                                                                                      |                                                                                                                                                                                                                              |
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**6.6** Parts – I & II shall be submitted in separate sealed covers duly superscribed as indicated above and shall be enclosed further in a main cover duly sealed and superscribed as:

“OFFER FOR (ITEM NAME) AGAINST **ENQUIRY NO. B/4066/5/4562V1 DUE ON** CONTAINING PART-I & PART-II Bids”. Vendor’s full name and address should be clearly mentioned on the envelope

**6.7 Envelope not marked with tender enquiry number is liable to be ignored and may not be opened.**

**6.8** Quotation must be enclosed in sealed cover on which tender enquiry number and the due date MUST BE written and be invariably sent under REGISTERED POST / SPEED POST / COURIER/Dropped in the Tender Box, addressed as follows:

**To,  
THE HEAD OF MATERIAL MANAGEMENT,  
Heavy Electrical Equipment Plant, Bharat Heavy Electricals Limited,  
HARIDWAR-249403 (Uttarakhand), INDIA.**

**6.9** Tender opening is scheduled to start in the Tender Room at 2:00 PM (IST), on the due date. Therefore bid/quotations must reach this office / tender Box latest by 1:45 PM (IST) on due date. Only participating bidders are allowed to attend tender opening. TENDERS RECEIVED AFTER THE SPECIFIED TIME OF THEIR SUBMISSION' WILL BE TREATED AS LATE TENDERS AND SHALL NOT BE CONSIDERED UNDER ANY CIRCUMSTANCES.

**6.10** The bid/quotation must be posted before due date, keeping allowance for postal transit time. Alternatively, the tenders duly sealed and super-scribed as above may be deposited in the Tender Box. Quotations sent by any mode but not received in time will be ignored. Tender received through authorized E-mail is also acceptable. **However, in time submission of tender in tender box shall be the responsibility of the bidder, sent through any mode.** Documents submitted with the offer/bid shall be signed and stamped in each page by authorized representative of the bidder.

**6.11 PART-I (Techno-Commercial bid with PQR)** will be opened on Due Date and time specified in the Enquiry, or extension thereof, in presence of tenderers who may like to attend. Incomplete offers are liable to be rejected.

**6.12 Techno-Commercial offer of only those bidders shall be evaluated who meet the Pre-Qualification Requirements mentioned in our Enquiry and who have submitted the EMD as stipulated in clause 3 above.**

**6.13** After opening of the techno-commercial offer, the offers would be evaluated by BHEL and acceptance shall be subject to End Customer approval. Price Bid shall be opened only of the Customer approved vendors.

**6.14** After finalization of Techno-Commercial evaluation, offers of BHEL and Customer approved

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vendors who have qualified in techno-commercial offer shall be considered for Price Bid Opening/RA.

**6.15** All correspondence thereof, shall be addressed to the following persons:

|                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Mr. Rahul Sharma</b><br><b>Designation: Dy. Manager (PPX-BOI)</b><br><b>4<sup>th</sup> Floor, Main Administrative Building</b><br><b>HEEP, BHEL</b><br><b>Hardwar- 249403</b><br><b>Uttarakhand, India</b><br><b>Email ID: <a href="mailto:rahuls@bhel.in">rahuls@bhel.in</a></b><br><b>Tel: +91 1334 28 1753</b> | <b>Mr. Kapil Yadav</b><br><b>Designation: DGM (PPX-BOI)</b><br><b>4th Floor, Main Administrative Building</b><br><b>HEEP, BHEL Hardwar- 249403</b><br><b>Uttarakhand, India</b><br><b>Email ID: <a href="mailto:k-yadav@bhel.in">k-yadav@bhel.in</a></b><br><b>Tel: +91 1334 28 1660</b> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**6.16** Bidders shall be allowed in the tender room in area identified for bidders and only one authorized representative from each bidder shall be allowed. No laptops/camera are allowed in tender room. Use of mobile phone is restricted in tender room.

**6.17** Details of offers shall be read out to bidders and in no case offers shall be handed over to any of the bidders for noting down.

**6.18** BHEL prefers to deal directly with the principal manufacturers/OEM. However, if the OEM/ Principal insists on engaging the services of an agent, the same can be allowed only thru a tender specific authorization letter issued by the principal/OEM. The acceptance of any such offer would be at the discretion of BHEL.

**6.19** 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 Hardwar 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).

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 the manufacturer/ supplier and the agent, bid received from the agent shall be ignored.

Vendors operating from BHEL quarters, unauthorized colonies on BHEL Land and Dharamshalas/ Hotels shall not be considered, hence such vendors need not apply.

## **7. RIGHT OF ACCEPTANCE**

**7.1** BHARAT HEAVY ELECTRICALS LIMITED HARIDWAR reserves the right to reject any or all the bids/quotations without assigning any reason thereof. BHEL also reserves the right to increase or decrease the tendered quantities. Bidders should be prepared to accept order for reduced quantity without any extra charges.

**7.2** Any discount/ revised offer submitted by a bidder on its own shall be accepted provided it is received on or before the due date and time of offer/bid submission (Part-I). The discount shall be applied on pro- rata basis to all items unless specified otherwise by the bidder. Conditional



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discounts shall not be considered for evaluation of tenders.

**7.3** Unsolicited discounts/revised offers given after enquiry opening (i.e. Part-I bid opening) shall not be accepted.

**7.4** In case there is no change in the technical scope and/or specifications and/or commercial terms & conditions, the bidder/s shall not be allowed to change his/their price bids after the due date (i.e. Part-I bid opening).

**7.5** In case of changes in scope and/or technical specification and/or commercial terms & conditions, having price implications, techno-commercially acceptable bidders shall be asked by BHEL (after freezing the scope, technical specifications and commercial terms & conditions) to submit the impact of such changes on their price bid. A cut-off date and time shall be given to all the techno-commercially acceptable bidders to submit the impact on their price bids.

**7.6** In the event of any bidder, after finalizing the technical specification & scope of supply, opting to revise and submit their latest price bid instead of submitting impact on their price bid asked by BHEL, then their latest price bid shall prevail. However in such condition their original price bid will necessarily be opened.

**7.7** After technical & commercial examination of the offers received and clarifications obtained (if required), Part-II (Revised Price Bid/ Original Price Bid along with Price Impact and Discount, if any) shall be opened, for which the date and time shall be intimated to technically and commercially acceptable bidders in case of public opening. BHEL may opt to finalise the prices through Reverse Auction amongst technically and commercially acceptable bidders. BHEL reserves the right to open the earlier price bids, if any, submitted by the bidder(s), if required.

**7.8** No correspondence shall be entertained from the tenderers after opening of Part-II (Price bid), except clarifications (if any) asked by BHEL in writing.

**8. DEALING WITH BANNED SUPPLIERS/CONTRACTOROS:**

Offers of the bidders who are on the banned list, as also the offers of the bidders who engage the services of banned firms, shall be rejected. The list of banned firms is available on BHEL website [www.bhel.com](http://www.bhel.com).

**9. REVERSE AUCTION**

BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on [www.bhel.com](http://www.bhel.com)) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno- commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/



PPX-BOI DEPARTMENT  
BHARAT HEAVY ELECTRICALS LIMITED  
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FAX: +91 1334 226084/226462  
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ENQUIRY NO. B/4066//5/4562V1  
PACKAGE: OIL PURIFICATION UNIT  
PROJECT: 5X800MW YADADRI  
ENQUIRY DUE DATE :26/07/2018; 13.45 IST  
Enquiry Opening Time : 26/07/2018; 14.00 HRS IST

NIT: TENDER DETAILS AND INSTRUCTION TO BIDDERS (ANNEXURE-1)

contractors (as available on [www.bhel.com](http://www.bhel.com)).

The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.

If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on [www.bhel.com](http://www.bhel.com)).

#### 10. IMPORTANT NOTE

*Kindly ensure the timely submission of your offer (by 1345 Hrs IST on the due date) and note that*

*Late Offers shall not be entertained under any circumstances.*

*Procurement is to be made from End User/ Customer approved vendors only.*

For and on behalf of BHEL,  
Hardwar

Kapil Yadav  
DGM (PPX-BOI)



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PRE-QUALIFICATION REQUIREMENT

Enquiry No.:  
B/4066/2015/4562V/1  
Due Date: 26/07/2018  
By 1345 Hrs IST  
Opening Time : 26/07/2018  
14.00 HRS IST

## Annexure-A

| Sl. No. | Pre-Qualification Requirements (Annexure-A)                                                                                                                                                                                                                                                                                                                                                                                                                               | Vendor's Response |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1.      | Vendor should have engineered and executed at least one contract for supply of lube oil purification system having flow capacity of 6000LPH/7500LPH for steam turbines application to any power plant manufactures.                                                                                                                                                                                                                                                       |                   |
| 2.      | The scope of supply shall include the complete Lube Oil Purification System. Major components of the system are centrifuge, feed pump, indirect type oil heater, control panel, polishing filter, piping, valves & instruments.                                                                                                                                                                                                                                           |                   |
| 3.      | The purification system be suitable for continuous operation round the clock.                                                                                                                                                                                                                                                                                                                                                                                             |                   |
| 4.      | Scope of supply of vendor shall be such that the oil purification system can be used as purifier as well as clarifier.                                                                                                                                                                                                                                                                                                                                                    |                   |
| 5.      | The lube oil purification system shall be capable to supply purified oil having oil purity level as mentioned below.<br>a. Particle size of impurities: Equal to or better than class 15/12 as per ISO 4406 at the outlet of oil purification system from inlet of class 21/18 (or inferior) in single pass.<br>b. Total moisture content: Equal to or better than 500 ppm at the outlet of oil purification system from inlet of 15000 ppm (or inferior) in single pass. |                   |
| 6       | Test certificate (not older than 5 years) for above-mentioned particle size & total moisture content at the outlet of oil purification system shall be submitted for our approval.                                                                                                                                                                                                                                                                                        |                   |
| 7       | Vendor to submit the experience list, PO copies and user certificate for lube oil purification system with operating parameters as mentioned in this document.                                                                                                                                                                                                                                                                                                            |                   |
| 8.      | Against supply at sl. No. 1 above, controls for supplied OPU shall have been realized in a standalone relay based panel to be interfaced with 24 V Distributed Control System (DCS). Vendor to submit control panel scheme for BHEL review.                                                                                                                                                                                                                               |                   |
| 9.      | Make/model/ data sheet of instruments, motor and major item of control panel shall be subject to BHEL review & approval. Vendor to confirm.                                                                                                                                                                                                                                                                                                                               |                   |

Note:-

1. Against vendor's replies, BHEL reserves the right to ask for more information/documents/clarifications. Vendor's offer shall not be considered if vendor fails to furnish the document/information/clarifications as mentioned above or vendor doesn't meet the above acceptance criteria.

Signature of authorized signatory.....





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**SPECIAL CONDITIONS OF ENQUIRY:**  
**Annexure-2**  
**Enquiry No. B/4066/5/4562V1**  
**Item : Oil Purification Unit**  
**Project: 5X800MW Yadadari**

### Foreign Supplier

| S.No. | Terms                                                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Your confirmation |
|-------|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1.    | Submission of Offer                                                   | The offer/bid shall be signed and stamped on each page by authorized representative of the bidder.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |
| 2.    | Confirmation to General Instructions and standard terms & conditions: | Please confirm each clause of following documents: -<br>1. General Instructions and standard terms & conditions for bidding against tender enquiry (GISTC- Foreign Bidders):<br>2. Special terms & conditions of tender enquiry (Annexure-2) for foreign bidders.<br>Deviation to conditions mentioned in above documents, if any, shall be submitted along with offer in separate documents.<br>Please note that in case, no- deviation sheet is received along with the offer, it will be considered that all terms and conditions mentioned in above documents are acceptable to the bidder and your offer will be processed accordingly.                                                   |                   |
| 3.    | Customer approval requirement                                         | End User approval is mandatory requirement for considering your offer in this tender. The offers meeting pre-qualification requirement will be referred to the End User for approval.<br>Price bid of the offer of only those bidders who meet pre-qualification requirement, technical requirement and approved by the End User will be considered for price bid opening.                                                                                                                                                                                                                                                                                                                     |                   |
| 4.    | Technical Spec & Checklist                                            | Technical Spec Applicable: <ul style="list-style-type: none"><li>ST39013 Rev. 08 (In order to reduce the time for technical scrutiny, we have prepared a checklist and the same is enclosed (Annexure VII of ST39013).</li><li>Annexure-B to spec ST39013 Rev 08</li><li>Doc. No. 41192896000 Rev. 05 addendum to ST39013 Rev. 08</li></ul> You are requested to submit your technical offer along with duly filled in checklist.                                                                                                                                                                                                                                                              |                   |
| 5.    | Documents Checklist:                                                  | Kindly confirm that the following documents have been submitted along with your offer: <ul style="list-style-type: none"><li>1. Requisite EMD</li><li>2. Signed &amp; Stamped Copy of Material Details and ITB- <b>Annex-1</b></li><li>3. Pre-Qualification Requirements (as defined in <b>Annexure-A</b>).</li><li>4. Complete Technical offer with relevant drawings/ documents / etc. (as per special instructions mentioned in <b>Annexure-2</b>).</li><li>5. Experience Details.</li><li>6. Any other document as specified in "<b>Instructions to Bidders and/or Special conditions of Enquiry</b>".</li></ul> Please note that all details required in supplier registration form to be |                   |



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**Item : Oil Purification Unit**  
**Project: 5X800MW Yadadari**

### Foreign Supplier

|    |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
|----|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|    |                            | filled and submitted on online supplier registration portal on www.bhel.com along with complete documents.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
| 6. | <b>Special Instruction</b> | <p>Please note that as per BHEL's Policy, we cannot allow Price impact for the requirement / scope of supply, which is a part of specifications of our tender enquiry. Hence please read all specification / documents thoroughly and submit your offer as per specifications of tender enquiry.</p> <p>In case of any confusion / un-clarity on any of the clause / requirement of specification, please clarify the same from BHEL before submission of offer.</p> <p>No deviation &amp; request regarding un-clarity / contradictory conditions / ambiguity of specifications would be entertained after opening of techno-commercial offers. Further no price impact would be allowed for the requirement which is already part of the specifications of the tender enquiry, after opening of techno-commercial offers.</p> <p>Please note and confirm.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| 7. | <b>Evaluation criteria</b> | <p>Evaluation would be done on the basis of total landed cost for the complete requirement covered in the enquiry. Considering total material value, supervision charges, type test charges (if applicable), taxes &amp; duties, Freight, Insurance, and Commercial Loading etc.). Import Offers (supply portion offered on CFR Mumbai (India) basis) shall be loaded for Marine Insurance, Port Handling/Clearing Charges, applicable custom duties for the project, freight element and other charges involved for delivery up to Project Site as following:</p> <ul style="list-style-type: none"><li>• Marine insurance – @ 0.01% of FOB value</li><li>• Port handling/ clearing charges – @ 1% of CIF value.</li><li>• Custom Duty (including CVD &amp; SAD): As prevailing on date of price bid opening.</li><li>• Inland freight &amp; Insurance (from Mumbai to respective Project Site): As per applicable rate of BHEL transportation contract/ standard practice at BHEL/GISTC, whichever is higher.</li></ul> <p>For evaluation (of offers quoted in Foreign Currency), exchange rate (TT selling rate of State Bank of India) as on date of tender opening (Part-I bid) 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.</p> |  |
| 8. | <b>Statutory Variation</b> | Any statutory change/revision in taxes & duties as and when implemented by the Government OF India shall become applicable in addition to or in lieu of existing tax structure, then same shall be taken into consideration. The evaluation of offers would be done as                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |



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**SPECIAL CONDITIONS OF ENQUIRY:  
Annexure-2  
Enquiry No. B/4066/5/4562V1  
Item : Oil Purification Unit  
Project: 5X800MW Yadadari**

### Foreign Supplier

|     |                                          |                                                                                                                                                                                                                                                                                                                                                                                      |  |
|-----|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|     |                                          | per the applicable Tax & Duty structure, prevailing on the date of opening of Price Bid.                                                                                                                                                                                                                                                                                             |  |
| 9.  | <b>Special Instructions/ Requirement</b> | <p>Kindly confirm that the following requirements have been noted and the same shall be complied:</p> <ol style="list-style-type: none"> <li>1. Specification ST39013 (Rev. No.-08) &amp; Addendum 41192896000 Rev.-05 are enclosed.</li> <li>2. <b>Please provide separate offer for conducting test for particle size of impurities on one Oil Purification System.</b></li> </ol> |  |
| 10. | <b>Optional Offers</b>                   | <p>Separate Offer (optional) for conducting the Type test for particle size of impurities on one Oil Purification System is to be submitted along with the offer. Kindly confirm that the same has been done.</p> <p>This option would be exercised at the discretion of BHEL and would be confirmed before opening of price bids.</p>                                               |  |
| 11. | <b>Validity</b>                          | <p>Confirm that validity of the offer shall be 180 days from the due date of opening of Techno-Comml. Offers.</p> <p>BHEL reserves the right to reject any or all quotations, quoting validity less than 180 days.</p>                                                                                                                                                               |  |
| 12. | <b>Basis of Quotation:</b>               | <p><b>For Import Scope of supply:</b></p> <ol style="list-style-type: none"> <li>1. Please quote prices on FOB as well as CFR Mumbai Basis. Freight/shipping charges shall be quoted separately in your offer. <b>Kindly confirm.</b></li> </ol>                                                                                                                                     |  |
|     |                                          | <ol style="list-style-type: none"> <li>2. Please note that BHEL reserves the right to place the order either on FOB or CFR Mumbai basis. In case order is placed on CFR basis then Transportation/shipment from port of origin to Mumbai Port shall be to your account.</li> </ol>                                                                                                   |  |
|     |                                          | <ol style="list-style-type: none"> <li>3. Please Inform Name of your FOB port.</li> </ol>                                                                                                                                                                                                                                                                                            |  |
|     |                                          | <ol style="list-style-type: none"> <li>4. In case of supply on FOB basis, advance intimation to BHEL freight forwarded to be given by bidder before 15 days. The delay on this account shall be on merit basis i.e. for delay attributable to BHEL/BHEL's freight forwarder shall be to BHEL and vice-versa.</li> </ol>                                                              |  |
|     |                                          | <ol style="list-style-type: none"> <li>5. Kindly confirm that the prices have been quoted on firm basis. The offer of the vendors not quoting firm prices is likely to be rejected by BHEL.</li> </ol>                                                                                                                                                                               |  |
|     |                                          | <ol style="list-style-type: none"> <li>6. Transit insurance would be arranged by BHEL. Please send your offer keeping this in view.</li> </ol>                                                                                                                                                                                                                                       |  |

|                                                                                  |                                                                                                                                                                                                                                             |                                                                                                                                                                                            |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p align="center"><b>PPX-BOI DEPARTMENT</b><br/> <b>BHARAT HEAVY ELECTRICALS</b><br/> <b>LIMITED HEEP: HARDWAR-249 403</b><br/> <b>(Uttarakhand)</b><br/> <b>FAX:+911 334 226084/226462</b><br/> <b>TEL: +91 1334 28 1690/1660/1753</b></p> | <p><b>SPECIAL CONDITIONS OF ENQUIRY:</b><br/> <b>Annexure-2</b><br/> <b>Enquiry No. B/4066/5/4562V1</b><br/> <b>Item : Oil Purification Unit</b><br/> <b>Project: 5X800MW Yadadari</b></p> |
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### Foreign Supplier

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|-----|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 13. | <b>Delivery Period:</b>                        | <p>Material is required as per delivery schedule mentioned in the enquiry. However, you are requested to offer your best possible delivery in number of weeks from the date of Purchase Order.</p> <p>If the delivery quoted by you does not meet BHEL's delivery requirement / revised delivery requirement as per site progress, you will be given a chance for reviewing your quoted delivery and inform revised delivery to BHEL. After this, if your delivery does not meet BHEL's required delivery / revised delivery as per site progress, BHEL reserves the right to reject your offer.</p>               |  |
| 14. | <b>Technical Requirement:</b>                  | <p>Please quote your valuable offer as per <b>BHEL Specification No. ST39013 (Rev. 08)</b> (copy enclosed).</p> <p><b>Please ensure that documents submitted with the offer/bid shall be signed and stamped in each page by authorized representative of the bidder.</b></p>                                                                                                                                                                                                                                                                                                                                       |  |
| 15. | <b>Engineering Document/ Document approval</b> | <p>Drawings/Data sheets/Documents/Electrical Write-UP/ Control Panel Drawing/ Quality Plan etc, as called for in the specifications shall be submitted for approval to BHEL for BHEL/customer approval within 30 days of purchase order. Any delay in delivery on account of late submission of drawings shall be to vendors account. BHEL will arrange the approval of the drawings/data sheets/ documents within 30 days of their receipt provided those are complete in all respect.</p>                                                                                                                        |  |
| 16. | <b>Quality Requirements</b>                    | <p>Please submit quality plan in enclosed QP format for BHEL approval. QP has to be in line with ordering documents including BHEL specification and addendum.</p> <p>After placement of P.O. successful vendor's QP shall be forwarded to customer for approval. And customer approved QP to be followed without any financial implications to BHEL.</p> <p>Pre-Inspection would be done by third party inspection agency (LRS/TUV/BV) as per customer approved Quality Plan. Please Confirm.</p> <p>The Charges for Pre-Inspection shall be to the bidders account.</p>                                          |  |
| 17. | <b>Firm &amp; Fixed Prices:</b>                | <p>Confirm that prices will remain firm and fixed during the entire validity and execution of the project.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
| 18. | <b>Penalty (Late Delivery) Clause:</b>         | <p>Kindly confirm that penalty for late delivery w.r.t. contractual delivery shall be applicable at the rate of 0.5% of the total order value per week of delay or part thereof subject to maximum of 10% of the total order value.</p> <p><b>Date of BL/AWB (Airway Bill) shall be treated as delivery date for all purposes.</b></p> <p><i>Loading for deviation in LD clause: In case of deviation in penalty clause, BHEL will evaluate your offer after loading on account of deviation in penalty. Loading will be done to the extent to which it is not agreed to by the bidder (at offered value).</i></p> |  |

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|  | <b>PPX-BOI DEPARTMENT</b><br><b>BHARAT HEAVY ELECTRICALS</b><br><b>LIMITED HEEP: HARDWAR-249 403</b><br><b>(Uttarakhand)</b><br><b>FAX:+911 334 226084/226462</b><br><b>TEL: +91 1334 28 1690/1660/1753</b> | <b>SPECIAL CONDITIONS OF ENQUIRY:</b><br><b>Annexure-2</b><br><b>Enquiry No. B/4066/5/4562V1</b><br><b>Item : Oil Purification Unit</b><br><b>Project: 5X800MW Yadadari</b> |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Foreign Supplier

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| 19. | <b>MDCC<br/>(Material<br/>dispatch<br/>clearance<br/>certificate)<br/>Clause:</b> | Please note that material shall be dispatched only after issue of Material dispatch clearance certificate (MDCC) by BHEL. For issue of MDCC, you are required to submit the set of documents (Packing List, Test certificate, Guarantee certificate etc.) to BHEL in 10 days advance for review and release of MDCC by BHEL before dispatch of the consignment.                                                                                                                                                                                                                                                                                                                                                                                |  |
| 20. | <b>O&amp;M Manual<br/>Requirement:</b>                                            | 02 SETS of O&M Manual (CDs also) of the equipment shall be provided as alongwith the each equipment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| 21. | <b>Supervision of<br/>erection &amp;<br/>commissioning</b>                        | Kindly note that the vendor shall carry out supervision work during Erection & Commissioning at site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
|     |                                                                                   | <p>Confirm that following charges have been quoted separately in your offer:</p> <ol style="list-style-type: none"> <li>1. Per day Charges for Supervision during Erection &amp; Commissioning (lumpsum &amp; inclusive of everything i.e. lodging, fooding, boarding etc.)</li> <li>2. Per Visit Charges for Supervision during Erection &amp; Commissioning.</li> </ol> <p>A total period of 02 day and 1 Visit would be taken for the evaluation of these charges for Each No. of Oil Purification Unit. Bidder to depute supervisor at site within 15 days from the date of intimation. Successful commissioning certificate issues by BHEL site alongwith time sheet shall be applicable for claiming payment of supervision charges.</p> |  |
| 22. | <b>Guarantee<br/>Clause:</b>                                                      | Kindly confirm that Guarantee shall be provided for a period of <b>"36 months from the date of dispatch or 18 months from the date of commissioning, whichever is later"</b> . In case of any failure or trouble reported from site, the supplier should depute their representative immediately to attend the problem and replace the defective component/part if required, without any additional cost to BHEL.                                                                                                                                                                                                                                                                                                                              |  |
|     |                                                                                   | Please note that vendors quoting guarantee less than 24 months from the date of dispatch, shall not be considered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
|     |                                                                                   | In case of deviation is Guarantee Period, offer shall be evaluated with loading @4% per-annum (on pro-rata basis) of quoted material value, for the deviated guarantee period.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|     |                                                                                   | Supplier shall be responsible for free replacement of defective equipment / material at our site                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| 23. | <b>Packing and<br/>Dispatch</b>                                                   | The equipment shall be packed and dispatched in a seaworthy packing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |



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### Foreign Supplier

|                                                                                                                                                                                                                                                                                                                                                          |                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|-----------------------------------|------------|-----------------------------------|--------|------------|---------|-------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------|--|
| 24.                                                                                                                                                                                                                                                                                                                                                      | Deviation:<br>(if any)                                                                                     | Kindly confirm that there is no deviation with respect to BHEL Specifications. However, If there is any deviation with respect to the tender documents then the same should be brought out specifically in separate annexure marked Deviations (Technical/Commercial).                                                                                                                                                                                                                                                                                                                                                                                                                |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
| 25.                                                                                                                                                                                                                                                                                                                                                      | Origin of Quotation:                                                                                       | Quotation should be from the principal / original supplier even if it is submitted through their authorized agent, failing which the quotation is liable to be ignored.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
| 26.                                                                                                                                                                                                                                                                                                                                                      | Payment Terms:                                                                                             | <b>For Material Portion :</b> Payment terms shall be 100% Payment after receipt of material at site.<br><b>Please note that in case of any deviation in penalty clause, BHEL shall evaluate your offer after loading on account of deviation in payment terms.</b><br><b>Loading for Deviation in Payment terms (for Foreign Bidders):</b> BHEL reserves the right to load the offers of vendors for deviation in payment terms mentioned in the enquiry (as above). Base rate of SBI (as on 31st March 2017) + 6% per annum, shall be considered for loading for the period of relaxation sought by bidders. Loading would be done on basic cost of items, as per table given below: |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
|                                                                                                                                                                                                                                                                                                                                                          |                                                                                                            | <b>Loading Criteria :</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
|                                                                                                                                                                                                                                                                                                                                                          |                                                                                                            | <table><tr><td>Terms</td><td>Days of Loading</td></tr><tr><td>After receipt of material at site</td><td>No loading</td></tr><tr><td>Against documents thru Bank (CAD)</td><td>45 day</td></tr><tr><td>Against LC</td><td>60 days</td></tr><tr><td rowspan="2">Against Usance LC</td><td>No loading if usance period &gt;45 days</td></tr><tr><td>Loading of days difference i.e. difference between 60 days and usance period if usance period is &lt;45 days.</td></tr></table>                                                                                                                                                                                                      | Terms           | Days of Loading | After receipt of material at site | No loading | Against documents thru Bank (CAD) | 45 day | Against LC | 60 days | Against Usance LC | No loading if usance period >45 days | Loading of days difference i.e. difference between 60 days and usance period if usance period is <45 days. |  |
|                                                                                                                                                                                                                                                                                                                                                          |                                                                                                            | Terms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Days of Loading |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
|                                                                                                                                                                                                                                                                                                                                                          |                                                                                                            | After receipt of material at site                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | No loading      |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
| Against documents thru Bank (CAD)                                                                                                                                                                                                                                                                                                                        | 45 day                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
| Against LC                                                                                                                                                                                                                                                                                                                                               | 60 days                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
| Against Usance LC                                                                                                                                                                                                                                                                                                                                        | No loading if usance period >45 days                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
|                                                                                                                                                                                                                                                                                                                                                          | Loading of days difference i.e. difference between 60 days and usance period if usance period is <45 days. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
| The payment may be claimed thru bank (i.e. CAD) or directly to BHEL. In case of payment through bank, all bank charges shall be on either side i.e. your bank’s charges shall be to your account and our bank’s charges shall be to our account. In case documents are presented directly to our nominated Banks, bank charges shall be to your account. |                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
| <b>Payment terms for Supervision during Erection &amp; Commissioning:</b><br>100% payment against submission of successful Erection & Commissioning certificate from Project Site and invoice thru Bank.                                                                                                                                                 |                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |
|                                                                                                                                                                                                                                                                                                                                                          |                                                                                                            | In case Bidders insists Payment thru Letter of Credit, BHEL may agree for Un- Confirmed and Irrevocable Letter of Credit and will be opened 60 days prior to the scheduled delivery and will be valid for 90 days.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 |                 |                                   |            |                                   |        |            |         |                   |                                      |                                                                                                            |  |



PPX-BOI DEPARTMENT  
BHARAT HEAVY ELECTRICALS  
LIMITED HEEP: HARDWAR-249 403  
(Uttarakhand)  
FAX:+911 334 226084/226462  
TEL: +91 1334 28 1690/1660/1753

SPECIAL CONDITIONS OF ENQUIRY:  
Annexure-2  
Enquiry No. B/4066/5/4562V1  
Item : Oil Purification Unit  
Project: 5X800MW Yadadari

### Foreign Supplier

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| 27. | <b>Arbitration Clause :</b> | <p>In case of dispute/difference arising out of or in connection with this contract, including any question regarding its existence, validity or termination, shall be referred to and finally resolved by arbitration under the Arbitration and Conciliation Act, 1996 of India by a Sole Arbitrator to be appointed with mutual consent of the parties. Such Sole Arbitrator shall be either a retired judge of Supreme Court or High Court or District Court of India or some Advocate having practiced in Indian Courts. The seat or place of arbitration shall be New Delhi, India. The language to be used in the arbitration shall be English. The governing law of the contract shall be the substantive law of India. In case the parties fail to agree on the appointment of arbitrator within 2 months of the notice invoking arbitration by one party, then the arbitrator shall be appointed in accordance with the Arbitration and Conciliation Act, 1996 of India.</p> <p><b>JURIDICITION:</b> The courts of New Delhi, India, shall have exclusive jurisdiction.</p> |  |
| 28. | <b>Risk Purchase:</b>       | <p>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 / alternative source 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. In case for compelling reasons BHEL accepts the offer without acceptance of this clause by the bidder and in the eventuality of Risk Purchase, appropriate action will be taken as per BHEL extant rules. This will be without prejudice to any other right of BHEL under the contract.</p> <p><b>Please note that deviation in Risk purchase clause shall not acceptable.</b></p>                                                                                        |  |
| 29. | <b>Bill of lading</b>       | <p>1 of 3 Original Bill of lading along with other Non-negotiable documents to be sent to General Manager, Regional Operating Division, Bharat Heavy Electricals Ltd, 14/15th Floor, World Trade Centre-1, Cuffe Parade, Mumbai-400005 within 10 days of shipment.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| 30. | <b>Order Acceptance:</b>    | <p>Ink signed order acceptance shall be furnished within 15 days of order placement. In case, order acceptance do not received within 15 days of order placement, PO deemed to be accepted by you.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |

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|  | <p align="center"><b>PPX-BOI DEPARTMENT</b><br/> <b>BHARAT HEAVY ELECTRICALS</b><br/> <b>LIMITED HEEP: HARDWAR-249 403</b><br/> <b>(Uttarakhand)</b><br/> <b>FAX:+911 334 226084/226462</b><br/> <b>TEL: +91 1334 28 1690/1660/1753</b></p> | <p><b>SPECIAL CONDITIONS OF ENQUIRY:</b><br/> <b>Annexure-2</b><br/> <b>Enquiry No. B/4066/5/4562V1</b><br/> <b>Item : Oil Purification Unit</b><br/> <b>Project: 5X800MW Yadadari</b></p> |
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### Foreign Supplier

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| 31. | <b>Packing, Marking and Identification</b> | Supplier shall arrange for adequately protecting and properly packing the consignment to withstand overseas /overland transport and transshipments en-route so as to avoid loss and damage during transit and also take appropriate measures to prevent metal parts from rusting and corrosion during transit. Supplier shall be responsible for any loss/damage during transit due to defective/inadequate packing.                                                                                          |  |
| 32. | <b>Special instructions</b>                | Mandatory Spares should be packed separately and properly marked to avoid mix-up.                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
| 33. | <b>Dimensions Of Packages</b>              | Certificate of origin shall be a negotiation document for payment. Supplier is to provide certificate of origin duly legalized by Chamber of commerce of originating country. Please confirm.                                                                                                                                                                                                                                                                                                                 |  |
| 34. | <b>Deficiencies and Defective Supplies</b> | Should, any deficiencies be established / suppliers be proved (found) defective, the same shall have to be made good / replaced by the suppliers under "Free of Charge" invoice, at suppliers cost, risk and responsibility.                                                                                                                                                                                                                                                                                  |  |
| 35. | <b>Certificate of Origin</b>               | Certificate of origin shall be a negotiation document for payment. Supplier is to provide certificate of origin duly legalized by Chamber of commerce of originating country. Please confirm.                                                                                                                                                                                                                                                                                                                 |  |
| 36. | <b>Negotiable documents</b>                | Negotiable documents are as under:<br>1) 2 of 3 Original Bill of lading<br>2) Original certificate of origin duly certified by Chamber of commerce of country of origin.<br>3) Original Guarantee certificate<br>4) Original invoice<br>5) Original packing list<br>6) Original release note by BHEL's approved Inspection agency.<br>7) Copy of Material/dispatch clearance certificate (MDCC) from BHEL<br>8) Original Phytosanitary certificate.                                                           |  |
| 37. | <b>BHEL Registration</b>                   | Online Registration Portal is operational in BHEL. Bidders not registered at BHEL, Hardwar for this item; have to apply through Online Registration portal, <a href="https://supplier.bhel.in/">https://supplier.bhel.in/</a> . All credentials and/or documents duly signed and stamped related to registration has to be uploaded on the website and the application submitted for registration. Application registration No (for applying online form) should be mentioned in the techno commercial offer. |  |
| 38. | <b>Reverse Auction:</b>                    | BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA                                                                                                                                 |  |

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|  | <p align="center"><b>PPX-BOI DEPARTMENT<br/>BHARAT HEAVY ELECTRICALS<br/>LIMITED HEEP: HARDWAR-249 403<br/>(Uttarakhand)<br/>FAX:+911 334 226084/226462<br/>TEL: +91 1334 28 1690/1660/1753</b></p> | <p><b>SPECIAL CONDITIONS OF ENQUIRY:<br/>Annexure-2<br/>Enquiry No. B/4066/5/4562V1<br/>Item : Oil Purification Unit<br/>Project: 5X800MW Yadadari</b></p> |
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### Foreign Supplier

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|     |                             | <p>In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid“ in the Reverse Auction. Non-submission of „online sealed bid“ by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.”</p>                                                                                                 |  |
| 39. | <b>Business Dealing:</b>    | <p>Please note that BHEL will deal directly with manufacturer and no correspondence with the agent will be entertained. The ink signed offer / bid in original has to be submitted by the registered manufacturer / OEMs directly to BHEL. Subsequently also, no correspondence of any type shall be entered into with the agents.<br/><b>Bids submitted by agents may not be considered for evaluation and shall be returned to them only, without assigning any reason. Please note the same.</b><br/><b>Also the name of principal supplier should be indicated on envelope in addition to Enquiry no and due date.</b></p> |  |
| 40. | <b>Right of Acceptance:</b> | <p>BHEL reserves the right to reject any or all the quotations without assigning any reasons thereof. BHEL also reserves the right to Increase or decrease the tendered quantities. Vendors should be prepared to accept order for reduced Quantity without any extra charges. Vendor should also be prepared for giving discount in case of Increase in Quantity.</p>                                                                                                                                                                                                                                                         |  |

**Kindly ensure to submit the below Enclosures along with ‘Techno-Commercial Bid’:**

1. Copy / Replica of Price Bid (without prices).
2. Catalog / Leaflet of the Equipment / Instrument.
3. Signed & Stamped copy (each page) of duly filled ‘Annexure-I’ Special terms & conditions of Enquiry.
4. Signed & Stamped copy (each page) of GISTC as token of acceptance.

Consignment weight: Gross / Net weight in Kg (approx.) to be indicated .....

**Signature of supplier with Seal**

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|  | <b>PPX-BOI DEPARTMENT<br/>BHARAT HEAVY ELECTRICALS<br/>LIMITED HEEP: HARDWAR-249<br/>403 (Uttarakhand)<br/>FAX:+911334 226084/226462<br/>TEL: +91 1334 28 1690</b> | <b>SPECIAL CONDITIONS OF<br/>ENQUIRY (Annexure-3)<br/>Enquiry No. B/4066/5/4562V1<br/>Item : Oil Purification Unit<br/>Project : 5X800 MW Yadadari</b> |
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### Indigenous Supplier

| Sl. No | Terms                                                                                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Your confirmation |
|--------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1.     | <b>Submission of Offer</b>                                                                          | The offer/bid shall be signed and stamped on each page by authorized representative of the bidder.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |
| 2.     | <b>Confirmation to General Instructions and Standard Terms &amp; Conditions (GISTC), Revision 1</b> | <p>Please submit signed and stamped copy of General Instructions and Standard Terms &amp; Conditions (enclosed) as your acceptance to these terms and conditions.</p> <p>Deviation to "General Instructions and Standard Terms &amp; Conditions, Revision 1", if any, shall be submitted along with offer in separate documents.</p> <p>Please note that in case no- deviation sheet of "General Instructions and Standard Terms &amp; Conditions, Revision 1", is received along with offer, it will be presumed that all terms and conditions mentioned in "General Instructions and Standard Terms &amp; Conditions, Revision 1", shall be acceptable to you and your offer will be processed accordingly.</p> |                   |
| 3.     | <b>Customer approval requirement</b>                                                                | <p>End User approval is mandatory requirement for considering your offer in this tender. The offers meeting pre-qualification requirement will be referred to the End User for approval.</p> <p>Price bid of the offer of only those bidders who meet pre-qualification requirement, technical requirement and approved by the End User will be considered for price bid opening.</p>                                                                                                                                                                                                                                                                                                                             |                   |
| 4.     | <b>Technical Spec &amp; Checklist</b>                                                               | <p>Technical Spec Applicable:</p> <ul style="list-style-type: none"> <li>ST39013 Rev. 08 (In order to reduce the time for technical scrutiny, we have prepared a checklist and the same is enclosed (Annexure VII of ST39013).</li> <li>Annexure-B to spec ST39013 Rev 08</li> <li>Doc. No. 41192896000 Rev. 05 addendum to spec ST39013 Rev. 08</li> </ul> <p>You are requested to submit your technical offer along with duly filled in checklist.</p>                                                                                                                                                                                                                                                          |                   |
| 5.     | <b>Document Checklist</b>                                                                           | <p>Kindly confirm that the following documents have been submitted along with your offer:</p> <ol style="list-style-type: none"> <li>1. Requisite EMD</li> <li>2. Pre-Qualification Requirements (as defined in <b>Annexure-C</b>).</li> <li>3. Complete Technical offer with relevant drawings/ documents /QP etc. (as per special instructions mentioned in <b>Annexure-B</b>).</li> </ol>                                                                                                                                                                                                                                                                                                                      |                   |

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|  | <b>PPX-BOI DEPARTMENT</b><br><b>BHARAT HEAVY ELECTRICALS</b><br><b>LIMITED HECP: HARDWAR-249</b><br><b>403 (Uttarakhand)</b><br><b>FAX:+911334 226084/226462</b><br><b>TEL: +91 1334 28 1690</b> | <b>SPECIAL CONDITIONS OF</b><br><b>ENQUIRY (Annexure-3)</b><br><b>Enquiry No. B/4066/5/4562V1</b><br><b>Item : Oil Purification Unit</b><br><b>Project : 5X800 MW Yadadari</b> |
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### Indigenous Supplier

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|    |                                                   | 4. Experience Details<br>5. Any other document as specified in “ <b>Instructions to Bidders</b> ”.<br>6. Please note that all details required in supplier registration form to be filled and submitted on online supplier registration portal on <a href="http://www.bhel.com">www.bhel.com</a> along with complete documents.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| 6. | <b>Special Instruction</b>                        | Please note that as per BHEL’s Policy, we cannot allow Price impact for the requirement / scope of supply, which is a part of specifications of our tender enquiry. Hence please read all specification / documents thoroughly and submit your offer as per specifications of tender enquiry.<br><br>In case of any confusion / un-clarity on any of the clause / requirement of specification, please clarify the same from BHEL before submission of offer.<br><br>No deviation & request regarding un-clarity / contradictory conditions / ambiguity of specifications would be entertained after opening of techno-commercial offers. Further no price impact would be allowed for the requirement which is already part of the specifications of the tender enquiry, after opening of techno-commercial offers.<br>Please note and confirm. |  |
| 7. | <b>Evaluation criteria</b>                        | Evaluation would be done on the basis of total landed cost for the complete requirement covered in the enquiry<br>Considering total material value, supervision charges, type test charges (if applicable), taxes & duties, Freight, Insurance, and Commercial Loading etc.).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
| 8. | <b>Statutory Variation and Taxes &amp; Duties</b> | Any statutory change/revision in taxes & duties as and when implemented by the Government OF India shall become applicable in addition to or in lieu of existing tax structure, then same shall be taken into consideration. The evaluation of offers would be done as per the applicable Tax & Duty structure, prevailing on the date of opening of Price Bid.<br><br>Details of applicable Taxes & Duties are to be mentioned as per clause 11 of General Instructions and Standard Terms & Conditions for bidding against Tender Enquiry (GISTC), Revision 1. In this regard, following information is to be specifically mentioned in the offer: <ol style="list-style-type: none"> <li>Name of the vendor</li> <li>GST Registration Number.</li> <li>Address of Principal place of Business</li> </ol>                                      |  |

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### Indigenous Supplier

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|     |                                          | <p>d. Type of Business</p> <p>e. HSN Code, its description and rate of applicable GST for the offered material.</p> <p>f. Whether registered under Composite scheme of GST (Y/N)</p> <p>g. During despatch of item Vendor will quote vendor's &amp; BHEL's GST no. on GST portal.</p> <p>h. Confirmation regarding online entry of vendor's sale at the time of despatch quoting BHEL's GST no. on GST portal.</p> <p>In case on line entry does not appear to BHEL at the time of vendor's payment, GST will not be paid and shall be deducted from bill.</p>                   |  |
| 9.  | <b>Special Instructions/ Requirement</b> | <p>Kindly confirm that the following requirements have be noted and the same shall be complied:</p> <ol style="list-style-type: none"> <li>1. Specification ST39013 (Rev. No.-08) &amp; Addendum 41192896000 Rev.-05 are enclosed.</li> <li>2. <b>Please provide separate offer for conducting test for particle size of impurities on one Oil Purification System.</b></li> </ol>                                                                                                                                                                                               |  |
| 10. | <b>Optional Offers</b>                   | <p>Separate Offer (optional) for conducting the Type test for particle size of impurities on one Oil Purification System is to be submitted along with the offer. Kindly confirm that the same has been done.</p> <p>This option would be exercised at the discretion of BHEL and would be confirmed before opening of price bids.</p>                                                                                                                                                                                                                                           |  |
| 11. | <b>Validity</b>                          | <p>Confirm that validity of the offer shall be 180 days from the due date of opening of Techno-Comml. Offers.</p> <p>BHEL reserves the right to reject any or all quotations, quoting validity less than 180 days.</p>                                                                                                                                                                                                                                                                                                                                                           |  |
| 12. | <b>Basis of quotation</b>                | <p>Kindly Confirm that material prices have been quoted on Ex-Works with freight Pre-paid up to destination basis. The goods can be dispatched through any Bank approved transporters having their branch at Haridwar. The names and addresses of transporters approved by IBA as well as BHEL are posted at our website <a href="http://www.bhelhwr.co.in">www.bhelhwr.co.in</a>.</p> <p>Pls. note that, if you dispatch the material by any BHEL un-approved transporter then you will be required to furnish the MRC (Material Receipt Certificate) from Project Site for</p> |  |

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### Indigenous Supplier

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|     |                                                | processing of your invoice. No demurrage charges would be borne by BHEL.                                                                                                                                                                                                                                                                                                                                                                                                             |  |
|     |                                                | Kindly confirm that the prices have been quoted on firm basis. The offer of the vendors not quoting firm prices is likely to be rejected by BHEL.                                                                                                                                                                                                                                                                                                                                    |  |
|     |                                                | Transit insurance would be arranged by BHEL. Please send your offer keeping this in view.                                                                                                                                                                                                                                                                                                                                                                                            |  |
|     |                                                | Applicable GST should be indicated separately and clearly in the quotation, else it will be concluded that the offer is inclusive of these Taxes & Duties.                                                                                                                                                                                                                                                                                                                           |  |
|     |                                                | The price comparison will be on the basis of total cost involved for delivery up to Site. Offers shall be loaded (if required) for applicable duties/taxes and other charges involved for delivery up to Site as per BHEL practice/ statutory rates.                                                                                                                                                                                                                                 |  |
| 13. | <b>Delivery :</b>                              | You are requested to offer your best possible delivery in number of weeks/ months.                                                                                                                                                                                                                                                                                                                                                                                                   |  |
|     |                                                | If the delivery quoted by you does not meet BHEL's delivery requirement / revised delivery requirement as per site progress, you will be given a chance for reviewing your quoted delivery and inform revised delivery to BHEL. After this, if your delivery does not meet BHEL's required delivery / revised delivery as per site progress, BHEL reserves the right to reject your offer.                                                                                           |  |
| 14. | <b>Technical Requirement:</b>                  | Please quote your valuable offer as per <b>BHEL Specification No. ST39013 (Rev. 08)</b> (copy enclosed).                                                                                                                                                                                                                                                                                                                                                                             |  |
|     |                                                | Please ensure that documents submitted with the offer/bid shall be signed and stamped in each page by authorized representative of the bidder.                                                                                                                                                                                                                                                                                                                                       |  |
| 15. | <b>Engineering Document/ Document approval</b> | Drawings/Data sheets/Documents/Electrical Write-UP/ Control Panel Drawing/ Quality Plan etc, as called for in the specifications shall be submitted for approval to BHEL for BHEL/customer approval within 30 days of purchase order. Any delay in delivery on account of late submission of drawings shall be to vendors account. BHEL will arrange the approval of the drawings/data sheets/ documents within 30 days of their receipt provided those are complete in all respect. |  |
| 16. | <b>Penalty for Late Delivery</b>               | Penalty for Late Delivery would be applicable @ 0.5% of the total order value per week of delay or part thereof subject to a maximum of <b>10% of the total order value</b> . The date of GR would be treated as the date of delivery for penalty purposes.                                                                                                                                                                                                                          |  |

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### Indigenous Supplier

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|-----|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|     |                                                     | Pls. note that BHEL reserves the right to load your offer to the extent to which penalty is not agreed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
| 17. | <b>Supervision of erection &amp; commissioning.</b> | <p>Kindly note that the vendor shall carry out supervision work during Erection &amp; Commissioning at site.</p> <p>Confirm that following charges have been quoted separately in your offer:</p> <ol style="list-style-type: none"> <li>1. Per day Charges for Supervision during Erection &amp; Commissioning (lumpsum &amp; inclusive of everything i.e. lodging, fooding, boarding etc.)</li> <li>2. Per Visit Charges for Supervision during Erection &amp; Commissioning.</li> </ol> <p>A total period of 02 day and 1 Visit would be taken for the evaluation of these charges for Each No. of Oil Purification Unit.</p> <p>Kindly confirm that the quoted Supervision charges are inclusive of applicable Service Tax.</p> <p>In case service charges are exclusive of applicable GST then mention explicitly.</p> <p>Rate of GST on Supervision and HSN Code</p>                                                                                                                                                                                                                                                                                                                                                    |  |
| 18. | <b>Payment Terms</b>                                | <p><b>Payment terms for Material Portion:</b> 100% payment shall be made after receipt of material at Project Site. Material receipt certificate from BHEL will be part of negotiation document for claiming payment.</p> <p>The payment may be claimed thru bank (i.e. CAD) or directly to BHEL. In case of payment through bank, all bank charges shall be on either side i.e. your bank's charges shall be to your account and our bank's charges shall be to our account. In case documents are presented directly to our nominated Banks, bank charges shall be to your account.</p> <p><b>Payment terms for Supervision during Erection &amp; Commissioning:</b></p> <p>100% payment against submission of successful Erection &amp; Commissioning certificate from Project Site and invoice thru Bank.</p> <p>No Deviation in payment terms is allowed for Supervision during E&amp;C.</p> <p>For deviation in Payment Terms for Material Portion, BHEL reserves the right to load the offers of vendors for deviation in payment terms mentioned in the enquiry. Base rate of SBI (as on 31st March 2017) + 6% per annum, shall be considered for loading for the period of relaxation sought by bidders. Loading</p> |  |



**PPX-BOI DEPARTMENT  
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LIMITED HEEP: HARDWAR-249  
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TEL: +91 1334 28 1690**

**SPECIAL CONDITIONS OF  
ENQUIRY (Annexure-3)  
Enquiry No. B/4066/5/4562V1  
Item : Oil Purification Unit  
Project : 5X800 MW Yadadari**

### Indigenous Supplier

|                                                                      |                      | would be done on basic cost of items, as mentioned below and the same would be confirmed before price bid opening:                                                                                                                                                                                                                                                                                                      |               |                 |                                                                      |            |                                       |    |  |
|----------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------|----------------------------------------------------------------------|------------|---------------------------------------|----|--|
|                                                                      |                      | <table><tr><th>Payment Terms</th><th>Days of Loading</th></tr><tr><td>Against Delivery at BHEL Site (against Material Receipt Certificate)</td><td>No Loading</td></tr><tr><td>Against documents through bank (CAD):</td><td>30</td></tr></table>                                                                                                                                                                       | Payment Terms | Days of Loading | Against Delivery at BHEL Site (against Material Receipt Certificate) | No Loading | Against documents through bank (CAD): | 30 |  |
| Payment Terms                                                        | Days of Loading      |                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                 |                                                                      |            |                                       |    |  |
| Against Delivery at BHEL Site (against Material Receipt Certificate) | No Loading           |                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                 |                                                                      |            |                                       |    |  |
| Against documents through bank (CAD):                                | 30                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                 |                                                                      |            |                                       |    |  |
| 19.                                                                  | Quality Requirements | <p>Please submit quality plan in enclosed QP format for BHEL approval. QP has to be in line with ordering documents including BHEL specification and addendum.</p>                                                                                                                                                                                                                                                      |               |                 |                                                                      |            |                                       |    |  |
|                                                                      |                      | After placement of P.O. successful vendor's QP shall be forwarded to customer for approval.                                                                                                                                                                                                                                                                                                                             |               |                 |                                                                      |            |                                       |    |  |
|                                                                      |                      | <p>Pre-Inspection would be done by BHEL nominated inspection Agency (BVIL) as per customer approved Quality Plan. Please Confirm.</p> <p>The Charges for Pre-Inspection would be borne by BHEL. However at least 15 days' notice is to be provided for arranging Pre-Inspection.</p>                                                                                                                                    |               |                 |                                                                      |            |                                       |    |  |
| 20.                                                                  | MDCC clause          | The Test Certificates/Inspection reports will be submitted to BHEL for review and acceptance before dispatch of Material. The Material Dispatch Clearance (MDCC) will be provided within 07 days of receipt of documents, provided those are complete in all respects.                                                                                                                                                  |               |                 |                                                                      |            |                                       |    |  |
| 21.                                                                  | Guarantee            | <p>Kindly confirm that Guarantee shall be provided for a period of <b>"36 months from the date of dispatch or 18 months from the date of commissioning, whichever is later"</b>. In case of any failure or trouble reported from site, the supplier should depute their representative immediately to attend the problem and replace the defective component/part if required, without any additional cost to BHEL.</p> |               |                 |                                                                      |            |                                       |    |  |
|                                                                      |                      | Please note that vendors quoting guarantee less than 24 months from the date of dispatch, shall not be considered.                                                                                                                                                                                                                                                                                                      |               |                 |                                                                      |            |                                       |    |  |
|                                                                      |                      | In case of deviation is Guarantee Period, offer shall be evaluated with loading @4% per-annum (on pro-rata basis) of quoted material value, for the deviated guarantee period.                                                                                                                                                                                                                                          |               |                 |                                                                      |            |                                       |    |  |

|                                                                                   |                                                                                                                                                                                                  |                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>PPX-BOI DEPARTMENT</b><br><b>BHARAT HEAVY ELECTRICALS</b><br><b>LIMITED HEEP: HARDWAR-249</b><br><b>403 (Uttarakhand)</b><br><b>FAX:+911334 226084/226462</b><br><b>TEL: +91 1334 28 1690</b> | <b>SPECIAL CONDITIONS OF</b><br><b>ENQUIRY (Annexure-3)</b><br><b>Enquiry No. B/4066/5/4562V1</b><br><b>Item : Oil Purification Unit</b><br><b>Project : 5X800 MW Yadadari</b> |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Indigenous Supplier

|     |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
|-----|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|     |                                                      | Supplier shall be responsible for free replacement of defective equipment / material at our site                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
| 22. | <b>Arbitration, Risk Purchase &amp; FORCE AJEURE</b> | Kindly confirm Arbitration, Risk Purchase & Force Majeure shall be applicable as per GISTC (copy enclosed).                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| 23. | <b>Deficiencies and Defective Supplies</b>           | Should, any deficiencies be established / suppliers be proved (found) defective, the same shall have to be made good / replaced by the suppliers under "Free of Charge" invoice, at suppliers cost, risk and responsibility.                                                                                                                                                                                                                                                                                                                        |  |
| 24. | <b>General terms</b>                                 | Right of Acceptance – BHEL reserves the right to reject any or all the quotations without assigning any reasons thereof. <b>BHEL also reserves the right to Increase or decrease the tendered quantities.</b> Vendors should be prepared to accept order for reduced Quantity without any extra charges. Vendor should also be prepared for giving discount in case of Increase in Quantity.                                                                                                                                                        |  |
|     |                                                      | Confirm that there is no deviation with respect to BHEL Specifications. However, deviations, if any, are to be listed as a separate attachment. The additional price, if any, for withdrawal of these deviations must be provided. The offers that do not meet the substantial requirements of our enquiry are liable to be ignored. The bidders shall be deemed to comply with all the requirements of bidding documents except for listed deviations without any extra cost irrespective of any mention to the contrary anywhere else in the bid. |  |
|     |                                                      | Please note no revision in the prices or submission of supplementary price bid will be allowed during the validity of the offer. However if there is any change by BHEL w.r.t. original specifications/ requirement/ scope/terms and conditions, the bidders may be asked by BHEL to submit only the price impact bid for such changes only                                                                                                                                                                                                         |  |
|     |                                                      | Confirm that Approx. Weight and Volume of the packages has been mentioned in the Techno-Commercial Offer (Part – 1).                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|     |                                                      | Origin of Quotation: The quotation should be from the principal/original supplier even if it is submitted through their authorized agents, failing which the quotation is liable to be ignored.                                                                                                                                                                                                                                                                                                                                                     |  |
|     |                                                      | Please note that BHEL will deal directly with manufacturer and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |



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**SPECIAL CONDITIONS OF  
ENQUIRY (Annexure-3)  
Enquiry No. B/4066/5/4562V1  
Item : Oil Purification Unit  
Project : 5X800 MW Yadadari**

### Indigenous Supplier

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | no correspondence with the agent will be entertained. The ink signed offer / bid in original has to be submitted by the registered manufacturer / OEMs directly to BHEL. Subsequently also, no correspondence of any type shall be entered into with the agents. <b>Bids submitted by agents may not be considered for evaluation and shall be returned to them only, without assigning any reason. Please note the same.</b><br><b>Also the name of principal supplier should be indicated on envelop in addition to Enquiry no and due date.</b> |  |
|  | Ink signed order acceptance shall be furnished within 15 days of order placement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
|  | All envelopes to be marked with whether "Priced Bid" (Part – 2) or "Un-Priced Bid Cum Techno-Commercial Bid" (Part – 1). <b>The replica of Priced Bid (without prices) would be necessarily submitted along with Part-1 of the offer.</b>                                                                                                                                                                                                                                                                                                          |  |
|  | Pl. Confirm that the prices will remain firm during the entire validity and execution of the Project.                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|  | BHEL also reserves the right to Increase or decrease the tendered quantities. Vendor should be prepared to accept order for reduced Quantity without any extra charges. Vendor should also be prepared for giving discount in case of Increase in Quantity                                                                                                                                                                                                                                                                                         |  |
|  | Please note that no revision in the prices or submission of supplementary price bid will be allowed during the validity of the offer. However if there is any change by BHEL w.r.t. original specifications/ requirement/ scope/terms and conditions, the bidders may be asked by BHEL to submit only the price impact bid for such changes only                                                                                                                                                                                                   |  |
|  | Confirm that Approx. Weight and Volume of the packages has been mentioned in the Techno-Commercial Offer (Part – 1).                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
|  | Please note that in unlikely event of delay in dispatches (for reasons attributed to either side) your invoices would be processed after suitable deduction as per PO clause. Any issue/ dispute regarding deduction of penalty for LD can be settled later on. This would help in earlier processing of invoice.                                                                                                                                                                                                                                  |  |

|                                                                                   |                                                                                                                                                                    |                                                                                                                                                        |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
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### Indigenous Supplier

|            |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
|------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|            |                          | Kindly confirm that the prices for Recommended Spares have been quoted separately in your offer and the prices for these spares would remain valid for entire guarantee period.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| <b>25.</b> | <b>O&amp;M Manuals</b>   | Kindly confirm that in the event of ordering, 02 Sets of O&M Manuals would be kept inside the dispatch box of Oil Purification Unit & the same shall also be mentioned in your Shipping/Packing List.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
| <b>26.</b> | <b>Order Acceptance:</b> | Ink signed order acceptance shall be furnished within 15 days of order placement. In case, order acceptance do not received within 15 days of order placement, PO deemed to be accepted by you.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| <b>27.</b> | <b>Reverse Auction:</b>  | BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA<br>In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid“ in the Reverse Auction. Non-submission of „online sealed bid“ by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.” |  |
| <b>28.</b> | <b>Business Dealing:</b> | Please note that BHEL will deal directly with manufacturer and no correspondence with the agent will be entertained. The ink signed offer / bid in original has to be submitted by the registered manufacturer / OEMs directly to BHEL. Subsequently also, no correspondence of any type shall be entered into with the agents.<br><b>Bids submitted by agents may not be considered for evaluation and shall be returned to them only, without assigning any reason. Please note the same.</b><br><b>Also the name of principal supplier should be indicated on envelope in addition to Enquiry no and due date.</b>                                                                                                                                                                                                                                                                                    |  |

|                                                                                   |                                                                                                                                                                    |                                                                                                                                                        |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>PPX-BOI DEPARTMENT<br/>BHARAT HEAVY ELECTRICALS<br/>LIMITED HEEP: HARDWAR-249<br/>403 (Uttarakhand)<br/>FAX:+911334 226084/226462<br/>TEL: +91 1334 28 1690</b> | <b>SPECIAL CONDITIONS OF<br/>ENQUIRY (Annexure-3)<br/>Enquiry No. B/4066/5/4562V1<br/>Item : Oil Purification Unit<br/>Project : 5X800 MW Yadadari</b> |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|

#### **Indigenous Supplier**

|     |                             |                                                                                                                                                                                                                                                                                                                                                                 |  |
|-----|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 29. | <b>Right of Acceptance:</b> | BHEL reserves the right to reject any or all the quotations without assigning any reasons thereof. BHEL also reserves the right to Increase or decrease the tendered quantities. Vendors should be prepared to accept order for reduced Quantity without any extra charges. Vendor should also be prepared for giving discount in case of Increase in Quantity. |  |
|-----|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

***Kindly ensure to submit the below Enclosures along with 'Techno-Commercial Bid':***

1. **Copy / Replica of Price Bid (without prices).**
2. **Catalog / Leaflet of the Equipment / Instrument.**
3. **Signed & Stamped copy (each page) of duly filled 'Annexure-I' Special terms & conditions of Enquiry.**
4. **Signed & Stamped copy (each page) of GISTC as token of acceptance**

**(Signature of the Vendor with Seal)**



## BHARAT HEAVY ELECTRICALS LIMITED

HEEP-HARIDWAR, UTTARAKHAND (249403)

### General Instructions and Standard Terms & Conditions for bidding against Tender Enquiry (GISTC) For Foreign Bidders (Version June-2017, Rev: 01)

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20. NON-DISCLOSURE AGREEMENT.
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22. INFORMATION TO THE BIDDERS.
23. NOTE.

#### 1. GENERAL.

These general terms & conditions shall apply to all the Tender Enquiries, notice inviting tenders, request for quotations concerning the supply of goods and / or rendering of services to Bharat Heavy Electricals Ltd., HEEP, Haridwar (hereinafter referred to as BHEL or the Purchaser).

#### 2. ORIGIN OF QUOTATION.

- a) The quotation should preferably be from the principal bidder. However tender specific authorized registered dealer / agent can also submit the bid on

their behalf, failing which the quotation is liable to be ignored. BHEL prefers to deal directly with the principal manufacturers.

- b) An agent cannot quote on behalf of more than one principal in the same Tender Enquiry.

#### 3. SUBMISSION OF TENDER.

- a) Bid / Quotation must be enclosed in sealed cover on which tender enquiry number and the due date MUST BE written and be invariably sent under REGISTERED POST / SPEED POST / COURIER / Dropped in the Tender Box: addressed as follows:-

Quotation Against Enquiry No. \_\_\_\_\_

Dated: \_\_\_\_\_

Due on: \_\_\_\_\_

To,  
THE HEAD OF MATERIALS MANAGEMENT,  
Heavy Electrical Equipment Plant,  
Bharat Heavy Electricals Limited,  
HARIDWAR-249403 (Uttarakhand), INDIA.

- b) In case of Three / Two Part Bid, technical bid containing technical offer, duly signed; and un-priced copy of the Price Bid should be kept in one envelope. Price Bid containing only the price should be kept in a separate envelope. All envelopes indicating Part-1 or Part-2 or Part-3 as the case may be to be put in a bigger envelope. Please note that un-priced bid should be the exact replica of price bid but without prices.
- c) The bid / quotation must be posted before due date, keeping allowance for postal transit time. Alternatively, the tenders duly sealed and superscribed as above may be deposited in the Tender Box. Quotations sent by any mode but not received

**## Quotations / Bids not in accordance with General Instructions and Standard Terms & Conditions are likely to be ignored.**



## BHARAT HEAVY ELECTRICALS LIMITED

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in time will be ignored. Tender received through authorized E-mail is also acceptable. However, in time submission of tender in tender box shall be the responsibility of the bidder, sent through any mode. Documents submitted with the offer / bid shall be signed and stamped in each page by authorized representative of the bidder.

- d) Any additional documents submitted by supplier / bidder, during processing of registration application / tender or after placement of order shall not be accepted unless it is submitted with forwarding letter and duly signed and stamped as mentioned above in clause c.
- e) 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 cutting / overwriting in the bid / offer must be duly attested by the signatories to the bid. The list of firms banned by BHEL is available on BHEL web site [www.bhel.com](http://www.bhel.com).
- f) 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 of such PMD vendor from BHEL's approved vendor list.
- g) The bidders will submit Integrity Pact, duly signed by its authorized signatory, along with their bids wherever estimated tender value is Rs. 5 Crore or more.
- h) In case of open tender, the unregistered bidder shall submit inter alia duly filled-in Supplier Registration Form (SRF) along with the bid. Bidders can download the SRF from [www.bhel.com](http://www.bhel.com)

- i) BHEL reserves the right to award tendered quantities among more than one bidder (after acceptance of L1 price by the other bidders). BHEL can also consider awarding of part of the tendered quantity to other than L-1 bidder at L1 counter offered rates, if the quantity offered by the L-1 bidder is less than the quantity tendered for.
- j) BHEL may also reduce the Tender Quantity for offering it to Micro & Small Enterprise (MSE) Indian Vendors as per applicable Government of India rules whose prices are within 15% of L1 prices as per directives of Government of India.

#### 4. TENDER OPENING.

Tender opening is scheduled to start in the Tender Room at 2:00 PM, on the due date. Therefore bid/quotations must reach this office / tender Box latest by 1:45 PM on due date. Only participating bidders are allowed to attend tender opening. **TENDERS RECEIVED AFTER THE SPECIFIED TIME OF THEIR 'SUBMISSION' WILL BE TREATED AS LATE TENDERS AND SHALL NOT BE CONSIDERED UNDER ANY CIRCUMSTANCES.** The bidders or their authorized representatives may be allowed to attend tender opening if duly authorized by their principals, through a tender specific letter, for price bid opening on that particular day. General authorization letter is not acceptable.

#### 5. SPECIFICATION, DRAWINGS & STANDARD.

- a) Bidders must give their detailed specification in the quotation along with relevant technical literature / catalogue etc. against the tender enquiry.
- b) The Bid should be accompanied with relevant copies of catalogues, drawings or specification as per tender enquiry. If these documents are not furnished, the offer is liable to be rejected.

**## Quotations / Bids not in accordance with General Instructions and Standard Terms & Conditions are likely to be ignored.**



## BHARAT HEAVY ELECTRICALS LIMITED

HEEP-HARIDWAR, UTTARAKHAND (249403)

### General Instructions and Standard Terms & Conditions for bidding against Tender Enquiry (GISTC) For Foreign Bidders (Version June-2017, Rev: 01)

- c) Wherever national / international (N/IN) standards are referred, the latest N/IN standards are to be followed. Mention year & date of standard revision that shall be followed for the supply.
- d) All Drawings and Standards are proprietary of BHEL. It must not be used in anyway detrimental to the interest of the company.

#### 6. PRICE SCHEDULE.

- a) 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.
- b) Prices quoted should not be more than the prices quoted to any other BHEL units / offices / divisions. Vendor to submit copy of latest Purchase Order placed by any unit of BHEL for similar items in the technical bid. In case no order has been placed on such items, specific confirmation that no order has been placed on such items should be provided.
- c) Bidders need to quote their prices on CFR any sea port in Mumbai or FCA basis to the named airport in Euro / USD / JPY / UK Pound / SF / Singapore Dollar or any other Internationally freely tradable currency only. The name of the currency should be clearly indicated in your bids.
- d) Offers received other than CFR basis may result in non-consideration of such bids.
- e) However if BHEL agrees to accept the FOB condition, to arrive at landed cost at our plant / site, the FOB prices shall be loaded for 3% (of FOB Value) towards marine insurance, port handling charges & inland freight or actual freight / port handling charges as per BHEL contract whichever is higher.

#### f) Basis of Evaluation for Bid / Quotation in foreign currency:

- I. Currency exchange rate (TT selling rates of SBI) for evaluation of the bid/quotation received in foreign currency will be as follows:
- II. Single part bid – Date of tender opening.
- III. Two / Three part bid – Date of part 1 opening.
- IV. Reverse auction – Date of part-1 opening.

NB: Financial evaluation of L1, L2 ----- status will be on the basis of Landed Cost to BHEL.

#### g) Evaluation of Indian Agents Commission:

- I. BHEL prefers to deal directly with foreign bidder, wherever required, for procurement of Goods. However if the Foreign Principal desires to avail services of an Indian Agent then the Principal should ensure compliance to applicable guidelines.
- II. The FOB / CIF price quoted will be deemed to be inclusive of Indian Agency commission. Agency commission if payable shall be converted to Indian Rupees at TT buying rates of exchange ruling on tender opening date which shall not be subjected to any further exchange rate variation, as disclosed by the bidder in his quoted FOB / CIF price will be paid in Indian Rupees on receipt & acceptance of Materials or it's installation at destination, as the case may be. The lower of the TT buying rate prevailing on the date of technical bid opening shall be considered for computation of Agency commission.
- III. In a tender either the Indian Agent on behalf of Principal / OEM or the Principal / OEM itself can bid, but both cannot bid simultaneously for same item / product in the same Tender. If both OEM and its authorized agent submit their bids

**## Quotations / Bids not in accordance with General Instructions and Standard Terms & Conditions are likely to be ignored.**



## BHARAT HEAVY ELECTRICALS LIMITED

HEEP-HARIDWAR, UTTARAKHAND (249403)

### General Instructions and Standard Terms & Conditions for bidding against Tender Enquiry (GISTC) For Foreign Bidders (Version June-2017, Rev: 01)

separately in that case only the offer of OEM can be considered as an exception.

#### h) While submitting your bids please clearly indicate:

- I. Expected weight of goods (lots wise).
- II. The size of packed goods.
- III. Whether the goods can be dispatched in containers?
- IV. Port of Loading.
- V. Port of Discharge.

#### 7. REVERSE AUCTION.

- a) BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after Techno-Commercial Evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides for RA. Detailed guidelines available at our site [www.bhel.com](http://www.bhel.com)
- b) In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'online sealed bid' in the Reverse Auction. Non-Submission of 'online sealed bid' by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

#### 8. DELIVERY TERMS.

- a) Goods shall be dispatched by sea, unless stated otherwise in the tender enquiry or purchase order.

- b) In the event of bidder offering CFR delivery terms for delivery in FCL (Full Container Load), the bidder shall provide 21 days' time free of detention for General Purchase Container / High Cube Container and 14 days for the other types from the date of delivery at delivery port. Wherever the detention free period offered is less than the above specified period, the consequential cost at port of clearance shall be to the account of the bidder. Number of detention free days must be mentioned on Bill of Lading (BL).
- c) In case of CFR delivery, Port congestion charges or any additional charges claimed by shipping line till delivery at destination port shall be to the bidder's account.
- d) Specifically confirm your agreement to change the mode by Air at BHEL's request as per mutually agreed terms even after placement of Purchase Orders.
- e) The Trans-shipment is not permissible in case of Break Bulk Cargo. In rest of the case Trans-shipment condition in BHEL purchase order / letter of credit will be as per Uniform Custom and Practice for documentary credits, UCP 600 of International Standard Bank proceed re-issued by International chamber of Commerce (ICC).
- f) No demurrage / godown rent will be payable to the vendor / vendor's transporter for any delay in payments attributable to the vendor.
- g) The shipping line should be ready to move the containers to consignees nominated CFS (Container Freight Station) yard and Indian agent of shipping line should issue Cargo Arrival Notice (CAN) 7 days in advance for filing the IGM (Import General Manifest) at discharge port.

**## Quotations / Bids not in accordance with General Instructions and Standard Terms & Conditions are likely to be ignored.**



## BHARAT HEAVY ELECTRICALS LIMITED

HEEP-HARIDWAR, UTTARAKHAND (249403)

### General Instructions and Standard Terms & Conditions for bidding against Tender Enquiry (GISTC) For Foreign Bidders (Version June-2017, Rev: 01)

- h) In case of CFR contract, bidder to supply the material through a Certified Sea worthy vessel.
- i) A certificate of origin (COO) sanctioned in country of origin from chamber of commerce of the manufacturing country is mandatory to be provided. However a certificate of origin (COO) from the countries under the restricted list of Govt. of India will not be acceptable.
- j) For reasons of delay in receipt of documents from suppliers or due to the same being found to be incomplete, and / or faulty, the suppliers shall be responsible to reimburse in all demurrages / wharfages, if any paid by BHEL (for stated reasons).
- k) **The invoices being issued by shipping lines must be in the name of BHEL. Otherwise, BHEL will have to forego Input Credit on GST.**
- l) While booking the shipment, bidder to also finalize **destination charges** and the same should appear over BL or agreed tariff to be provided to BHEL before arrival of shipment.
- m) If cargo is stuffed in container then the same should be allowed to be moved to CFS of importers choice without any additional charges.
- n) Load port charges shall be settled by the supplier and not be passed on to BHEL in form of destination charges.
- o) NNDs (Non Negotiable Documents) (preferably with OBLs) should be sent at least 7 days in advance i.e. 7 days before the arrival of vessel so as to enable BHEL to move the containers to JWC CFS.
- p) **Information related to OBL / AWB Documents:**
- I. Consignee name and address should be same as mentioned in the Purchase order.
- II. Notify party: Name and address will be as follows :( For discharge port Mumbai or Nhava Sheva)  
Bharat Heavy Electricals Limited  
14th Floor World Trade Centre-1, Cuffe Parade, Colaba, Mumbai -400005  
Email: [msseahwr@bhel.in](mailto:msseahwr@bhel.in) &  
[ppximx@bhelhwr.co.in](mailto:ppximx@bhelhwr.co.in) (in case of Sea Shipments)  
Email: [msair@bhel.in](mailto:msair@bhel.in) and  
[ppximx@bhelhwr.co.in](mailto:ppximx@bhelhwr.co.in) ( in Case of Air shipments)  
For latest updating please refer our web site:  
[www.bhelhwr.co.in](http://www.bhelhwr.co.in)
- III. OBL should clearly mention the Indian agent address and contact details.
- IV. OBL should be issued as per UCP 600.
- V. In case of incoterms other than FOB, OBL should mention the container detention free period.
- VI. In case of placement of an Order, BHEL requests bidder to supply one Original Bill of Lading / AWB directly to their Mumbai office with other non-negotiable documents to ensure timely clearance of goods. The other Original Bill of Ladings may be routed through bank based on the other agreed terms and conditions of purchase order.

#### 9. PENALTY FOR LATE DELIVERY.

- a) Date of delivery will be considered as per the delivery terms mentioned in the Purchase Order. Penalty will be applicable on total order value @0.5% per week or part thereof subject to maximum of 10% of the PO value unless otherwise specified in Special Conditions of tender enquiry. Acceptance / Non Acceptance of this CONDITION

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## **BHARAT HEAVY ELECTRICALS LIMITED**

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### **General Instructions and Standard Terms & Conditions for bidding against Tender Enquiry (GISTC) For Foreign Bidders (Version June-2017, Rev: 01)**

must be specifically mentioned in your quotation. Any deviation from this will be loaded accordingly i.e. BHEL shall load maximum penalty under penalty for late delivery Clause, to the extent the same is not agreed by the bidder, for the purpose of evaluation.

- b) Bidders are requested to quote the best delivery meeting the delivery requirements. BHEL reserves the right to reject the offers not meeting BHEL's delivery requirement.
- c) Commencement of delivery period shall be reckoned from the date of PO / LOI or any other agreed milestone.
- d) Bidder shall deliver the goods in the manner and schedule agreed under the terms and conditions of Purchase order.
- e) The delivery date for penalty purpose will be the Bill of Lading Date / Air way bill.

#### **10. PAYMENT TERMS.**

- a) BHEL's standard payment term is Payment after Receipt and Acceptance of Material / Item at HEEP, BHEL-Store or at desired destination unless otherwise specified in Special Terms attached to the tender enquiry.
- b) BHEL reserves the right to accept or reject the offer of the bidder who quotes the payment term other than BHEL's standard payment term.
- c) Loading on account of deviation in payment terms shall be done as per extant rules of BHEL-Haridwar.
- d) Where the payments are through bank, the documents may be presented for negotiation through BHEL designated banks which will be

specified in Purchase order. Documents should be submitted within 5 days of vessel sailing and receipt of OBL from shipping line.

- e) In case BHEL agrees for payment through LC, the same shall be irrevocable, unconfirmed and will be opened 30 days prior to the scheduled delivery and will be valid for a period of 60 days.

#### **11. BANK GUARANTEE.**

In case the bank guarantees are required to be deposited towards security deposit / performance guarantee or for any other purpose as per the terms of this tender enquiry, such bank guarantees of the requisite value in the denominated currency of the purchase order should be from one of the Indian branch of BHEL consortium banks and the bank guarantee should be in the proforma as prescribed by BHEL. The proforma of bank guarantee and the list of consortium banks are displayed at BHEL website [www.bhelhwr.co.in](http://www.bhelhwr.co.in). However, in case the bank guarantee is not from BHEL consortium banks, then the bidder has to get the bank guarantee confirmed from one of the Indian branch of BHEL consortium banks and the bank charges for such confirmation will be borne by the bidder.

#### **12. GUARANTEE / WARRANTY AND CORRESPONDING REPAIRS / REPLACEMENT OF GOODS.**

- a) Goods shall comply with the specifications for material, workmanship and performance. Unless otherwise specified, the warranty shall be for a period of 18 months from the date of receipt. If the delivery is found non-compliant during the warranty period, leading to rejection, the Seller shall arrange free replacement / repair of goods, within one month from the date of intimation or any mutually agreed period. The rejected goods shall be taken away by the Seller at his cost and replaced on

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## **BHARAT HEAVY ELECTRICALS LIMITED**

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Delivered Duty Paid (DDP) (FOR - BHEL Stores / designated destination basis) within such period. In the event of the Seller's failure to comply, Purchaser may take action as appropriate, including Repair / Replenish rejected goods & disposal of rejections, at the risk & cost of the Seller. In case the defects attributable to Seller are detected during processing of the goods at BHEL or at our subcontractor's works, the Seller shall be responsible for free replacement / repair of the goods as required by BHEL.

- b) In case the material is rejected, then date of replacement will be considered as the actual date of delivery.
- c) The bidder shall have to pay 5% incidental charges while taking back supplied material if it is found rejected on receipt. The rejected material shall be sent back only after receipt of replacement / submission of BG/refund of amount paid.

#### **13) QUALITY REQUIREMENT.**

Your bid / quotation should have specific confirmation regarding meeting all our quality requirements such as. (i) Test Certificate (TC), (ii) Guarantee Certificate (GC) / Warranty Certificate (WC), (iii) Quality Plan (QP) (if applicable); and (iv) Pre-Dispatch Inspection at your works (if applicable).

#### **14. VALIDITY.**

The quotation should be valid for a minimum period of 90 days effective from the date of opening of tender, unless otherwise specified in the tender enquiry.

#### **15. RIGHT OF ACCEPTANCE.**

- a) **BHARAT HEAVY ELECTRICALS LIMITED HARIDWAR** reserves the right to reject any or all the bids / quotations without assigning any reason thereof. BHEL also reserves the right to increase or decrease the tendered quantities. Bidders should be prepared to accept order for reduced quantity without any extra charges.
- b) 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.
- c) Unsolicited discounts / revised offers / bids given after Part-1 bid opening shall not be accepted. No change in price will be permitted within the validity period asked for in the tender enquiry.
- d) In case of changes in scope and / or technical specification and / or commercial terms & conditions having price implication, techno-commercially acceptable bidders shall be asked by BHEL to submit the impact of such changes on their price bids. In case a bidder opts to submit revised price bid instead of impact called for, then latest price bid shall prevail. However in both situations, original price bid will be necessarily opened.
- e) 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.
- f) BHEL reserves the right to short close the existing Purchase Order / Rate Contract / Work Order or any extension thereof at any stage.

#### **16. TRANSIT INSURANCE.**

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## BHARAT HEAVY ELECTRICALS LIMITED

HEEP-HARIDWAR, UTTARAKHAND (249403)

### General Instructions and Standard Terms & Conditions for bidding against Tender Enquiry (GISTC) For Foreign Bidders (Version June-2017, Rev: 01)

- a) Transit Insurance will be covered by BHEL under its open Marine Insurance Policy. Seller shall inform dispatch particulars (Purchase Order, RR / GR / BL / AWB, Invoice value etc.) to Finance department (Store bill Section), BHEL Ranipur Haridwar (Uttarakhand -India) with value of consignment to the Purchaser within 07 days of dispatch for BHEL to arrange insurance coverage in its policy. Failure on the part of seller to inform dispatch particulars will make him liable to pay for any transit damages / losses suffered by the Purchaser.
- b) If Quoted Prices are inclusive of transit insurance, no weightage shall be given while evaluating the bids for Cost of Insurance, being in BHEL Scope.

#### 17. PHYTOSANITARY CERTIFICATE:

- a) As per the Indian Law, all consignments being imported into India by air/sea require a phytosanitary certificate from the country of origin-if articles have been packed with wooden packaging materials. This is mandatory. Please confirm in your offer/dispatch documents that the required phytosanitary certificate will be submitted.
- b) Packaging material means any kind of material of plant origin used for packing which include hay, straw wood shavings, wood chips, saw dust, wood waste, wooden pallets, dunnage mats, wooden packages, coir pith, peat or sphagnum moss etc.

#### 18. RISK PURCHASE.

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 / alternative source 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. In case for compelling reasons BHEL accepts the offer without acceptance of this clause by the bidder and in the eventuality of Risk Purchase, appropriate action will be taken as per BHEL extant rules. This will be without prejudice to any other right of BHEL under the contract.

#### 19. FORCE MAJEURE CLAUSE.

Notwithstanding any other thing contained anywhere else in the contract or PO (Purchase Order), In case the discharge of obligation under the contract by either party is impeded or made unreasonably onerous, neither party shall be considered in breach of the contract to the extent that performance of their respective obligation is prevented by an event of Force Majeure that arises after the effective date (PO date).

In the above clause, Force Majeure means an event beyond the control of the parties to the contract which prevents a party from complying with any obligation of the contract including but not limited to:

- a) Act of God (Such as but not limited to earthquake, drought, tidal waves, floods etc.).
- b) War (whether war be declared or not), Hostilities Invasion, Act of foreign enemy etc.
- c) Rebellion, revolution, insurrection, civil war etc.
- d) Contamination of Radio Activity from any nuclear fuel or from any other nuclear waste or any other hazardous materials.
- e) Riots, commotions, strike unless restricted to the employees of supplier.
- f) Acts of terrorism.

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- g) Other unforeseeable circumstances beyond the control of the parties and which the affected party cannot avoid even by using its best efforts.
- h) Cancellation of contract by customer.
- i) Change in law / government. Regulation making the performance impossible.

The party claiming to be affected by force majeure shall notify the other party in writing immediately without delay on the intervention and on the cessation of such circumstances.

Irrespective of any extension of time, if an event of force majeure occurs and its effect continues for more than 180 days the affected party shall have right to cancel the contract.

As soon as reasonably practicable following the date of commencement of a Force Majeure Event, and within a reasonable time following the date of termination of a Force Majeure Event, either Party invoking it shall submit to the other Party reasonable proof of the nature of the Force Majeure Event and of its effect upon the performance of the Party's obligations under this Agreement.

The party shall, and shall ensure that its Subcontractors shall, at all times take all reasonable steps within their respective powers and consistent with Good Operating Practices (but without incurring unreasonable additional costs) to:

- a) Prevent Force Majeure Events affecting the performance of the party's obligations under this Agreement;
- b) mitigate the effect of any Force Majeure Event; and
- c) Comply with its obligations under this Agreement.

If the war like situation has developed in a country where a seller's works is located in this P.O. or there is political instability and Indian Embassy located in that country forbids or advises for not having any business dealing

with the sellers located in such zone / region/ country then BHEL reserves the right to cancel the order.

#### **20. NON-DISCLOSURE AGREEMENT.**

All Drawing and Technical Documents relating to the product or it's manufacture submitted by one party to the other, prior or subsequent to the formation of contract, shall remain property of the submitting party. Drawing, 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. Such technical information shall not without the consent of the submitting party, otherwise be used or copied, reproduced, transmitted or communicated to a third party. Patterns supplied by BHEL will remain BHEL's property which shall be returned by the bidder on demand to BHEL. Bidder shall in no way share or use such intellectual property of BHEL to promote his own business with others. BHEL reserves the right to claim damages from the bidder, or take appropriate penal action as deemed fit against the bidder, for any infringement of the provisions contained herein.

#### **21. SETTLEMENT OF DISPUTES / ARBITRATION.**

Any dispute / difference arising out of or in connection with this contract, including any question regarding its existence, validity or termination, shall be referred to and finally resolved by arbitration under the Arbitration and Conciliation Act, 1996 of India by a Sole Arbitrator to be appointed with mutual consent of the parties. Such Sole Arbitrator shall be either a retired judge of Supreme Court or High Court or District Court of India or some Advocate having practiced in Indian Courts. The seat or place of arbitration shall be New Delhi, India. The language to be used in the arbitration shall be English. The governing law of the contract shall be the substantive law of India. In case the parties fail

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to agree on the appointment of arbitrator within 2 months of the notice invoking arbitration by one party, then the arbitrator shall be appointed in accordance with the Arbitration and Conciliation Act, 1996 of India.

**JURIDICTION:** The courts of New Delhi, India, shall have exclusive jurisdiction.

#### 22. INFORMATION TO THE BIDDERS.

- a) Purchase related information is available at our Business-to-Business (B2B) Portal available on our website [www.bhelhwr.co.in](http://www.bhelhwr.co.in). The user ID & password can be obtained by sending a request to concerned purchase executives.
- b) Intimate your change in mail address or communication address or changes, if any, by email to [ppx\\_idx@bhelhwr.co.in](mailto:ppx_idx@bhelhwr.co.in) giving your bidder Code.
- c) Please resolve your rejections and unexecuted overdue purchase order immediately which are posted at our B2B Portal, which can be visited through our site [www.bhelhwr.co.in](http://www.bhelhwr.co.in).
- d) Copy of this Tender Enquiry is being sent through the post/ Courier / E-mail or by any existing means.
- e) Invoice description and Unit of measurement should be strictly in accordance with Purchase order.
- f) Unit of measurement for dimension and weight should be in metric system only.

#### 23. NOTE.

- a) Special conditions of enquiry, if enclosed By BHEL, will supersede the respective standard / general terms of enquiry.

- b) Any other Standard terms and Conditions of the bidder attached / referred against the tender enquiry will be treated as null and void ab initio.
- c) In order to protect the commercial interests of BHEL, it becomes necessary to take action against suppliers / contractors by way of supervision of business dealings, who either fail to perform or are in default without any reasonable cause, cause loss of business / money / reputation, indulged in malpractices, cheating, bribery, fraud or any other misconducts or formation of cartel so as to influence the bidding process or influence the price etc. Guidelines for Suspension of Business Dealings with Suppliers / Contractors shall prevail over which is available at BHEL website <http://www.bhel.com>
- d) 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.

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# **BHARAT HEAVY ELECTRICALS LIMITED**

HEEP-HARIDWAR, UTTARAKHAND (249403)

General Instructions and Standard Terms & Conditions for bidding against Tender Enquiry (GISTC)

For Indian Bidders (Version June-2017,Rev: 01)

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### **1. GENERAL.**

These general terms & conditions shall apply to all the Tender Enquiries, notice inviting tenders, request for quotations concerning the supply of goods and / or rendering of services to Bharat Heavy Electricals Ltd., HEEP, Haridwar (hereinafter referred to as BHEL or the Purchaser).

### **2. ORIGIN OF QUOTATION.**

- a) The quotation should preferably be from the principal bidder. However tender specific authorized registered dealer / agent can also submit the bid on their behalf, failing which the quotation is liable to be ignored. BHEL prefers to deal directly with the principal manufacturers.

- b) An agent cannot quote on behalf of more than one principal in the same Tender Enquiry.

### **3. SUBMISSION OF TENDER.**

- a) Bid / Quotation must be enclosed in sealed cover on which tender enquiry number and the due date MUST BE written and be invariably sent under REGISTERED POST / SPEED POST / COURIER / Dropped in the Tender Box: addressed as follows:-

Quotation Against Enquiry No. \_\_\_\_\_

Dated: \_\_\_\_\_

Due on: \_\_\_\_\_

To,

**THE HEAD OF MATERIALS MANAGEMENT,  
Heavy Electrical Equipment Plant,  
Bharat Heavy Electricals Limited,  
HARIDWAR-249403 (Uttarakhand), INDIA.**

- b) In case of Three / Two Part Bid, technical bid containing technical offer, duly signed and un-priced copy of the Price Bid should be kept in one envelope. Price Bid containing only the price should be kept in a separate envelope. All envelopes indicating Part-1 or Part-2 or Part-3 as the case may be to be put in a bigger envelope. Please note that un-priced bid should be the exact replica of price bid but without prices.
- c) The bid / quotation must be posted before due date, keeping allowance for postal transit time. Alternatively, the tenders duly sealed and super-scribed as above may be deposited in the Tender Box. Quotations sent by any mode but not received in time will be ignored. Tender received through authorized E-mail is also acceptable. However, in time submission of tender in tender box shall be the responsibility of the bidder, sent through any mode. Documents submitted with the offer / bid shall be signed and stamped in each page by authorized representative of the bidder.
- d) Any additional documents submitted by supplier / bidder, during processing of registration application / tender or after placement of order shall not be accepted unless it is

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submitted with forwarding letter and duly signed and stamped as mentioned above in clause c.

- e) 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 cutting / overwriting in the bid / offer must be duly attested by the signatories to the bid. The list of firms banned by BHEL is available on BHEL web site [www.bhel.com](http://www.bhel.com).
- f) 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.
- g) The bidders will submit Integrity Pact, duly signed by its authorized signatory, along with their bids wherever estimated tender value is Rs. 5 Crore or more.
- h) In case of open tender, the unregistered bidder shall submit inter alia duly filled-in Supplier Registration Form (SRF) along with the bid. Bidders can download the SRF from [www.bhel.com](http://www.bhel.com)
- i) BHEL reserves the right to award tendered quantities among more than one bidder (after acceptance of L1 price by the other bidders). BHEL can also consider awarding of part of the tendered quantity to other than L-1 bidder at L1 counter offered rates, if the quantity offered by the L-1 bidder is less than the quantity tendered for.

#### 4. TENDER OPENING.

Tender opening is scheduled to start in the Tender Room at 2:00 PM, on the due date. Therefore bid / quotations must reach this office / tender Box latest by 1:45 PM on due date. Only participating bidders are allowed to attend tender opening. **TENDERS RECEIVED AFTER THE SPECIFIED TIME OF THEIR 'SUBMISSION' WILL BE TREATED AS LATE TENDERS AND SHALL NOT BE CONSIDERED UNDER ANY CIRCUMSTANCES.** The bidders or their authorized representatives may be allowed to attend tender opening if duly authorized by their principals, through a tender

specific letter, for price bid opening on that particular day. General authorization letter is not acceptable.

#### 5. SPECIFICATION, DRAWINGS & STANDARD.

- a) Bidders must give their detailed specification in the quotation along with relevant technical literature / catalogue etc. against the tender enquiry.
- b) The Bid should be accompanied with relevant copies of catalogues, drawings or specification as per tender enquiry. If these documents are not furnished, the offer is liable to be rejected.
- c) Wherever national / international (N/IN) standards are referred, the latest N/IN standards are to be followed. Mention year & date of standard revision that shall be followed for the supply.
- d) All Drawings and Standards are proprietary of BHEL. It must not be used in anyway detrimental to the interest of the company.

#### 6. PRICE SCHEDULE.

- a) 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.
- b) Prices quoted should not be more than the prices quoted to any other BHEL units / offices / divisions. Vendor to submit copy of latest Purchase Order placed by any unit of BHEL for similar items in the technical bid. In case no order has been placed on such items, specific confirmation that no order has been placed on such items should be provided.
- c) Prices should be quoted on F.O.R. Destination basis. Transit insurance shall be arranged by BHEL and not to be included in the prices. The offers quoted on other than F.O.R destination basis may result in non consideration of such bids.

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- d) In case BHEL accepts the EX-Works prices, such offers will be loaded by 1.5% of EX-Works value towards freight or with actual freight charges as per BHEL freight rate contract whichever is higher.
- e) In case of Indigenous items covered by DGS & D Rate Contract, the bidders should submit latest valid copy of the rate contract along with bid / quotation
- f) Applicable **IGST / CGST / SGST** and any other statutory levy should be indicated separately and clearly in the bid / quotation.
- g) Bidders can dispatch goods through any Indian Bank Association approved transporters having their branch at HARIDWAR / destination. If material is dispatched through other than Indian Bank Association approved transporter, material to be delivered on door delivery BHEL Stores basis.
- h) In case of dispatch of material through any other unapproved transporter, payment shall be made only after receipt of material and any additional charges payable to the transporter shall be to the bidder's account.
- i) No demurrage / godown rent will be payable to the vendor / vendor's transporter for any delay in payments attributable to the vendor.

**NB: Financial evaluation of L1, L2 ..... Status will be on the basis of Landed Cost to BHEL.**

### 7. REVERSE AUCTION.

- a) BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after Techno-Commercial Evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides for RA. Detailed guidelines available at our site [www.bhel.com](http://www.bhel.com)
- b) In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to

participate in Reverse Auction will have to necessarily submit 'online sealed bid' in the Reverse Auction. Non-Submission of 'online sealed bid' by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

### 8. DELIVERY TERMS.

- a) Goods shall be delivered on 'FOR Destination' basis to the named destination unless otherwise called for in the tender enquiry.
- b) Loading on account of 3rd party inspection charges in case of Indian bidders shall be 0.20%.

### 9. PENALTY FOR LATE DELIVERY.

- a) Date of delivery will be considered as per the delivery terms mentioned in the Purchase Order. Penalty will be applicable on total order value @0.5% per week or part thereof subject to maximum of 10% of the PO value unless otherwise specified in Special Conditions of tender enquiry. Acceptance / Non Acceptance of this condition must be specifically mentioned in your quotation. Any deviation from this will be loaded accordingly i.e. BHEL shall load maximum penalty under penalty for late delivery Clause, to the extent the same is not agreed by the bidder, for the purpose of evaluation.
- b) Bidders are requested to quote the best delivery meeting the delivery requirements. BHEL reserves the right to reject the offers not meeting BHEL's delivery requirement.
- c) Commencement of delivery period shall be reckoned from the date of PO / LOI or any other agreed milestone.
- d) Bidder shall deliver the goods in the manner and schedule agreed under the terms and conditions of Purchase order.
- e) **DELIVERY IN CASE OF REJECTION:** In case the material is rejected, then date of replacement will be considered as the actual date of delivery.
- f) **DELIVERY AGAINST BANK DOCUMENTS:** In case payment terms quoted by bidder are documents through bank, and

**## Quotations / Bids not in accordance with General Instructions and Standard Terms & Conditions are likely to be ignored.**



## BHARAT HEAVY ELECTRICALS LIMITED

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the delivery terms being "FOR Haridwar / FOR Transporter Go-down" then date of delivery will be date of intimation by transporter / bidder of delivery of material at Haridwar for the penalty purpose.

- g) Where the payments are through bank, the documents may be presented for negotiation to BHEL authorized / nominated bank.

### 10. PAYMENT TERMS.

- a) BHEL's standard payment term is Payment after receipt and acceptance of materials / items at HEEP, BHEL-Store or at desired destination unless otherwise specified in Special Terms attached to the tender enquiry.
- b) BHEL reserves the right to accept or reject the offer of the bidder who quotes the payment term other than BHEL's standard payment term.
- c) Loading on account of deviation in payment terms shall be done as per extant rules of BHEL-Haridwar.

### 11. TAXES & DUTIES.

- a) The bidder to specify in their offer (part 1 bid) the category of their registration under GST like Registered, Unregistered and composite dealer.
- b) The provisional GST registration number of Bharat Heavy Electrical Ltd, Heavy Electricals Equipment Plant, Ranipur, Haridwar is "05AAACB4146P1ZL" with state Code as "05" and State Name as "Uttarakhand".
- c) Please quote our provisional GST registration number in all invoices raised for supply of goods and services under GST regime and also ensure filing of timely return and payment of tax and compliance of other applicable provisions on supplier under GST regime.
- d) No GST will be reimbursed to unregistered or composite dealer. In the event, any GST is quoted by composite dealer, the same shall be added to the cost of supply in evaluating the bid.

- e) Since, input credit of GST will be available to BHEL-Haridwar only after correct filing of return and payment of applicable GST by supplier, reimbursement of GST shall be made by BHEL-Haridwar on matching of vendor inputs at GST portal, ensuring availability of input credit to BHEL Haridwar. Payment of GST will be made to vendor after matching of input credit and vendor to ensure submission of their invoices along with consent to accept payment of tax after such matching in all cases where bills are submitted directly to BHEL-Haridwar or through bank or under LC or through any other mode.
- f) In the event of any disallowance of input credit or applicability of interest or any other financial liability arises on BHEL-Haridwar due to any default of supplier under GST, such implication shall be to supplier's account.
- g) In the event of any change in the status of the vendor after the submission of the bid but before the supply, GST applicable at the time of supply or in the bid, based on the registration status of the vendor, whichever is lower shall be payable.
- h) Where ever applicable If PAN (Permanent Account Number) of the recipient is not available, income tax is deductible either at the normal rate or at the rate of 20 percent, whichever is higher as per Section 206AA of Indian Income Tax Act 1961.
- i) The bidder shall clearly indicate HSN (*Harmonised System Nomenclature*) / SAC (*Service Accounting Code*), its description and applicable rate of GST for each item in his techno-commercial bid.
- j) Statutory Variation in Taxes & duties as applicable at the time of supply shall be payable. However, in the event of no change in law but bidder quoting certain tax structure in bid document which is lower than the applicable one, such amount shall be the maximum amount of tax that can be claimed by bidder.
- k) IMPORTED GOODS OFFERED BY INDIAN BIDDERS AGAINST DEALER INVOICE: Wherever the material being offered is imported, the bidder must quote the prices inclusive of IGST. The rate and value of IGST as included in

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the price must be indicated separately. In case quantum of IGST is not mentioned by the bidder the same will not be considered for evaluation. However, bidder will have to pass on the benefit of IGST to BHEL at the time supply.

- i) In case of directly dispatchable items to Customer's Site, BHEL-Haridwar will inform the GST registration number of the respective customer which must be mentioned on the vendor's invoice. Vendor to ensure availability of such information from BHEL-Haridwar before dispatch of any material. However while filing GSTN-1, BHEL Haridwar GSTN number to be quoted.

**Note:** - Vendors must ensure compliance of all the applicable rules and procedure as envisaged in the GST Regime. Any loss to BHEL-Haridwar due to fault / non-compliance by the vendor will be to the vendor's account.

### 12. BANK GUARANTEE.

In case the bank guarantees are required to be deposited towards security deposit/performance guarantee or for any other purpose as per the terms of this tender enquiry, such bank guarantees of the requisite value in the denominated currency of the purchase order should be from one of the Indian branch of BHEL consortium banks and the bank guarantee should be in the proforma as prescribed by BHEL. The proforma of bank guarantee and the list of consortium banks are displayed at BHEL website [www.bhelhwr.co.in](http://www.bhelhwr.co.in). However, in case the bank guarantee is not from BHEL consortium banks, then the bidder has to get the bank guarantee confirmed from one of the Indian branch of BHEL consortium banks and the bank charges for such confirmation will be borne by the bidder.

### 13. GUARANTEE / WARRANTY AND CORRESPONDING REPAIRS / REPLACEMENT OF GOODS.

Goods shall comply with the specifications for material, workmanship and performance. Unless otherwise specified, the warranty shall be for a period of 18 months from the date of receipt. If the delivery is found non-compliant during the warranty period, leading to rejection, the Seller shall arrange free replacement / repair of goods, within one month from the date of intimation or any mutually agreed period. The rejected goods shall be taken

away by the Seller at his cost and replaced on Delivered Duty Paid (DDP) (FOR - BHEL Stores / designated destination basis) within such period. In the event of the Seller's failure to comply, Purchaser may take action as appropriate, including Repair / Replenish rejected goods & disposal of rejections, at the risk & cost of the Seller. In case the defects attributable to Seller are detected during processing of the goods at BHEL or at our subcontractor's works, the Seller shall be responsible for free replacement / repair of the goods as required by BHEL.

- b) **RETURN OF REJECTED MATERIAL FOR REPLACEMENT:** The bidder shall have to pay 5% incidental charges while taking back supplied material if it is found rejected on receipt. The rejected material shall be sent back only after receipt of replacement / submission of BG/refund of amount paid.

### 14. QUALITY REQUIREMENT.

Your bid/quotation should have specific confirmation regarding meeting all our quality requirements such as. (i) Test Certificate (TC), (ii) Guarantee Certificate (GC) / Warranty Certificate (WC), (iii) Quality Plan (QP) (if applicable); and (iv) Pre-Dispatch Inspection at your works (if applicable).

### 15. VALIDITY

The quotation should be valid for a minimum period of 90 days effective from the date of opening of tender, unless otherwise specified in the tender enquiry.

### 16. RIGHT OF ACCEPTANCE.

- a) **BHARAT HEAVY ELECTRICALS LIMITED HARIDWAR** reserves the right to reject any or all the bids / quotations without assigning any reason thereof. BHEL also reserves the right to increase or decrease the tendered quantities. Bidders should be prepared to accept order for reduced quantity without any extra charges.
- b) 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.

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- c) Unsolicited discounts / revised offers / bids given after Part-1 bid opening shall not be accepted. No change in price will be permitted within the validity period asked for in the tender enquiry.
- d) In case of changes in scope and / or technical specification and / or commercial terms & conditions having price implication, techno-commercially acceptable bidders shall be asked by BHEL to submit the impact of such changes on their price bids. In case a bidder opts to submit revised price bid instead of impact called for then the latest price bid shall prevail. However in both situations, original price bid will be necessarily opened.
- e) 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.
- f) BHEL reserves the right to short close the existing Purchase Order / Rate Contract / Work Order or any extension thereof at any stage.

### 17. TRANSIT INSURANCE.

- a) Transit Insurance will be covered by BHEL under its open Insurance Policy. Seller shall inform dispatch particulars (Purchase Order, RR/GR/, Invoice value etc.) to "Finance department (Store bill Section), BHEL Ranipur Haridwar (Uttarakhand -India) with value of consignment to the Purchaser within 07 days of dispatch for BHEL to arrange insurance coverage in its policy. Failure on the part of seller to inform dispatch particulars will make him liable to pay for any transit damages / losses suffered by the Purchaser.
- b) If Quoted Prices are inclusive of transit insurance, no weightage shall be given while evaluating the bids for Cost of Insurance, being in BHEL Scope.

### 18. RISK PURCHASE.

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 / alternative source 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. In case for compelling reasons BHEL accepts the offer without acceptance of this clause by the bidder and in the eventuality of Risk Purchase, appropriate action will be taken as per BHEL extant rules. This will be without prejudice to any other right of BHEL under the contract.

### 19. FORCE MAJEURE CLAUSE.

Notwithstanding any other thing contained anywhere else in the contract or PO (Purchase Order), In case the discharge of obligation under the contract by either party is impeded or made unreasonably onerous, neither party shall be considered in breach of the contract to the extent that performance of their respective obligation is prevented by an event of Force Majeure that arises after the effective date (PO date).

In the above clause, Force Majeure means an event beyond the control of the parties to the contract which prevents a party from complying with any obligation of the contract including but not limited to:

- a) Act of God (Such as but not limited to earthquake, drought, tidal waves, floods etc.).
- b) War (whether war be declared or not), Hostilities Invasion, Act of foreign enemy etc.
- c) Rebellion, revolution, insurrection, civil war etc.
- d) Contamination of Radio Activity from any nuclear fuel or from any other nuclear waste or any other hazardous materials.
- e) Riots, commotions, strike unless restricted to the employees of supplier.
- f) Acts of terrorism.
- g) Other unforeseeable circumstances beyond the control of the parties and which the affected party cannot avoid even by using its best efforts.
- h) Cancellation of contract by customer.
- i) Change in law/ government. Regulation making the performance impossible.

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The party claiming to be affected by force majeure shall notify the other party in writing immediately without delay on the intervention and on the cessation of such circumstances.

Irrespective of any extension of time, if an event of force majeure occurs and its effect continues for more than 180 days the affected party shall have right to cancel the contract.

As soon as reasonably practicable following the date of commencement of a Force Majeure Event, and within a reasonable time following the date of termination of a Force Majeure Event, either Party invoking it shall submit to the other Party reasonable proof of the nature of the Force Majeure Event and of its effect upon the performance of the Party's obligations under this Agreement.

The party shall, and shall ensure that its Subcontractors shall, at all times take all reasonable steps within their respective powers and consistent with Good Operating Practices (but without incurring unreasonable additional costs) to:

- a) Prevent Force Majeure Events affecting the performance of the party's obligations under this Agreement.
- b) mitigate the effect of any Force Majeure Event and
- c) Comply with its obligations under this Agreement.

If the war like situation has developed in a country where a seller's works is located in this P.O. or there is political instability and Indian Embassy located in that country forbids or advises for not having any business dealing with the sellers located in such zone / region/ country then BHEL reserves the right to cancel the order.

### 20. NON-DISCLOSURE AGREEMENT.

All Drawing and Technical Documents relating to the product or it's manufacture submitted by one party to the other, prior or subsequent to the formation of contract, shall remain property of the submitting party. Drawing, 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. Such technical information shall not without the consent of the submitting party, otherwise be used or copied, reproduced, transmitted or communicated to a third party. Patterns supplied by BHEL will remain BHEL's property which shall be returned by the

bidder on demand to BHEL. Bidder shall in no way share or use such intellectual property of BHEL to promote his own business with others. BHEL reserves the right to claim damages from the bidder, or take appropriate penal action as deemed fit against the bidder, for any infringement of the provisions contained herein.

### 21. SETTLEMENT OF DISPUTES / ARBITRATION.

In all cases of dispute the matter shall be referred for ARBITRATION by sole arbitrator to be appointed by the Unit Head of Bharat Heavy Electricals Ltd., at HARIDWAR. The award of the Arbitrator shall be final and binding on both the parties. The place of Arbitration shall be Haridwar.

**JURIDICTION:** The courts of Haridwar, India, shall have exclusive jurisdiction.

### 22. WHARFAGE / DEMURRAGE RESPONSIBILITY.

In the event of delay in receipt of documents by Manager (Stores-Shipping) BHEL-Haridwar and in case where dispatches are made through Unapproved Transporter the sole responsibility for wharfage /demurrage for such delay shall be that of supplier.

### 23. CONDITIONS FOR AVAILING MICRO & SMALL ENTERPRISES (MSE'S) BENEFITS.

- a) "MSE Suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM II certificate having deemed validity (**five years** from the date of issue of acknowledgement in EM II) or valid NSIC certificate or EM II certificate along with attested copy of a CA certificate (Format enclosed at annexure-1 where deemed validity of EM II certificate of five years has expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents is found or the requisite 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

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uploaded on the portal. Documents should be notarized or attested by a Gazetted officer."

- b) Any new supplier will be eligible for registration with BHEL as MSE supplier provided at least any one of the following documents are submitted along with application for registration :-
- c) Valid NSIC Certificate or
- d) Entrepreneurs Memorandum part II (EM II) certificate (valid based on deemed validity of 5 years) or
- e) EM II certificate along with attested copy of CA Certificate (as per prescribed format at annexure-A) applicable for the relevant financial year (latest audited), where the deemed validity of EM II is over.
- f) However, credentials of all MSE suppliers will be verified before advancing the intended benefits.
- g) MSE bidders claiming SC/ST status will have to submit SC/ST certificate of the Proprietor from competent authority. Attested (notarized or attested by Gazetted officer) copy to be submitted along with the offer.
- h) In case techno-commercial accepted bidders include MSE source and their prices (based on landed cost – considering quoted prices) are within the price band of 15% w.r.t. L-1 bidder, then BHEL can offer 20% of quantity of respective item (rounded off to nearest number) to MSE bidders at L-1 price and in case, more than one MSE bidder is in 15 % band and the same is accepted by more than one MSE bidders then 20% quantities of respective items will be considered for ordering on proportionate basis amongst MSE bidders.
- i) While distributing the 20% quantity amongst MSE bidders the decimal points in quantity shall be ignored for all the bidders except the L-1 amongst MSE bidders. Balance quantity after allocating the quantity to other MSE bidders ignoring the quantities in decimal, shall be given to L-1 (amongst MSE) bidder. However if there are more than one MSE bidder at the same price level than preference for additional quantities due to ignoring off the decimal (as mentioned above) shall be given to the bidder offering

favorable terms to BHEL and if the conditions offered are also same then preference will be given to the bidder having high SPR rating.

- j) In case there are more than one MSE bidders (with different landed cost to BHEL) within 15% price band of lowest bidder and quantity to be offered is 1 no. only, then preference shall be given to the MSE bidder with lowest landed cost .
- k) In case there are more than one MSE bidders (with same landed cost to BHEL) within 15% price band of lowest bidder and quantity to be offered is 1 no. only, then preference shall be given first, based on the favorable terms in the bid and in case terms are also same, the bidder with high SPR rating shall be given preference.
- l) If L1 bidder is MSE bidder, entire quantity will be given to such MSE bidder only.
- m) Note: It may however be noted that MSE guidelines as on date (Date of Technical Bid Opening Part-1) shall prevail

#### 24. INFORMATION TO THE BIDDERS.

- a) Purchase related information is available at our Business-to-Business (B2B) Portal available on our website [www.bhelhwr.co.in](http://www.bhelhwr.co.in) The user ID & password can be obtained by sending a request to concerned purchase executives.
- b) Intimate your change in mail address or communication address or changes, if any, by email to [ppx\\_idx@bhelhwr.co.in](mailto:ppx_idx@bhelhwr.co.in) giving your bidder Code.
- c) Please resolve your rejections and unexecuted overdue purchase order immediately which are posted at our B2B Portal, which can be visited through our site [www.bhelhwr.co.in](http://www.bhelhwr.co.in)
- d) Copy of this Tender Enquiry is being sent through the post.

**## Quotations / Bids not in accordance with General Instructions and Standard Terms & Conditions are likely to be ignored.**

**BHARAT HEAVY ELECTRICALS LIMITED**

HEEP-HARIDWAR, UTTARAKHAND (249403)

**General Instructions and Standard Terms & Conditions for bidding against Tender Enquiry (GISTC)****For Indian Bidders (Version June-2017,Rev: 01)****25. NOTE.**

- a) Special conditions of enquiry, if enclosed by BHEL, will supersede the respective standard/general terms of enquiry.
- b) Any other Standard terms and Conditions of the bidder attached/referred against the tender enquiry will be treated as null and void ab initio.
- c) In order to protect the commercial interests of BHEL, it becomes necessary to take action against suppliers / contractors by way of supervision of business dealings, who either fail to perform or are in default without any reasonable cause, cause loss of business / money / reputation, indulged in malpractices, cheating, bribery, fraud or any other misconducts or formation of cartel so as to influence the bidding process or influence the price etc. Guide- lines for Suspension of Business Dealings with Suppliers / Contractors shall prevail over which is available at BHEL website <http://www.bhel.com>
- d) 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.

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## Certificate by Chartered Accountant on letter head

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

Category :.....(Micro/Small). (Copy enclosed).

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

**1. For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No. S.O.1722 (E) dated October 5, 2006:

Rs.....Lacs

**2. For Service Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the MSMED act, 2006:

Rs.....Lacs

**(Strike off whichever is not applicable)**

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

Or

The company has been graduated from its original category (Micro / Small) **(Strike off whichever is not applicable)** and the date of graduation of such enterprises from its original category is .....  
 (dd/mm/yyyy) which is within the period of 3 years from the date of graduation of such enterprises from its original category as notified vide S.O. No. 3322(E) dated 01.11.2013 published in the gazette notification dated 04.11.2013 by Ministry of MSME.

Date:

(Signature)

Name-

Membership Number-

Seal of Chartered Accountant

## **NON-DISCLOSURE AND PROPRIETARY INFORMATION AGREEMENT**

BETWEEN

\_\_\_\_\_ (**Name of the Vendor**),, having its registered offices in  
\_\_\_\_\_ (**Address of Vendor**), registered under the no. \_\_\_\_\_  
of the Companies' register of \_\_\_\_\_ (**Name of Place and Country**),  
capital stock of \_\_\_\_\_ (**Value**), with a place of business in  
\_\_\_\_\_ (**Name of Place and Country**) (hereinafter referred to as  
" \_\_\_\_\_ (**Name of Vendor**)");

AND

**Bharat Heavy Electricals Ltd** a company incorporated under the Indian Companies Act 1956 having its registered offices at BHEL House, Siri Fort, New Delhi -110 049 and having one of its works at Heavy Electrical Equipment Plant, Ranipur, Haridwar-249403 ( Uttarakhand), India registered under the No. 4281 of 1964-65 of the companies register of Delhi, capital stock of Rs 4895.2 million with a place of registered office in New Delhi (hereinafter referred to as “BHEL”) hereinafter also referred to individually as “the Party” or collectively as “the Parties”.

### **BACKGROUND**

This Agreement sets forth the rights and obligations of the Parties with respect to the use, handling, protection and safeguarding of Proprietary Information that is disclosed by and between the Parties.

### **WHEREAS**

A) the Parties wish to pursue exploratory discussions concerning a possible collaboration between them in relation to the Program defined in Exhibit 1;

B) during the ensuing discussions and negotiations it may occur that either Party discloses to the other technical, financial or business information of a proprietary or confidential nature, which the Parties intend to protect against, making it available, by any means to any third person, and other unauthorized use and/or further disclosure by the recipient, in accordance with the terms and conditions set forth herein;

**NOW, THEREFORE,** the Parties have agreed as follows:

1. The term “Proprietary Information” shall mean any information or data of whatsoever kind of a confidential or proprietary nature, including but not limited to, commercial information, know how and technical information in the form of designs, drawings, concepts, requirements, specifications, software, interfaces, components, processes, or the like, that have been or will be disclosed by either Party to the other pursuant to this Agreement, either in writing, orally or other form, which is designated as “Proprietary” or “Confidential” by the disclosing Party by means of formal declaration or an appropriate stamp, legend or any other written or orally notice .
2. Proprietary Information may be conveyed, without limitation, through any written or printed documents, samples, models, electronic form on disk, tape, other storage media or any other means of disclosing such Proprietary Information that either Party may elect to use during the life of this Agreement, but if an originating Party originally discloses information orally or visually, the receiving Party will protect such information as Proprietary Information to the extent that the originating Party :
  - identifies the Information as Proprietary at the time of original disclosure,
  - summarizes the Proprietary Information in writing .

Information stored in electronic form on disk, tape, other storage media will be adequately marked if a proprietary legend displays when the information originally runs on a computer system and when the information is printed from its data file.

Proprietary Information also includes any information which can be obtained by examination, testing or analysis of any hardware or material substance or any component part of such hardware or material substance provided by the Disclosing Party even though the requirements in Clause 1 for marking and designation have not been fulfilled.

3. Each Party, to the extent of its rights to do so, shall disclose to the other only the Proprietary Information which the disclosing Party deems appropriate to fulfil the objectives of this Agreement. The Parties hereby represent that the disclosure of Proprietary Information by and between themselves shall be made in compliance with, and subject to the laws and regulations of the Disclosing Party's country.
4. The receiving Party hereby agrees and covenants that, from the effective date of this Agreement until the expiry date as per article 11 and the following period as per article 12, the Proprietary Information that either Party receives from the other shall:
  - a) be protected and kept in strict confidence by the receiving Party which must use the same degree of care it uses to protect its own confidential information and in no case less than a reasonable care;
  - b) be only disclosed to and used by those persons within the receiving Party's organization or that of its parent or controlled companies who have a need to know and solely for the purposes specified in this Agreement, and be treated by such persons or entities with the same degree of care and subject to the same restrictions;
  - c) to procure that each third party to whom Proprietary Information is disclosed under this Agreement is made aware of the provisions of this Agreement prior to such disclosure to it and that each such third party is

bound by obligations of confidentiality which are no less onerous than those contained in this Agreement;

- d) neither be disclosed nor caused to be disclosed or made available, either directly or indirectly, to any third Party or persons other than those mentioned in subparagraph b) above or other persons upon which both of the contractual Parties shall agree in an amendment to this Agreement;
- e) not to copy, reproduce or reduce to writing any part of such Proprietary Information except as may be reasonably necessary for the purpose referred to in the Recitals of this Agreement

PROVIDED THAT the Receiving Party shall be entitled to make any disclosure required by court order or government or regulatory requirement of the Disclosing Party's Proprietary Information subject to notifying the Disclosing Party as soon as possible of such requirement

- 5. Any Proprietary Information and copies thereof disclosed by either Party to the other shall remain the property of the disclosing Party and shall be immediately returned or destroyed by the receiving Party upon request.
- 6. The receiving Party shall have no obligations or restrictions with respect to any Proprietary Information for which the receiving Party can prove that:
  - a) is in or which comes into the public domain otherwise than as a result of a breach of this Agreement by any person to whom a disclosure of Proprietary Information is made as permitted under this Agreement or of any other duty of confidentiality relating to the Proprietary Information of which the Receiving Party has knowledge; or
  - b) it has been in its possession without restriction at the time of the disclosure, as evidenced by written documentation in its files; or
  - c) it has been lawfully received from a third Party without breach of this Agreement; or

- d) it has been or is published without violation of this Agreement; or
  - e) it has been independently developed in good faith by employees of the receiving Party who did not have access to the Proprietary Information; or
  - f) it has not been properly declared, designated or confirmed as Proprietary or Confidential; or
  - g) the protection period has expired according to articles 11 and 12 of this Agreement.
7. With respect to any exchange of Proprietary Information which may occur as a result of this Agreement, it is expressly understood and agreed that the persons listed in Exhibit 2 shall, on behalf of the respective Parties, be the exclusive individuals authorized to receive from and transmit to the other Party Proprietary Information under this Agreement. Each Party may replace at any time its respective authorized individuals identified in such Exhibit 2, within its own organization. Any such new designation by a Party shall be made by written notice to the other at the address indicated in such Exhibit 2.
8. Any Proprietary Information which is identified as “Classified Information”, or whose export is subject to an export license, shall be identified as such by the disclosing Party at the time of disclosure and the disclosure, protection, use and handling thereof, shall remain subject to the security procedures and restrictions imposed by the disclosing Party's Government.
9. The disclosure of Proprietary Information under this Agreement by either Party to the other shall not be construed as granting to the receiving Party any right, whether express or implied by licence or otherwise, on the matters, inventions or discoveries to which such information pertains, or as granting any trademark, patents, copyrights, trade secret right or other form of intellectual property right.

10. Nothing in this Agreement may be construed as an obligation of either Party to disclose any Proprietary Information to the other, or to enter into any subsequent contractual relationship with such other Party.
11. This Agreement covers the exchange of Proprietary Information which may be made by either Party to the other until ten years from signing of the agreement or any extension thereto which may be agreed upon by the Parties in writing. Proprietary information relevant to the Program detailed in Exhibit 1, already made available to the other contractual Party before the effective date, shall also be protected under this Agreement.

It is understood by the parties that, prior to disclosure, the Disclosing Party shall have obtained any government authorisation needed for the export of the Proprietary Information

12. The expiry of the period contemplated in Article 11 of this Agreement shall not relieve the receiving Party from complying with the obligations imposed by Article 4 here above with respect to the use and protection of the Proprietary Information, received prior the date of such expiry, for a period of ten (10) years after such expiry.
13. The Parties are independent contractors. Each will bear all costs and expenses in connection with this Agreement. This Agreement is intended to facilitate only the exchange of Proprietary Information and is not intended to be, and shall not be construed to create a teaming agreement, joint venture, association, partnership, or other business organisation or agency arrangement and no Party shall have the authority to bind the other without the other Party's separate prior written agreement .
14. This Agreement shall be governed by and shall be interpreted in accordance with the substantive Indian laws. Irrespective of the foregoing each Party shall remain

bound by the provisions of its own national laws and regulations with respect to the transfer or use of Classified Information or information whose export is subject to an export license.

15. All disputes among the Parties, in connection with or arising out of the existence, validity, construction, performance and termination of this Agreement (or any terms thereof), which the Parties are unable to resolve among themselves, shall be finally settled by an Arbitration. The Arbitration shall be held in Haridwar (India), in English language, in accordance with the rules laid down in the arbitration and reconciliation act of India.
16. The foregoing constitutes the entire Agreement among the Parties with respect to the subject matter hereof and supersedes and cancels all prior representations, negotiations, commitments, undertakings, communications, either oral or written, acceptances, understandings and agreements among the Parties with respect to or in connection with any of the matters to which such Agreement applies or refers.
17. Notices to \_\_\_\_\_(**Name of Vendor**) shall be made at the following address:

**(Complete Address of Vendor)**

Attention: Mr. \_\_\_\_\_(**Name of the Authorised Person of Vendor**)

Notices to BHEL shall be made at the following address:

BHARAT HEAVY ELECTRICALS LIMITED,  
HEAVY ELECTRICAL EQUIPMENT PLANT,  
Ranipur, Haridwar-249403 (Uttarakhand), India

Attention: \_\_\_\_\_(**Name of the PPX Incharge**)

18. The effective date of this Agreement shall be the date of the last signature appearing herein.

**IN WITNESS WHEREOF**, each of the Parties has caused this Agreement, to be executed by its duly authorized officer.

Date :

Signed for and on behalf of

Signed for and on behalf of

**(Name of Vendor)**

BHEL

By:

By:

Title:

Title:

Signature:

Signature:

**EXHIBIT 1**

to the

**NON-DISCLOSURE AGREEMENT**

between

\_\_\_\_\_ **(Name of Vendor)**

and

**BHARAT HEAVY ELECTRICALS LIMITED**

dated:

\_\_\_\_\_

The Non Disclosure Agreement covers the exchange of Proprietary Information which may occur during the discussions and negotiations in view of a possible cooperation between the Parties in the following programs:

-Description of Material or Services for which the order is placed

\_\_\_\_\_ **(Name of Vendor)** list of products that require an exchange of Proprietary Information which may be occur during the discussions and negotiations in view of a possible cooperation for the above programs :

**EXHIBIT 2**

To the  
NON-DISCLOSURE AGREEMENT  
between  
\_\_\_\_\_ (Name of Vendor)

and  
Bharat Heavy Electricals Ltd.

dated:

Personnel of the Parties authorized to receive and/or transmit Proprietary Information  
under this Agreement:

For (Name of Vendor)  
(Name of Person)  
Tel.  
Fax  
Address.

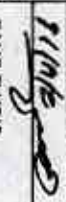
For Bharat Heavy Electricals Ltd.  
Mr.  
Tel. 01334  
Fax 01334  
Address. Main Administration Building  
BHEL, HEEP, Haridwar  
India

Tel.  
Fax  
Address.

Mr.  
Tel. 01334  
Fax 01334  
Address. Main Administration Building  
BHEL, HEEP, Haridwar  
India

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|                                                             |                                      |                                                                                                                                                                                                                       |                                          |                                                                                                            |  |  |
|-------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------|--|--|
| SIGN & DATE<br>24/11                                        | SUPERSEDES<br>INVENTORY NO<br>P-5538 | COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company. | ST39013<br>पृष्ठ 40 का 2<br>Page 2 of 40 | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> |  |  |
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| Rev. no.<br>08                                              |                                      | निर्माणकर्ता<br>WORKED BY: Anil / Kavita                                                                                                                                                                              |                                          | 18.03.16                                                                                                   |  |  |
|                                                             |                                      | जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh                                                                                                                                                                        |                                          | 18.03.16                                                                                                   |  |  |

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| SIGN & DATE<br>SUPERVISOR<br>INVENTORY NO                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013                         |          |
|                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                            | पृष्ठ 40 का 3<br>Page   3 of 40 |          |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company. | <b>1 INTENT OF SPECIFICATION</b><br><br>This specification is intended to cover design, manufacturing, testing, delivery supervision of system & commissioning of turbine oil purification system and putting the system into satisfactory operation.<br><br><u>RESPONSIBILITY OF BIDDER:</u> The bidder shall be responsible for providing all material, equipment and services, specified or otherwise which are required to complete the project and fulfill the intent of ensuring operability, maintainability and the reliability of the complete work covered under this specification. It is not the intent to specify completely here in, all aspects of design and construction of equipment. Nevertheless, the equipment shall conform in all respects to high standards of engineering, design & workmanship & shall be capable of performing in continuous commercial operation, in a manner acceptable to Purchaser/Owner. Bidder is requested to carefully examine and understand the specification & seek clarification, if required, to ensure that they have understood the specifications prior to submit the bid. |                                                                                                            |                                 |          |
|                                                                                                                                                                                                                       | <b>2 SCOPE OF SUPPLY</b><br><br>2.1 One oil purification system (OPS) shall comprise of: <ul style="list-style-type: none"> <li>a. One centrifuge along with its drive &amp; accessories.</li> <li>b. Indirect type oil heater and accessories</li> <li>c. One dirty oil feed pump complete with its drive &amp; accessories.</li> <li>d. One clean oil discharge pump complete with its drive &amp; accessories (if applicable).</li> <li>e. Polishing filter with suitable bypass arrangement.</li> <li>f. Adequately sized booster pump (if required).</li> <li>g. One overflow sight fitting (loose supply).</li> <li>h. The OPS shall be such that it can be used both as purifier as well as clarifier.</li> <li>i. An arrangement to detect and raise alarm in case of liquid seal breakage.</li> <li>j. All relevant valves, Y-type strainer, fittings and inter-connecting piping.</li> <li>k. All flanged end valves and flanged terminal points of piping along with counter flanges, nuts, bolts and gaskets.</li> </ul>                                                                                                  |                                                                                                            |                                 |          |
| SIGN & DATE<br>                                                                                                                    | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | निर्माणकर्ता<br>WORKED BY:                                                                                 | Anil / Kavita                   | 18.03.16 |
| INVENTORY<br>P-53/98                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | जाँचकर्ता<br>CHECKED BY:                                                                                   | A. S. Rajput /<br>Devesh        | 18.03.16 |

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| उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) |  |
| PRODUCT PURCHASE SPECIFICATION         |  |
| (HEEP: HARIDWAR)                       |  |

|      |  |
|------|--|
| BHEL |  |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 1. All relevant controls, interlocks and instrumentation.                                                                                                                                                                                                                                                                                                                                                                       |  |
| m. Foundation plates, anchor bolts, sleeves, inserts etc. required for installation of the complete system on foundation.                                                                                                                                                                                                                                                                                                       |  |
| n. Necessary lugs and eye bolts of all equipments for lifting the complete system during erection and maintenance.                                                                                                                                                                                                                                                                                                              |  |
| o. A set of required special tools and tackles for erection & commissioning and operation & maintenance of the system.                                                                                                                                                                                                                                                                                                          |  |
| 2.2 Spare Parts: - Spares for satisfactory commissioning of the OPS are to be supplied (apart from mandatory spares). Also, a list of recommended spare parts with price break-up for 3 year satisfactory operation of the system shall also be supplied by vendor. Purchase order on the same shall be placed later by BHEL as per customer's requirement. Validity shall be kept suitable to meet our customer's requirement. |  |

|                                                                                                                                                                                                                                                                                                                             |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 3 GENERAL TECHNICAL REQUIREMENTS                                                                                                                                                                                                                                                                                            |  |
| 3.1 The OPS shall operate on a bypass system and the capacity of the unit shall as per the Table-A of this specification. The oil in system conforms to Servoprime-46 / ISO VG 46 / Turbinol-47 / BHEL standard practice (refer Annexure -I). The system will be located inside the turbine hall in oil room near oil tank. |  |
| 3.2 The OPS should be as compact as possible so that it may be installed in the minimum required space and easy to handle.                                                                                                                                                                                                  |  |
| 3.3 The OPS should be suitably designed to operate in tropical climatic conditions. Equipment shall be designed for ambient temperature of 55°C and relative humidity of 95%.                                                                                                                                               |  |
| 3.4 Base area/ foundation of purifier shall be designed to be as compact as possible without any vibration problem as per IS: 10816-2.Norms as per approved datasheet.                                                                                                                                                      |  |
| 3.5 All valves and instruments should be readily accessible to facilitate maintenance and operation.                                                                                                                                                                                                                        |  |
| 3.6 The OPS should be completely vapour tight to prevent fumes and vapours from entering.                                                                                                                                                                                                                                   |  |
| 3.7 The equipment shall be suitable for continuous operation round the clock.                                                                                                                                                                                                                                               |  |
| 3.8 On load automatic cleaning of bowl assembly is preferable.                                                                                                                                                                                                                                                              |  |

|           |             |                       |            |               |            |          |
|-----------|-------------|-----------------------|------------|---------------|------------|----------|
| Rev. no.  | 08          | निर्माणकर्ता          | WORKED BY: | Anil / Kavita | Anil Kumar | 18.03.16 |
| जाँचकर्ता | CHECKED BY: | A. S. Rajput / Devesh |            |               |            | 18.03.16 |

|                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                            |                                            |          |
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| BHEL<br>भारतीय इलेक्ट्रिकल लिमिटेड<br>भारतीय इलेक्ट्रिकल लिमिटेड                                                                                                                                                       | उत्पाद क्रय विनिर्देश (होप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                            | ST39013<br>पृष्ठ 40 का 5<br>Page   5 of 40 |          |
|                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                            |                                            |          |
| SUPERSEDES<br>INVENTORY NO<br>प्रतीक नंबर<br>प्रतीक नंबर                                                                                                                                                               | 3.9 The OPS shall be equipped with sight glasses both for the purified oil and the separated water from the collecting pan.<br><br>3.10 Each purifier system shall be furnished with a positive displacement feed pump & a similar type discharge pump, if needed. Each pump shall be of the helical, herringbone, Spur gear or screw type with a normal capacity of at least 10% greater than that of the purifier system when operating under the maximum suction lift against the pressure required to feed the centrifuge. Each pump shall be fitted with adequate relief bypass valve to prevent damage from excess pressure.<br><br>3.11 Although oil temperature at the inlet to heater during normal operation of Turbine Generator set shall be 65°C but system should be designed to operate with oil at 20°C during cold starting of TG-set. During such operation, even if guaranteed purification cannot be achieved, the system shall be accepted.<br><br>3.12 Arrangement of oil recirculation piping/piping connection should be provided with recirculation line connecting to clean oil line at oil purifier outlet (with applicable NRVs) such that there are only two interfaces of oil inlet & outlet connection to oil purifier.<br><br>3.13 For two or more centrifuges running in parallel, a common skid housing for both or multiple centrifuges shall be supplied with inlet & outlet manifold. Connection interface with BHEL shall be inlet & outlet only, not multiple connections.<br><br>3.14 Pressure at the outlet of oil purification system shall be 1.5 to 2.0 bar (gauge).<br><br>3.15 The inlet, outlet & overflow connections to overflow sight fitting shall be NB80 (ø88.9X3.96)/NB40 (ø48.3X3.96)/NB15 (ø21.3X2.6) respectively. Also, it is to be noted that overflow sight fitting is to be supplied loose and the same shall be fitted in BHEL's Main Oil Tank at site.<br><br>3.16 A common drive system for separator, dirty oil feed pump and clean oil discharge pump (if required) shall also be considered. Details of such drive should be clearly submitted by the vendor in his offer.<br><br>3.17 Different variants for combination of Flow capacity of Oil Purification System, Control Panel Type and Heater Rating are given below in <u>Table-A</u> . |                            |                                            |          |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited and must not be used directly or indirectly in any way detrimental to the interest of this company. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                            |                                            |          |
| SIGN & DATE<br>18/03/16                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                            |                                            |          |
| INVENTORY NO<br>25538                                                                                                                                                                                                  | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | निर्माणकर्ता<br>WORKED BY: | Anil / Kavita                              | 18.03.16 |
|                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | जाँचकर्ता<br>CHECKED BY:   | A. S. Rajput / Devesh                      | 18.03.16 |

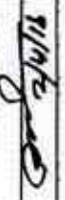
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| SIGN & DATE<br> | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013        |
|                                                                                                  |                                                                                                            | पृष्ठ 40 का 6  |
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| SUPERSEDES<br>INVENTORY NO<br>आवृत्ति नम्बर<br>(अविवक्षित अवस्था) | TABLE - A |
|                                                                   |           |

| Var. No. | Flow capacity of purification system (Litre Per Hour) | Control Panel Type | Heater Rating ( kW) |
|----------|-------------------------------------------------------|--------------------|---------------------|
| 1.       | 7500                                                  | DCS                | 90 kW               |
| 2.       | 6000                                                  | DCS                | 72 kW               |
| 3.       | 2 x 4500                                              | DCS                | 120 kW              |
| 4.       | 7500                                                  | Relay              | 90 kW               |
| 5.       | 6000                                                  | Relay              | 72 kW               |
| 6.       | 2 x 4500                                              | Relay              | 120 kW              |
| 7.       | 7500                                                  | DCS                | 55 kW               |
| 8.       | 6000                                                  | DCS                | 45 kW               |
| 9.       | 2 x 4500                                              | DCS                | 80 kW               |
| 10.      | 7500                                                  | Relay              | 55 kW               |
| 11.      | 6000                                                  | Relay              | 45 kW               |
| 12.      | 2 x 4500                                              | Relay              | 80 kW               |

|                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interests of the company. | <b>4 CONTROL AND INSTRUMENTATION</b>                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                        | <p>4.1 Offer should include all necessary interlocks &amp; instruments along with remote indication facility in the control panel (protection type). Purchaser will review same &amp; necessary addition / subtraction in interlocks &amp; instruments, considered essential for smooth operation of the unit, will be asked to include. Some of the important interlocks/controls, required, are given below.</p> |

- Separator shall be provided with interlocks to prevent the operation of the unit unless the feed pump & the discharge pump are operating.
- A system of annunciating the flooding of the separator due to loss of water seal shall be provided.
- All instruments i.e. pressure gauges, RTDs etc. should be reliable & of proven design. Purchaser has full right to ask them changed from one supply source to another according to operational experience. All instruments should be calibrated at minimum 5 points throughout the range and accuracy, hysteresis, repeatability etc. shall be within the specified limits i.e.  $\pm 1\%$ .
- Auxiliary electric supply available at site comprises of 415V, 3 $\phi$ , 3 wires, 50 Hz ( $\pm 10\%$  V,  $\pm 5\%$  frequency,  $\pm 10\%$  combined). If supplier requires any other supply for his devices, instruments and drives etc. he shall arrange \ to convert 415V, 3 $\phi$  supply to the required value for further distribution. Isolating switches, over current protection, fuses, junction boxes with terminal strips etc. as required for sub-distribution shall be deemed to be in bidder's scope.

|                                                                                                    |                |                                                |                        |
|----------------------------------------------------------------------------------------------------|----------------|------------------------------------------------|------------------------|
| SIGN & DATE<br> | Rev. no.<br>08 | निर्माणकर्ता<br>WORKED BY: Anil / Kavita       | Anil Kumar<br>18.03.16 |
|                                                                                                    |                | जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh | 18.03.16               |

|                                                            |                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                          |          |
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| Here we power<br>SIGN & DATE                               |  | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>ST39013</b>                           |          |
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| Here we power<br>SIGN & DATE<br>SUPERSEDES<br>INVENTORY NO | Here we power<br>SIGN & DATE<br>SUPERSEDES<br>INVENTORY NO                        | <p>(e) Motor shall be flame proof as per IS: 2148 and make shall be of BHEL approved vendor make. Motor shall be preferably of class 2 or better in efficiency rating. If motor of any other efficiency is required, the same will be intimated to vendor during enquiry. Technical requirement for motor is given in Annexure-III.</p> <p>(f) The temperature of the oil leaving the heater shall be automatically controlled by RTD in not less than 3 steps. RTD shall function to open the heater circuits when the desired temperature is exceeded &amp; to close the heater circuits before the temperature drops below that necessary for proper purification of the oil. The heater circuits shall be interlocked with the pump motor circuits to shut off the heaters when the pumps are not being operated. Heater rating should be as given in Table-A. Heaters shall be designed to operate in minimum of three steps &amp; shall be of indirect type.</p> <p>(g) In case of polishing filter, it shall be equipped with a differential pressure switch with adjustable contracts to indicate high pressure drop across the filter along with alarm &amp; annunciation system.</p> <p>(h) Local instruments for pressure temp. &amp; flow indication shall be provided in accordance with clause 8.0 of Annexure-I.</p> <p>(i) The unit should be provided with suitable alarm &amp; annunciation system for easy operation &amp; identification of fault conditions. It should have spare outputs in the form of potential free contact to be hooked-up with central annunciation system in the room.</p> <p>(j) All control switches, indicating lamps &amp; sound alarm devices shall be mounted on the front face plate of a cubicle (panel) to be supplied with purification unit.</p> <p>(k) Remote operating facility for all electrically operated components should be provided on control panel.</p> <p>(l) All motors, heaters included in the offer, should be supplied along with its starter which will be mounted in the same panel.</p> <p>(m) An arrangement to detect and raise alarm in case of liquid seal breakage shall be provided. It may be adequately sized anti-flood tank with necessary drain valves along with level gauge or any other equivalent arrangement as per standard practice of the vendor. Drain and vent connections for level switch specified in Annexure-III to ST39013 shall be NB15 (ø21.3X2.6).</p> <p>(n) Control switches &amp; Indicating lamps shall be as per vendor's standard practice or owner approved vendor/ make (project dependent).</p> |                                          |          |
| Here we power<br>SIGN & DATE<br>SUPERSEDES<br>INVENTORY NO | Here we power<br>SIGN & DATE<br>SUPERSEDES<br>INVENTORY NO                        | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | निर्माणकर्ता<br>WORKED BY: Anil / Kavita | 18.03.16 |
| Here we power<br>SIGN & DATE<br>SUPERSEDES<br>INVENTORY NO | Here we power<br>SIGN & DATE<br>SUPERSEDES<br>INVENTORY NO                        | जॉचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 18.03.16                                 | 18.03.16 |

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| Here is power<br>SIGN & DATE                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                        | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013                         |          |
|                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                         |                                                                                                            | पृष्ठ 40 का 8<br>Page   8 of 40 |          |
| SUPERSEDES<br>INVENTORY NO.                                                                                                                                                                                                  | (o) If a common control panel is provided by vendor for two or more oil purifiers running in parallel, then control panel should be designed in such a way that it allows control of both the separators on the same panel. Control panel & controls shall also be able to work a purifier satisfactorily while one purifier is in shutdown/ breakdown. |                                                                                                            |                                 |          |
| मध्यम एवं भारी<br>अवस्था में                                                                                                                                                                                                 | (p) Local Panel (LCP) construction:<br>Type: Fabricated from cold rolled sheet steel<br>Frame thickness: 2.0 mm<br>Enclosure thickness: 1.6 mm<br>Gland plate thickness: 3.0 mm                                                                                                                                                                         |                                                                                                            |                                 |          |
| <b>COPYRIGHT AND CONFIDENTIAL</b><br>The information on this document is the property of Bharat Heavy Electricals Limited and must not be used directly or indirectly in any way detrimental to the interest of the company. | (q) ON/OFF control, indication, and alarm functions shall be provided on the LCP as well as on HM system (DCS).                                                                                                                                                                                                                                         |                                                                                                            |                                 |          |
|                                                                                                                                                                                                                              | (r) Adequately sized copper ground bus shall be provided for each panel.                                                                                                                                                                                                                                                                                |                                                                                                            |                                 |          |
|                                                                                                                                                                                                                              | (s) Control voltage shall be 110 V AC/220 VAC. This will be informed at the time of detail Engineering.                                                                                                                                                                                                                                                 |                                                                                                            |                                 |          |
|                                                                                                                                                                                                                              | (t) Cables for Motors and heaters shall be adequately sized keeping sufficient margin. Sizes shall be subject to BHEL/Customer approval.                                                                                                                                                                                                                |                                                                                                            |                                 |          |
|                                                                                                                                                                                                                              | (u) Cable glands suitable for incoming 415 V feeder cables shall be provided. Cable Sizes will be intimated later.                                                                                                                                                                                                                                      |                                                                                                            |                                 |          |
|                                                                                                                                                                                                                              | (v) LCP shall have 20% spare terminals.                                                                                                                                                                                                                                                                                                                 |                                                                                                            |                                 |          |
|                                                                                                                                                                                                                              | (w) Polishing filter (if applicable), chock alarm shall be provided through DPS.                                                                                                                                                                                                                                                                        |                                                                                                            |                                 |          |
|                                                                                                                                                                                                                              | (x) All instruments/ Devices shall have IP55 degree of protection.                                                                                                                                                                                                                                                                                      |                                                                                                            |                                 |          |
|                                                                                                                                                                                                                              | (y) For level switches and other instruments, plug and socket type connectors shall be provided. For level switch over range proof pressure shall be 150% of max design pressure.                                                                                                                                                                       |                                                                                                            |                                 |          |
|                                                                                                                                                                                                                              | (z) For Pressure gauge, Temperature gauge and level gauge over range test pressure shall be 1.5 times the maximum design pressure at 38 C. Range selection should cover 125% of max of scale. For Rotameter, the housing shall be IP55 protection class.                                                                                                |                                                                                                            |                                 |          |
| Here is power<br>SIGN & DATE                                                                                                                                                                                                 | (aa) Reports of type tests shall be those conducted within last five years.                                                                                                                                                                                                                                                                             |                                                                                                            |                                 |          |
| मध्यम एवं भारी<br>INVENTORY NO.                                                                                                                                                                                              | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                          | निर्माणकर्ता<br>WORKED BY:                                                                                 | Anil / Kavita                   | 18.03.16 |
| मध्यम एवं भारी<br>INVENTORY NO.                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                         | जाँचकर्ता<br>CHECKED BY:                                                                                   | A. S. Rajput / Devesh           | 18.03.16 |



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(bb) The local control panel shall have main switch fuse unit, power contactors, control transformer, space heater, alarm lamps, terminals, switchgear, OLR for separator motors and heaters and other contactors.

(cc) Interconnection diagram shall be provided along with offer.

(dd) Anti vibration pads shall be provided. Control panel should also be designed in such a way that it is able to withstand the site vibrations.

(ee) Instruments/ equipments used in parallel system of 2x4500LPH system shall be of same make & type for both the purifiers in a single project.

#### 4.2 For DCS control panel, additional requirements

The purification system shall be operated from control room as well as local panel having the logic built in BHEL control system instead of relay based control system.

It shall also have Local/remote switch, separator start/stop selector Switch, heater on/off sel. Switch Test/Accept/Reset push buttons and 24 V DC interfacing relays with DCS.

### Control Philosophy

(a) The purification system shall be operated from control room, as well as local control panel. "DCS/Local" selector switch shall be provided on the LCP.

(b) All field instruments shall be wired to a JB, which shall be in vendor scope. From JB these shall be wired to DCS by BHEL.

(c) Operating sequence and interlocks for various drives shall be programmed in BHEL's DCS. Vendor shall furnish Logic diagram and write-up for operation of the system. All interlocks shall be clearly brought out in the logic diagram and write-up.

(d) 24V Interfacing relay are to be supplied by vendor mounted in the LCP for operation of drives. 24V commands shall be given from DCS to these relays for operation of various drives.

(e) Alarms shall be generated in DCS and output shall be given for driving the alarm windows in LCP.

(f) Control of individual heaters stages shall be from DCS for maintaining required oil temp using 2 nos. duplex RTDs.

SIGN &amp; DATE

SUPERSHEDS  
INVENTORY NO.

10-11-2019

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स्वतन्त्राधिकार एवं गोपनीय

DESIGN & DATE

INVENTORY

Rev. no.  
08

निर्माणकर्ता  
WORKED BY

Anil / Kavita

Anil Kumar  
Kannur

18.03.16

जॉचकर्ता  
CHECKED BY:

A. S. Rajput /  
Devesh

Christina  
Patterson

18.03.16

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| Draw no. & date<br>SIGN & DATE                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | <b>ST39013</b>                    |          |
|                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            | पृष्ठ 40 का 10<br>Page   10 of 40 |          |
| SUPPLEMENT<br>INVENTORY NO.                                                                                                                                                                                           | (g) Limit switch or any other alternate arrangement with BHEL approval shall be provided for separator cover for remote monitoring when operating in DCS.<br>(h) Flow switch shall be provided at centrifuge inlet.<br>(i) List of drives to be operated from DCS, list of instruments and list of alarms shall be furnished along with the offer.<br>(j) Air requirement for 3-way valve shall be furnished with the offer.<br>(k) Functional testing of system shall be done with local control panel and by simulating DCS outputs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                            |                                   |          |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company. | <b>5 PERFORMANCE REQUIREMENTS</b><br>a. The quality of purified oil at outlet of OPS at 65°C shall be as follows.<br>(i) Particle size of impurities at the outlet of OPS shall be equal to or better than class 15/12 as per ISO 4406 from class 21/18 at the inlet of the oil purification system in single pass without removing any additives/ inhibitors present in the oil and maintaining the lubricating value of the oil.<br>(ii) Moisture contents at the outlet of OPS shall be maximum 300 to 500 ppm from inlet of maximum 15000 ppm.<br>b. Polishing filter shall be capable of handling the quantity of clean oil, coming out of the centrifuge & filtering it down to $\beta_3=1000$ or better including colloidal carbon but shall not remove any rust inhibitor or oxidation inhibitor.<br>c. Noise level shall not exceed 85 decibel measured at a distance of 1 meter from the equipment and at height of 1.5 meter from the ground level.<br>d. Facility of indirect heater for heating oil from 50°C to the temperature which is required to make separation of water and oil most effective shall be provided. But to take care of situation while temperature is much below than 50°C, an arrangement of utilizing the heater to elevate the temperature of oil in the main oil tank to 50°C shall be provided. Heater shall be provided with suitable bypass arrangement. |                                                                                                            |                                   |          |
| 6 GUARANTEES<br>6.1 The unit should be guaranteed for trouble free operation for a minimum period of 18 months after commissioning or 36 months after dispatch whichever is earlier.                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                   |          |
| Rev. no.<br>08                                                                                                                                                                                                        | निर्माणकर्ता<br>WORKED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Anil / Kavita                                                                                              | Anil Kumar<br>Kavita              | 18.03.16 |
| INVENTORY<br>P-5338                                                                                                                                                                                                   | जाँचकर्ता<br>CHECKED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | A. S. Rajput /<br>Devesh                                                                                   | A. S. Rajput<br>Devesh            | 18.03.16 |



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6.5 Care should be taken during packing of electrical/electronic items to insure that there is no damage to these items during handling/transportation.

## 7 QUALITY ASSURANCE, INSPECTION AND TESTING

7.5 The minimum tests / checks to be carried out on the unit as envisaged by purchaser are given below. This is however , not intended to form a comprehensive testing programme as it is supplier's responsibility to prepare the detailed quality plan, which should also include tests checks carried out by supplier as a part of their normal practice. This quality plan is subjected to the approval of BHEL & owner. BHEL/ Owner reserves the right to ask any more checks at the time of quality plan finalization.

(2) Following tests shall be carried out during various stages of manufacture at manufacture's works.

Rev. no. 02

निर्माणकर्ता  
WORKED BY:

Anil / Kavita

Anil Kumar  
Kamits

18.03.16

जाँचकर्ता  
CHECKED BY

A. S. Rajput /  
Devesh

Elizabeth  
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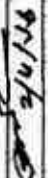
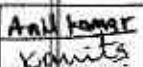
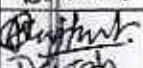
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|                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            | पृष्ठ 40 का 12<br>Page   12 of 40 |                                    |
| SUPERSEDES<br>INVENTORY NO<br>मशीन नं. का<br>अवस्था नं.                                                                                                                                                              | <p>(a) Check for dimensions of all the component parts including surface finish, radial run out of shaft</p> <p>(b) NDT:- Bowls shall be subjected to DP after final machining to ensure freedom from surface defects. Shaft shall be subjected to UT &amp; DP to ensure freedom from internal &amp; surface defects. All butt welds on oil piping shall be subjected to 10% RT &amp; fillet welds to 100% MP/DP. Norms for acceptance to be informed in the offer for BHEL approval.</p> <p>(c) Static &amp; dynamic balancing test on all rotating elements of the centrifuge. Acceptance Norms for vibration is 5.6 mm/s.</p> <p>(d) Hydraulic testing of all pressure parts including polishing filter if offered and vessel body etc. for 1.5 times of working pressure for 30 minutes &amp; seat leakage test of valves at 1.0 times of working pressure for 30 minutes. No leakage to be ensured.</p> <p>(e) Performance test on feed &amp; discharge oil pump, purifier motor, heaters, control system &amp; other accessories. Reference &amp; Acceptance norms for vibration to be informed in the offer for BHEL approval.</p> <p>(f) Type-test reports detailing the results for motors of similar ratings shall be furnished as called annexure III.</p> <p>(g) Routine test reports of motors to be furnished as per annexure III.</p> <p>(h) Control panel RTD, level switch &amp; solenoid valve shall be subjected to the following final testing as applicable as routine test (unless otherwise stated) in addition to the stage inspection carried out by the vendor.</p> <p>(i) Dimensional checks as per approved drawing including proper cut outs, mounting of all instruments/ accessories etc. as per approved general arrangement drawing.</p> <p>(j) Functional/ operational checks of all wiring schematics, operational/ sequential interlocks etc. are applicable as per approved drawing.</p> <p>i) Degree of protection test as per IS: 2147 (Type test) at 2.0 KV.</p> <p>(k) High voltage test &amp; IR measurement not less than 30 mega ohm (MΩ) before and after test.</p> <p>ii) Pick up and drop down test &amp; performance with ±10% voltage variation.</p> <p>(l) Capacity test of complete oil purification system. During capacity test, the complete purifier shall be tested at manufacture's works for mechanical running, vibration &amp; noise level, sequential operation &amp; interlocks, test for vapour tightness (if applicable), maximum particle size &amp; moisture</p> |                                                                                                            |                                   |                                    |
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| INVENTORY<br>18.03.16                                                                                                                                                                                                | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | निर्माणकर्ता<br>WORKED BY:                                                                                 | Anil / Kavita                     | Anil Kumar<br>Kavita<br>18.03.16   |
|                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | जाँचकर्ता<br>CHECKED BY:                                                                                   | A. S. Rajput /<br>Devesh          | A. S. Rajput<br>Devesh<br>18.03.16 |

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| SIGNATURE<br>SIGN & DATE                                                                                                                                                                                               |                                                                                                                                                                                                                                          | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013                           |                                    |
|                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                           |                                                                                                            | पृष्ठ 40 का 13<br>Page   13 of 40 |                                    |
| SUPERSEDES<br>INVENTORY NO                                                                                                                                                                                             | content at the outlet of oil purification system. Acceptance norms for vibration to be informed in the offer for BHEL approval<br><br>(m) Verification/ BHEL approved type-test report for max. particle size & moisture content.                                                                                         |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | 7.6 Party to furnish certificate of compliance for the instruments which are being installed in the system after P.O. placement.                                                                                                                                                                                          |                                                                                                            |                                   |                                    |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited<br>It must not be used directly or indirectly in any way detrimental to the interest of the company | 7.7 <u>STORAGE</u> :- Bidder shall inform to purchaser along with the offer regarding storage facility which they require at the site for their equipment if the unit is to be stored at site for their equipment. If the unit is to be stored at site for next 12 to 18 months after dispatch from manufacturer's works. |                                                                                                            |                                   |                                    |
|                                                                                                                                                                                                                        | <b>8 DOCUMENTS, DATA AND DRAWINGS TO BE FURNISHED BY SUPPLIER</b>                                                                                                                                                                                                                                                         |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | <b>8.1 <u>DRAWINGS/ DOCUMENTS REQUIRED WITH THE OFFER</u></b>                                                                                                                                                                                                                                                             |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | a. GA drawing of the equipment offered, arrangement and layout drawing showing various equipments with all fittings, accessories and connection as well as clearance necessary for other equipment or structural members for operation and maintenance, loading data and foundation details of oil purification system.   |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | b. Data sheets of all instruments including RTDs, motor, solenoid valves, instruments and 3-way pneumatic/solenoid valve for oil purification system shall be furnished as per Annexure-II of this specification for BHEL's review.                                                                                       |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | c. P&ID including bill of material indicating piping, valves, all instruments and devices of the system as per BHEL format annexure-VII.                                                                                                                                                                                  |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | d. Drawings / Documents of all equipments such as heater, y-strainer, dirty & clean oil pump etc. shall also be included in the offer.                                                                                                                                                                                    |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | e. Detailed technical literature on various equipments/ instruments and GA drawing of control panel.                                                                                                                                                                                                                      |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | f. Characteristic curves of all pumps.                                                                                                                                                                                                                                                                                    |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | g. Manufacturer's descriptive and illustrative literature showing details of equipments and method of operation of the complete system.                                                                                                                                                                                   |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | h. Electrical single line diagram, control wiring diagram, interlocks schematic, protection scheme, details of motor and starter etc.                                                                                                                                                                                     |                                                                                                            |                                   |                                    |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | Rev. no.<br>08                                                                                                                                                                                                                                                                                                            | निर्माणकर्ता<br>WORKED BY:                                                                                 | Anil / Kavita                     | Anil Kumar<br>Kavita<br>18.03.16   |
| नवीनीकृत करने के लिए<br>अनुमति दें                                                                                                                                                                                     | 17.03.16                                                                                                                                                                                                                                                                                                                  | जाँचकर्ता<br>CHECKED BY:                                                                                   | A. S. Rajput /<br>Devesh          | A. S. Rajput<br>Devesh<br>10.03.16 |

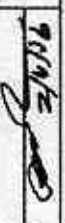
|                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                            |                                   |          |
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| SIGNATURE<br>SIGN & DATE                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | <b>ST39013</b>                    |          |
|                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                            | पृष्ठ 40 का 14<br>Page   14 of 40 |          |
| SUPERSEDES<br>INVENTORY NO<br>मध्यम रूप से नष्ट<br>अधिकृत रूप से                                                                                                                                                     | i. Cross-sectional drawings of all equipments including horizontal and vertical section of separator indicating the recommended and mandatory spare parts. Also, list of recommended and mandatory spares with their part no. / model no. and quantity required.<br>j. Details of standards /codes used for designing of the various equipments and selecting the material of various components.<br>k. Name of the manufacturer and illustrative literature all components which have been out-sourced for purchaser's review.<br>l. All other relevant data and drawings which supplier considers necessary for better understanding of the system.<br>m. Type test Reports for capacity, moisture content, particle size of impurities and motor efficiency conducted within last 5 years.<br>n. Interconnecting diagram of DCS control panel (if required).<br>o. Acceptance norms for (i) in process NDT of bowl, shaft, butt welds of piping. (ii) Static & dynamic balancing of shaft. (iii) Performance test on pumps & motors. (iv) Vibration norms for pumps, motor and unit.<br>p. Also, Bidder to shall furnish the filled up check list of BHEL format as per annexure –VII. |                                                                                                            |                                   |          |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electrical Limited and must not be used directly or indirectly in any way detrimental to the interest of the company. | <b>8.2 DRAWINGS / DOCUMENTS REQUIRED WITHIN 30 DAYS AFTER PLACEMENT OF ORDER</b><br>a. Five sets (paper based) of each of GA drawing, P&ID, filled in data sheet, control panel schematic & write-up etc. shall be furnished for review/ approval by BHEL/CUSTOMER after placement of order.<br>b. Motor datasheet, curves/ graphs, type- test reports, efficiency rating etc. for review/ approval by BHEL/CUSTOMER after placement of order.<br>c. O & M manual (soft/ paper based) shall be furnished for BHEL review/ approval.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                            |                                   |          |
|                                                                                                                                                                                                                      | <b>8.3 DRAWINGS/ DOCUMENTS REQUIRED ALONGWITH SUPPLY</b><br>a. All relevant test certificates & full details of the tests carried out as per the requirement of this specification before dispatch.<br>b. Twenty sets (paper based) and 2 set (in CDROM) of O&M manual shall be furnished containing all drawings and datasheets, catalogues of all instruments and instructions for storage, erection &                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                            |                                   |          |
| SIGN & DATE<br>                                                                                                                   | Rcv. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | निर्माणकर्ता<br>WORKED BY:                                                                                 | Anil / Kavita                     | 18.03.16 |
| INVENTORY<br>18.03.16                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | जाँचकर्ता<br>CHECKED BY:                                                                                   | A. S. Rajput /<br>Devesh          | 18.03.16 |

| Date of issue<br>SIGN & DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                             | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>                                                                                                                                                                                                                                                                                         | ST39013<br>पृष्ठ 40 का 15<br>Page   15 of 40 |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------|---------------|----------------------|----------|--------------------------|-----------------------------------|--------|----------|---------------------|--------------------------------------------|---|----|-----------------------|----------------------------------------------------|---|----|
| SUPERSEDES<br>INVENTORY NO<br>(यदि कोई नया नंबर है तो यहाँ दर्ज करें)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | commissioning, operation and maintenance after approval. Vendor shall keep 2 copies of O&M manual in the dispatch box & shall also mention the same in its shipping list.                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.                                                                                                                                                                                                                                                                                                                                                                                                                                          | c. Before bidder finalises these manuals, the same will be reviewed by purchaser. After getting approval of purchaser, final manual in required quality shall be dispatched. Manual shall clearly indicate all inspections & tests to be carried out at site and if any check list/ log sheets etc. are required to carry-out specified inspection & test that shall be made part of manual. |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | d. Data sheets of all instruments, thermostats and motor. The same shall be included in O&M manual of oil purification system along with the catalogues of all instruments.                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| <b>9 MATERIALS OF CONSTRUCTION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| 9.1 The material of all rotating parts / components i.e. "bowl, bowl cover, disc, Shaft/spindle, gear/screw shall be of high grade stainless steel (e.g. austenitic) considering the purpose and the extent of contact with oil. Other parts coming in direct contact with water shall be of stainless steel or other corrosion resistant material conforming to applicable standard (IS / BS) or equivalent standard. All those parts that are coming in contact with oil & are not of Stainless steel / other corrosion resistant shall be mentioned in their offer. This should be submitted as a separate document indicating material/ make of all parts. |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| 9.2 All piping, fittings & valves should be suitably selected as per applicable IS, BS or equivalent standard.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| 9.3 Strainers, wherever provided, should be designed to enable them to be cleaned during operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| 9.4 All other parts/ components shall be of compatible material to suit the applications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| <b>10 CODES AND STANDARDS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| In addition to the codes and standards specifically mentioned in the relevant technical specification for the equipment/ plant/ system, all equipment parts, systems and works covered under this specification shall comply with all currently applicable statutory regulations and safety codes (National/International).                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| <b>11. CLEANING, PROTECTION AND PAINTING</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| Painting scheme shall be according to BHEL approved/ previously approved scheme. Painting scheme for oil purification system shall be as below.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Paint (Coat)</th> <th style="width: 45%;">Paint Type</th> <th style="width: 15%;">No. of coat</th> <th style="width: 15%;">DFT*</th> </tr> </thead> <tbody> <tr> <td>Primer Paint:</td> <td>Epoxy base Zinc rich primer paint</td> <td>2</td> <td>70</td> </tr> <tr> <td>Intermediate Paint:</td> <td>Epoxy TiO2 Pigmented Polyamide Cured Paint</td> <td>1</td> <td>70</td> </tr> <tr> <td>Finish (Final) Paint:</td> <td>Aliphatic Acrylic 2 Pack Polyurethane Finish paint</td> <td>2</td> <td>60</td> </tr> </tbody> </table>                      |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |                                              | Paint (Coat)               | Paint Type    | No. of coat          | DFT*     | Primer Paint:            | Epoxy base Zinc rich primer paint | 2      | 70       | Intermediate Paint: | Epoxy TiO2 Pigmented Polyamide Cured Paint | 1 | 70 | Finish (Final) Paint: | Aliphatic Acrylic 2 Pack Polyurethane Finish paint | 2 | 60 |
| Paint (Coat)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Paint Type                                                                                                                                                                                                                                                                                                                                                                                   | No. of coat                                                                                                                                                                                                                                                                                                                                                                                        | DFT*                                         |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| Primer Paint:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Epoxy base Zinc rich primer paint                                                                                                                                                                                                                                                                                                                                                            | 2                                                                                                                                                                                                                                                                                                                                                                                                  | 70                                           |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| Intermediate Paint:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Epoxy TiO2 Pigmented Polyamide Cured Paint                                                                                                                                                                                                                                                                                                                                                   | 1                                                                                                                                                                                                                                                                                                                                                                                                  | 70                                           |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| Finish (Final) Paint:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Aliphatic Acrylic 2 Pack Polyurethane Finish paint                                                                                                                                                                                                                                                                                                                                           | 2                                                                                                                                                                                                                                                                                                                                                                                                  | 60                                           |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| Date of issue<br>SIGN & DATE<br>11/11/18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                               | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">निर्माणकर्ता<br/>WORKED BY:</td> <td style="width: 20%;">Anil / Kavita</td> <td style="width: 20%;">Anil Kumar<br/>Kavita</td> <td style="width: 40%;">18.03.16</td> </tr> <tr> <td>जाँचकर्ता<br/>CHECKED BY:</td> <td>A. S. Rajput / Devesh</td> <td>Devesh</td> <td>18.03.16</td> </tr> </table> |                                              | निर्माणकर्ता<br>WORKED BY: | Anil / Kavita | Anil Kumar<br>Kavita | 18.03.16 | जाँचकर्ता<br>CHECKED BY: | A. S. Rajput / Devesh             | Devesh | 18.03.16 |                     |                                            |   |    |                       |                                                    |   |    |
| निर्माणकर्ता<br>WORKED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Anil / Kavita                                                                                                                                                                                                                                                                                                                                                                                | Anil Kumar<br>Kavita                                                                                                                                                                                                                                                                                                                                                                               | 18.03.16                                     |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |
| जाँचकर्ता<br>CHECKED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | A. S. Rajput / Devesh                                                                                                                                                                                                                                                                                                                                                                        | Devesh                                                                                                                                                                                                                                                                                                                                                                                             | 18.03.16                                     |                            |               |                      |          |                          |                                   |        |          |                     |                                            |   |    |                       |                                                    |   |    |

|                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                            |  |                                                                                                        |          |      |             |      |          |      |           |      |           |      |           |      |
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| Date of entry<br>SIGN & DATE<br><br>KUMIRSEDES<br>INVENTORY NO<br><br>मशीन नं. एवं तिथि<br>संख्या एवं तिथि                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> |  | ST39013                                                                                                |          |      |             |      |          |      |           |      |           |      |           |      |
|                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                            |  | पृष्ठ 40 का 16<br>Page   16 of 40                                                                      |          |      |             |      |          |      |           |      |           |      |           |      |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company. | Total Minimum DFT=180<br>*DFT-- Dry Film Thickness (Final) in micron.<br><br>Paint Shade shall be as below:- <ul style="list-style-type: none"> <li>For Oil purifier- Light Blue (RAL 5012)</li> <li>For Control Panel generally it is - External-Light Grey (shade 631 of IS-5), Internal- Brilliant White or paint shade will be informed during later stage of engineering.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |  |                                                                                                        |          |      |             |      |          |      |           |      |           |      |           |      |
|                                                                                                                                                                                                                       | <p>11.1 All surfaces shall be thoroughly cleaned of all mill scales, oxides and other coating and prepared in the shops. The protective coating should be such as to prevent the deterioration of coating itself by him for internal and external surface protection which shall be checked and approved by BHEL / Owner. All surfaces which will not be easily accessible after the shop assembly, shall before hand be treated and protected for life of the equipment.</p> <p>11.2 The pre-treatment/ painting of the control panel shall be done by 7 tank process/ shot blasting/ sand blasting, by 2 coats of primer and 2 coats of paint of shade no. 692 as per IS: 6005. The total thickness of paint shall be a minimum of 180 micron and maximum of 250 micron.</p> <p>11.3 After testing of unit, its internals shall be thoroughly cleaned, dried and conserved before packing. Conservation shall be suitable for storing in saline atmosphere &amp; for a period of 2 years before use. Unit shall be suitably packed for transportation. Supplier shall be responsible for all loss or damage during transportation, handling and storage due to improper packing.</p> <p>11.4 Painting treatment for LCP shall be as per IS: 6005. Two coats of lead oxide primer followed by powder painting. External shade for front and Rear shall be RAL9002 and for panel sides shall be RAL5012. Internal color shall be same as external color indicated above.</p> |                                                                                                            |  |                                                                                                        |          |      |             |      |          |      |           |      |           |      |           |      |
| भारतीय भारत भारतीय<br>भारतीय भारत भारतीय                                                                                                                                                                              | <b>12 DESIGN CO-ORDINATION MEETING</b><br><br>Supplier shall attend the meeting on his own cost, whenever felt necessary, called by purchaser / owner to clarify the subject matter to them during engineering, erection, commissioning, and any stage prior to handing over.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                            |  |                                                                                                        |          |      |             |      |          |      |           |      |           |      |           |      |
|                                                                                                                                                                                                                       | <b>13 LIST OF CROSS-REFERRED STANDARDS</b> <table border="0"> <tr><td>13.1</td><td>IS: 10816-2</td></tr> <tr><td>13.2</td><td>IS: 325,</td></tr> <tr><td>13.3</td><td>IS: 4029,</td></tr> <tr><td>13.4</td><td>IS: 2147,</td></tr> <tr><td>13.5</td><td>IS: 2148,</td></tr> <tr><td>13.6</td><td>IS: 6005,</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                            |  |                                                                                                        |          | 13.1 | IS: 10816-2 | 13.2 | IS: 325, | 13.3 | IS: 4029, | 13.4 | IS: 2147, | 13.5 | IS: 2148, | 13.6 |
| 13.1                                                                                                                                                                                                                  | IS: 10816-2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                            |  |                                                                                                        |          |      |             |      |          |      |           |      |           |      |           |      |
| 13.2                                                                                                                                                                                                                  | IS: 325,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                            |  |                                                                                                        |          |      |             |      |          |      |           |      |           |      |           |      |
| 13.3                                                                                                                                                                                                                  | IS: 4029,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |  |                                                                                                        |          |      |             |      |          |      |           |      |           |      |           |      |
| 13.4                                                                                                                                                                                                                  | IS: 2147,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |  |                                                                                                        |          |      |             |      |          |      |           |      |           |      |           |      |
| 13.5                                                                                                                                                                                                                  | IS: 2148,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |  |                                                                                                        |          |      |             |      |          |      |           |      |           |      |           |      |
| 13.6                                                                                                                                                                                                                  | IS: 6005,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |  |                                                                                                        |          |      |             |      |          |      |           |      |           |      |           |      |
| Date of entry<br>SIGN & DATE<br>                                                                                                   | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | निर्माणकर्ता<br>WORKED BY: Anil / Kavita                                                                   |  | Anil / Kavita<br> | 18.03.16 |      |             |      |          |      |           |      |           |      |           |      |
| मशीन नं. एवं तिथि<br>INVENTORY NO<br>25538                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh                                                             |  |                   | 18.03.16 |      |             |      |          |      |           |      |           |      |           |      |

|                                                                                                                                                                                                                                 |                                                                                   |                                                                                                                                                                                                      |                                              |                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------|
| Rev. no. & DATE<br>SIGN & DATE                                                                                                                                                                                                  |  | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>                                                                                           | ST39013<br>पृष्ठ 40 का 17<br>Page   17 of 40 |                          |
| SUPERSEDES<br>INVENTORY NO                                                                                                                                                                                                      |                                                                                   |                                                                                                                                                                                                      |                                              |                          |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited.<br>It must not be used directly or indirectly in any way detrimental to the interests of the company.       |                                                                                   | 13.7 IS: 5,<br>13.8 IS: 4722,<br>13.9 IS: 2253,<br>13.10 IS: 2254,<br>13.11 IS: 3202,<br>13.12 IS: 4722-1992,<br>13.13 ISO: 4406,<br>13.14 IS: 12075,<br>13.15 IS: 12615:2011,<br>13.16 IS: 10816-2. |                                              |                          |
| इस दस्तावेज़ पर गोपनीयता का अधिकार है। इस दस्तावेज़ को बिना लिखित अनुमति के किसी भी व्यक्ति को प्रकट नहीं किया जाना चाहिए।<br>This document is confidential. It must not be disclosed to any person without written permission. |                                                                                   |                                                                                                                                                                                                      |                                              |                          |
| Rev. no. & DATE<br>SIGN & DATE                                                                                                                                                                                                  |                                                                                   |                                                                                                                                                                                                      |                                              |                          |
| INVENTORY NO<br>2558                                                                                                                                                                                                            | Rev. no.<br>08                                                                    |                                                                                                                                                                                                      | निर्माणकर्ता<br>WORKED BY:                   | Anil / Kavita            |
|                                                                                                                                                                                                                                 |                                                                                   |                                                                                                                                                                                                      | जाँचकर्ता<br>CHECKED BY:                     | A. S. Rajput /<br>Devesh |
|                                                                                                                                                                                                                                 |                                                                                   |                                                                                                                                                                                                      |                                              | 18.03.16<br>18.03.16     |

| SIGN & DATE<br>18.03.16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> |                                        |                                                |          | <b>ST39013</b><br>पृष्ठ 40 का 18<br>Page   18 of 40 |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------|----------|-----------------------------------------------------|------------|-------|-------------|-------|-------------------------------|------------------------|---------------|----|-------------------------------|---------|---------------|----|-----------------|--------|---------------|-------|-------------------|-----|--------------|----|-----------------|---------------------|--------------|----|--------------------|----------------------------------|-----------|----|--------|--------|---------------|----|---------------------------|-------|---------------|----|--------------------------------|------------|--|----|--------------------------------------------------|---------------------|---------------|----|------------|------------|---------------|----|---------------------------------|----------------------|-------------|-----|--------------------------|---------------------|-----------------|-----|-----------------------------------------|---------------------------------------|---------------------------|-----|------------------------------|--|--|--|-------------|-----|----------------------------------------|--|---------------|-----|
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                   |                                                                                                            |                                        |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| SUPERSEDES<br>INVENTORY NO.<br>14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>14 ANNEXURE-I (PROPERTIES OF TURBINE OIL)</b>                                  |                                                                                                            |                                        |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">S. No.</th> <th style="width: 40%;">Properties</th> <th style="width: 30%;">Value</th> <th style="width: 20%;">Test Method</th> </tr> </thead> <tbody> <tr> <td>1. a.</td> <td>Kinematic viscosity at 37.8°C</td> <td>47.5 c.s. to 49.5 c.s.</td> <td>IS : 1448-P25</td> </tr> <tr> <td>b.</td> <td>Kinematic viscosity at 50.0°C</td> <td>28 c.s.</td> <td>IS : 1448-P25</td> </tr> <tr> <td>2.</td> <td>Viscosity index</td> <td>Min 97</td> <td>IS : 1448-P56</td> </tr> <tr> <td>3. a.</td> <td>Inorganic acidity</td> <td>Nil</td> <td>IS : 1448-P2</td> </tr> <tr> <td>b.</td> <td>Organic acidity</td> <td>Max. 0.14 mg of KOH</td> <td>IS : 1448-P2</td> </tr> <tr> <td>c.</td> <td>Neutralisation No.</td> <td>Max. 0.2 mg of KOH per gm of oil</td> <td>IS : 1012</td> </tr> <tr> <td>4.</td> <td>Colour</td> <td>Max. 2</td> <td>IS : 1448-P12</td> </tr> <tr> <td>5.</td> <td>Specific gravity at 50 °C</td> <td>0.852</td> <td>IS : 1448-P32</td> </tr> <tr> <td>6.</td> <td>Flash point Cleveland Open cup</td> <td>Min. 200°C</td> <td></td> </tr> <tr> <td>7.</td> <td>Copper strip corrosion test At 100°C for 3 hours</td> <td>Not worse than No.1</td> <td>IS : 1448-P15</td> </tr> <tr> <td>8.</td> <td>Pour point</td> <td>-6 °C max.</td> <td>IS : 1448-P10</td> </tr> <tr> <td>9.</td> <td>Rust preventing characteristics</td> <td>negative test passed</td> <td>ASTM : D665</td> </tr> <tr> <td>10.</td> <td>Emulsion characteristics</td> <td>40-40-0(20 minutes)</td> <td>ASTMD : 1401-67</td> </tr> <tr> <td>11.</td> <td>Total acidity after 1000 hrs. oxidation</td> <td>Max. 2.0 mg of KOH per gm of the oil.</td> <td>ASTMD : 943-54/ IP 157/64</td> </tr> <tr> <td>12.</td> <td>Foaming characteristics Max.</td> <td></td> <td></td> </tr> <tr> <td></td> <td>(a) At 24°C</td> <td>Nil</td> <td rowspan="2" style="vertical-align: middle;">           Volume in ml of foam after 10 minutes.         </td> </tr> <tr> <td></td> <td>(b) At 93.5°C</td> <td>Nil</td> </tr> </tbody> </table> |                                                                                   |                                                                                                            |                                        |                                                |          | S. No.                                              | Properties | Value | Test Method | 1. a. | Kinematic viscosity at 37.8°C | 47.5 c.s. to 49.5 c.s. | IS : 1448-P25 | b. | Kinematic viscosity at 50.0°C | 28 c.s. | IS : 1448-P25 | 2. | Viscosity index | Min 97 | IS : 1448-P56 | 3. a. | Inorganic acidity | Nil | IS : 1448-P2 | b. | Organic acidity | Max. 0.14 mg of KOH | IS : 1448-P2 | c. | Neutralisation No. | Max. 0.2 mg of KOH per gm of oil | IS : 1012 | 4. | Colour | Max. 2 | IS : 1448-P12 | 5. | Specific gravity at 50 °C | 0.852 | IS : 1448-P32 | 6. | Flash point Cleveland Open cup | Min. 200°C |  | 7. | Copper strip corrosion test At 100°C for 3 hours | Not worse than No.1 | IS : 1448-P15 | 8. | Pour point | -6 °C max. | IS : 1448-P10 | 9. | Rust preventing characteristics | negative test passed | ASTM : D665 | 10. | Emulsion characteristics | 40-40-0(20 minutes) | ASTMD : 1401-67 | 11. | Total acidity after 1000 hrs. oxidation | Max. 2.0 mg of KOH per gm of the oil. | ASTMD : 943-54/ IP 157/64 | 12. | Foaming characteristics Max. |  |  |  | (a) At 24°C | Nil | Volume in ml of foam after 10 minutes. |  | (b) At 93.5°C | Nil |
| S. No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Properties                                                                        | Value                                                                                                      | Test Method                            |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 1. a.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Kinematic viscosity at 37.8°C                                                     | 47.5 c.s. to 49.5 c.s.                                                                                     | IS : 1448-P25                          |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| b.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Kinematic viscosity at 50.0°C                                                     | 28 c.s.                                                                                                    | IS : 1448-P25                          |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Viscosity index                                                                   | Min 97                                                                                                     | IS : 1448-P56                          |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 3. a.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Inorganic acidity                                                                 | Nil                                                                                                        | IS : 1448-P2                           |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| b.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Organic acidity                                                                   | Max. 0.14 mg of KOH                                                                                        | IS : 1448-P2                           |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| c.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Neutralisation No.                                                                | Max. 0.2 mg of KOH per gm of oil                                                                           | IS : 1012                              |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Colour                                                                            | Max. 2                                                                                                     | IS : 1448-P12                          |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Specific gravity at 50 °C                                                         | 0.852                                                                                                      | IS : 1448-P32                          |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 6.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Flash point Cleveland Open cup                                                    | Min. 200°C                                                                                                 |                                        |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 7.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Copper strip corrosion test At 100°C for 3 hours                                  | Not worse than No.1                                                                                        | IS : 1448-P15                          |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 8.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Pour point                                                                        | -6 °C max.                                                                                                 | IS : 1448-P10                          |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 9.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Rust preventing characteristics                                                   | negative test passed                                                                                       | ASTM : D665                            |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 10.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Emulsion characteristics                                                          | 40-40-0(20 minutes)                                                                                        | ASTMD : 1401-67                        |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 11.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Total acidity after 1000 hrs. oxidation                                           | Max. 2.0 mg of KOH per gm of the oil.                                                                      | ASTMD : 943-54/ IP 157/64              |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| 12.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Foaming characteristics Max.                                                      |                                                                                                            |                                        |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (a) At 24°C                                                                       | Nil                                                                                                        | Volume in ml of foam after 10 minutes. |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (b) At 93.5°C                                                                     | Nil                                                                                                        |                                        |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
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| 18.03.16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                   |                                                                                                            |                                        |                                                |          |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |
| SIGN & DATE<br>18.03.16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Rev. no.<br>08                                                                    | निर्माणकर्ता<br>WORKED BY: Anil / Kavita                                                                   | 18.03.16                               | जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh | 18.03.16 |                                                     |            |       |             |       |                               |                        |               |    |                               |         |               |    |                 |        |               |       |                   |     |              |    |                 |                     |              |    |                    |                                  |           |    |        |        |               |    |                           |       |               |    |                                |            |  |    |                                                  |                     |               |    |            |            |               |    |                                 |                      |             |     |                          |                     |                 |     |                                         |                                       |                           |     |                              |  |  |  |             |     |                                        |  |               |     |

| SIGN & DATE<br> |                                                                                                                                         | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                          | ST39013                           |             |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------------------|-------------|--------|------------|-------|-------------|--|-------------------------------------|-----|--|-----|------------------------------|---------------|-----------|-----|-----------------|-----------|---------------|-----|-------------------------|-----------------------------------------------------|-----------|-----|------------------------------|------------------------------------------------|-----------|-----|--------------------------------------------------|------------------|-----------|
|                                                                                                    |                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          | पृष्ठ 40 का 19<br>Page   19 of 40 |             |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |
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|                                                                                                    |                                                                                                                                                                                                                          | S. No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Properties               | Value                             | Test Method |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |
|                                                                                                    | (c) At 24°C after testing at 93.5°C                                                                                                                                                                                      | Nil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |                                   |             |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |
| 13.                                                                                                | De-aeration capacity at 50°C                                                                                                                                                                                             | 6 Minute Max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | DIN 51381                |                                   |             |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |
| 14.                                                                                                | Ash (by weight)                                                                                                                                                                                                          | Max. 0.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | IS : 1448- P4            |                                   |             |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |
| 15.                                                                                                | Water content by weight                                                                                                                                                                                                  | % gm below the limit of quantitative detectability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DIN 51592                |                                   |             |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |
| 16.                                                                                                | Mechanical solid impurities.                                                                                                                                                                                             | Below the limit of quantitative detectability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | DIN 51592                |                                   |             |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |
| 17.                                                                                                | Water separation capacity After steam treatment.                                                                                                                                                                         | Max. 300 seconds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | DIN 51589                |                                   |             |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |
| मूल नमूने का<br>INVENTORY NO.<br>P-53-38                                                           | Rev. no.<br>08                                                                                                                                                                                                           | निर्माणकर्ता<br>WORKED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Anil / Kavita            | Anil Kumar<br>Kavita              | 18.03.16    |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |
|                                                                                                    |                                                                                                                                                                                                                          | जाँचकर्ता<br>CHECKED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | A. S. Rajput /<br>Devesh | A. S. Rajput<br>Devesh            | 18.03.16    |        |            |       |             |  |                                     |     |  |     |                              |               |           |     |                 |           |               |     |                         |                                                     |           |     |                              |                                                |           |     |                                                  |                  |           |

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------|-----|------------|--------|-----|----------------------|--------|-----|--------------------------------------------------------------------|---------|-----|----------------------------------------------------------------|---------|-----|-----------------------------------------------------------------------------------------|--------|-----|------------|--------|-----|-----------------|--------|-----|------------------|--------|-----|-------------------|--------|------|------------------------------------|--------|------|------------------------|--------|------|------------------------------------------|--------|------|-------------------------------------------------------------------------|--------|------|---------------|--------|------|----------------------------------|--|--------|-----------|--------|--------|------------|--------|--------|-----------|--------|--------|-------------|--------|--------|---------------|--------|--------|--------------------------------|--------|--------|-----------------------------------------------------|--------|------|-----------------------------------|--------|------|----------------------------------------|--------|------|-------------------------------------------|--------|
| Date of issue:<br>SIGN & DATE                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br>(HEEP: HARIDWAR) | <b>ST39013</b>                    |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
|                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                     | पृष्ठ 40 का 20<br>Page   20 of 40 |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| SUPPLEMENTARY INVENTORY NO.<br><br>भारी मशीन वस्तुओं की शीटिंग क्रमांक                                                                                                                                                       | <b>15 ANNEXURE-II (DATA SHEET OF TURBINE OIL PURIFICATION SYSTEM)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                     |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
|                                                                                                                                                                                                                              | <b>1.0 NUMBER OF UNITS OFFERED:</b><br><br><b>2.0 SCOPE OF SUPPLY:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                     |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| <b>COPYRIGHT AND CONFIDENTIAL</b><br>The information on this document is the property of Bharat Heavy Electricals Limited and must not be used directly or indirectly in any way detrimental to the interest of the company. | <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>2.1</td><td>Centrifuge</td><td>Yes/No</td></tr> <tr><td>2.2</td><td>Centrifuge feed pump</td><td>Yes/No</td></tr> <tr><td>2.3</td><td>Centrifuge discharge pump</td><td>Yes/No</td></tr> <tr><td>2.4</td><td>Speed indicator</td><td>Yes/No</td></tr> <tr><td>2.5</td><td>Thermostatically controlled electric heater with control and trip thermostat (indirect)</td><td>Yes/No</td></tr> <tr><td>2.6</td><td>Flow meter</td><td>Yes/No</td></tr> <tr><td>2.7</td><td>Pressure gauges</td><td>Yes/No</td></tr> <tr><td>2.8</td><td>Temp. indicators</td><td>Yes/No</td></tr> <tr><td>2.9</td><td>Anti-flood device</td><td>Yes/No</td></tr> <tr><td>2.10</td><td>Y-Strainer at suction of feed pump</td><td>Yes/No</td></tr> <tr><td>2.11</td><td>Electric control panel</td><td>Yes/No</td></tr> <tr><td>2.12</td><td>Common base plate for complete equipment</td><td>Yes/No</td></tr> <tr><td>2.13</td><td>Necessary spares for three (3) years of normal operation &amp; maintenance.</td><td>Yes/No</td></tr> <tr><td>2.14</td><td>Special tools</td><td>Yes/No</td></tr> <tr><td>2.15</td><td>Heater (With Valves) connections</td><td></td></tr> <tr><td>2.15.1</td><td>Oil inlet</td><td>Yes/No</td></tr> <tr><td>2.15.2</td><td>Oil outlet</td><td>Yes/No</td></tr> <tr><td>2.15.3</td><td>Oil drain</td><td>Yes/No</td></tr> <tr><td>2.15.4</td><td>Water drain</td><td>Yes/No</td></tr> <tr><td>2.15.5</td><td>Make-up water</td><td>Yes/No</td></tr> <tr><td>2.15.6</td><td>Open vent connection from drum</td><td>Yes/No</td></tr> <tr><td>2.15.7</td><td>Globe valve by pass connection to heater (Oil side)</td><td>Yes/No</td></tr> <tr><td>2.16</td><td>Centrifuge feed pump relief valve</td><td>Yes/No</td></tr> <tr><td>2.17</td><td>Centrifuge discharge pump relief valve</td><td>Yes/No</td></tr> <tr><td>2.18</td><td>Isolating &amp; bypass valves for flow meter.</td><td>Yes/No</td></tr> </table> |                                                                                                     |                                   | 2.1 | Centrifuge | Yes/No | 2.2 | Centrifuge feed pump | Yes/No | 2.3 | Centrifuge discharge pump                                          | Yes/No  | 2.4 | Speed indicator                                                | Yes/No  | 2.5 | Thermostatically controlled electric heater with control and trip thermostat (indirect) | Yes/No | 2.6 | Flow meter | Yes/No | 2.7 | Pressure gauges | Yes/No | 2.8 | Temp. indicators | Yes/No | 2.9 | Anti-flood device | Yes/No | 2.10 | Y-Strainer at suction of feed pump | Yes/No | 2.11 | Electric control panel | Yes/No | 2.12 | Common base plate for complete equipment | Yes/No | 2.13 | Necessary spares for three (3) years of normal operation & maintenance. | Yes/No | 2.14 | Special tools | Yes/No | 2.15 | Heater (With Valves) connections |  | 2.15.1 | Oil inlet | Yes/No | 2.15.2 | Oil outlet | Yes/No | 2.15.3 | Oil drain | Yes/No | 2.15.4 | Water drain | Yes/No | 2.15.5 | Make-up water | Yes/No | 2.15.6 | Open vent connection from drum | Yes/No | 2.15.7 | Globe valve by pass connection to heater (Oil side) | Yes/No | 2.16 | Centrifuge feed pump relief valve | Yes/No | 2.17 | Centrifuge discharge pump relief valve | Yes/No | 2.18 | Isolating & bypass valves for flow meter. | Yes/No |
|                                                                                                                                                                                                                              | 2.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Centrifuge                                                                                          | Yes/No                            |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.2                                                                                                                                                                                                                          | Centrifuge feed pump                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.3                                                                                                                                                                                                                          | Centrifuge discharge pump                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.4                                                                                                                                                                                                                          | Speed indicator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.5                                                                                                                                                                                                                          | Thermostatically controlled electric heater with control and trip thermostat (indirect)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.6                                                                                                                                                                                                                          | Flow meter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.7                                                                                                                                                                                                                          | Pressure gauges                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.8                                                                                                                                                                                                                          | Temp. indicators                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.9                                                                                                                                                                                                                          | Anti-flood device                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.10                                                                                                                                                                                                                         | Y-Strainer at suction of feed pump                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.11                                                                                                                                                                                                                         | Electric control panel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.12                                                                                                                                                                                                                         | Common base plate for complete equipment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.13                                                                                                                                                                                                                         | Necessary spares for three (3) years of normal operation & maintenance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.14                                                                                                                                                                                                                         | Special tools                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.15                                                                                                                                                                                                                         | Heater (With Valves) connections                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                     |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.15.1                                                                                                                                                                                                                       | Oil inlet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.15.2                                                                                                                                                                                                                       | Oil outlet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.15.3                                                                                                                                                                                                                       | Oil drain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.15.4                                                                                                                                                                                                                       | Water drain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.15.5                                                                                                                                                                                                                       | Make-up water                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.15.6                                                                                                                                                                                                                       | Open vent connection from drum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.15.7                                                                                                                                                                                                                       | Globe valve by pass connection to heater (Oil side)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.16                                                                                                                                                                                                                         | Centrifuge feed pump relief valve                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.17                                                                                                                                                                                                                         | Centrifuge discharge pump relief valve                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 2.18                                                                                                                                                                                                                         | Isolating & bypass valves for flow meter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Yes/No                                                                                              |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| <b>3.0 DESIGN FEATURES OF CENTRIFUGE</b>                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| Date of issue:<br>SIGN & DATE                                                                                                                                                                                                | <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>3.1</td><td>Location</td><td>Indoor</td></tr> <tr><td>3.2</td><td>Type of operation</td><td></td></tr> <tr><td>3.3</td><td>Max. hydraulic capacity with turbine oil (110% of design capacity)</td><td>Lit/Hr.</td></tr> <tr><td>3.4</td><td>Recommended through put for best performance (for turbine oil)</td><td>Lit/Hr.</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                     |                                   | 3.1 | Location   | Indoor | 3.2 | Type of operation    |        | 3.3 | Max. hydraulic capacity with turbine oil (110% of design capacity) | Lit/Hr. | 3.4 | Recommended through put for best performance (for turbine oil) | Lit/Hr. |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
|                                                                                                                                                                                                                              | 3.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Location                                                                                            | Indoor                            |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 3.2                                                                                                                                                                                                                          | Type of operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                     |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 3.3                                                                                                                                                                                                                          | Max. hydraulic capacity with turbine oil (110% of design capacity)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Lit/Hr.                                                                                             |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| 3.4                                                                                                                                                                                                                          | Recommended through put for best performance (for turbine oil)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Lit/Hr.                                                                                             |                                   |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| भारी मशीन वस्तुओं की शीटिंग क्रमांक                                                                                                                                                                                          | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | निर्माणकर्ता<br>WORKED BY: Anil / Kavita                                                            | 18.03.16                          |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |
| भारी मशीन वस्तुओं की शीटिंग क्रमांक                                                                                                                                                                                          | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh                                                      | 18.03.16                          |     |            |        |     |                      |        |     |                                                                    |         |     |                                                                |         |     |                                                                                         |        |     |            |        |     |                 |        |     |                  |        |     |                   |        |      |                                    |        |      |                        |        |      |                                          |        |      |                                                                         |        |      |               |        |      |                                  |  |        |           |        |        |            |        |        |           |        |        |             |        |        |               |        |        |                                |        |        |                                                     |        |      |                                   |        |      |                                        |        |      |                                           |        |

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| Design and Drawing<br>SIGN & DATE                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013<br>पृष्ठ 40 का 21<br>Page   21 of 40 |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| SUPPLIES<br>INVENTORY NO<br>माली को प्रेषित की<br>अवधि एवं मिति                                                                                                                                                      | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">3.5</td> <td style="width: 70%;">Speed</td> <td style="width: 20%;">RPM</td> </tr> <tr> <td>3.6</td> <td>Particle size distribution of impurities in purified oil at outlet of centrifuge in single pass as per ISO 4406</td> <td></td> </tr> <tr> <td>3.7</td> <td>Particle size distribution of impurities in purified oil at outlet of oil purification system (i.e. polishing filter) in single pass as per ISO 4406</td> <td></td> </tr> <tr> <td>3.8</td> <td>Moisture/Water content in purified oil at outlet of oil purification system / polishing filter</td> <td>ppm</td> </tr> <tr> <td>3.9</td> <td colspan="2"><u>OIL TEMPERATURES</u></td> </tr> <tr> <td>3.9.1</td> <td>Inlet to electric heater</td> <td>°C (Max), °C (Min)</td> </tr> <tr> <td>3.9.2</td> <td>Outlet from electric heater</td> <td>°C (Not to exceed 90°C)</td> </tr> <tr> <td>3.10</td> <td colspan="2">Water temperature in the heater tank</td> </tr> <tr> <td>3.11</td> <td colspan="2">Bearings :</td> </tr> <tr> <td>3.11.1</td> <td colspan="2">Nos.</td> </tr> <tr> <td>3.11.2</td> <td colspan="2">Type</td> </tr> <tr> <td>3.11.3</td> <td colspan="2">Manufacturer</td> </tr> <tr> <td>3.12</td> <td colspan="2">Dirt holding capacity of the bowl</td> </tr> </table> |                                                                                                            |                                              | 3.5                  | Speed                                                                       | RPM                        | 3.6           | Particle size distribution of impurities in purified oil at outlet of centrifuge in single pass as per ISO 4406 |                      | 3.7 | Particle size distribution of impurities in purified oil at outlet of oil purification system (i.e. polishing filter) in single pass as per ISO 4406 |                          | 3.8                   | Moisture/Water content in purified oil at outlet of oil purification system / polishing filter | ppm                   | 3.9 | <u>OIL TEMPERATURES</u> |                       | 3.9.1 | Inlet to electric heater | °C (Max), °C (Min) | 3.9.2 | Outlet from electric heater | °C (Not to exceed 90°C) | 3.10 | Water temperature in the heater tank |  | 3.11 | Bearings : |  | 3.11.1 | Nos. |  | 3.11.2 | Type |  | 3.11.3 | Manufacturer |  | 3.12 | Dirt holding capacity of the bowl |  |
| 3.5                                                                                                                                                                                                                  | Speed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RPM                                                                                                        |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.6                                                                                                                                                                                                                  | Particle size distribution of impurities in purified oil at outlet of centrifuge in single pass as per ISO 4406                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.7                                                                                                                                                                                                                  | Particle size distribution of impurities in purified oil at outlet of oil purification system (i.e. polishing filter) in single pass as per ISO 4406                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.8                                                                                                                                                                                                                  | Moisture/Water content in purified oil at outlet of oil purification system / polishing filter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ppm                                                                                                        |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.9                                                                                                                                                                                                                  | <u>OIL TEMPERATURES</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.9.1                                                                                                                                                                                                                | Inlet to electric heater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | °C (Max), °C (Min)                                                                                         |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.9.2                                                                                                                                                                                                                | Outlet from electric heater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | °C (Not to exceed 90°C)                                                                                    |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.10                                                                                                                                                                                                                 | Water temperature in the heater tank                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.11                                                                                                                                                                                                                 | Bearings :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.11.1                                                                                                                                                                                                               | Nos.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.11.2                                                                                                                                                                                                               | Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.11.3                                                                                                                                                                                                               | Manufacturer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 3.12                                                                                                                                                                                                                 | Dirt holding capacity of the bowl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company. | <h4>4.0 CONSTRUCTION FEATURES OF CENTRIFUGE</h4> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">4.1</td> <td style="width: 70%;">Automatic tripping of all electric motors on actuation of anti-flood device</td> <td style="width: 20%;">Not provided /provided</td> </tr> <tr> <td>4.2</td> <td>Cleaning of centrifuge bowl</td> <td>Self-cleaning/manual</td> </tr> <tr> <td>4.3</td> <td>Type of centrifuge drive</td> <td>Worm &amp; Gear /Belt</td> </tr> <tr> <td>4.4</td> <td>If centrifuge is belt driven automatic tripping of all electric motors on belt failure.</td> <td>Not Provided/Provided</td> </tr> <tr> <td>4.5</td> <td>Hand brake</td> <td>Not Provided/Provided</td> </tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                            |                                              | 4.1                  | Automatic tripping of all electric motors on actuation of anti-flood device | Not provided /provided     | 4.2           | Cleaning of centrifuge bowl                                                                                     | Self-cleaning/manual | 4.3 | Type of centrifuge drive                                                                                                                             | Worm & Gear /Belt        | 4.4                   | If centrifuge is belt driven automatic tripping of all electric motors on belt failure.        | Not Provided/Provided | 4.5 | Hand brake              | Not Provided/Provided |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 4.1                                                                                                                                                                                                                  | Automatic tripping of all electric motors on actuation of anti-flood device                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Not provided /provided                                                                                     |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 4.2                                                                                                                                                                                                                  | Cleaning of centrifuge bowl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Self-cleaning/manual                                                                                       |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 4.3                                                                                                                                                                                                                  | Type of centrifuge drive                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Worm & Gear /Belt                                                                                          |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 4.4                                                                                                                                                                                                                  | If centrifuge is belt driven automatic tripping of all electric motors on belt failure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Not Provided/Provided                                                                                      |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 4.5                                                                                                                                                                                                                  | Hand brake                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Not Provided/Provided                                                                                      |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| माली को प्रेषित की अवधि एवं मिति<br>माली को प्रेषित की अवधि एवं मिति<br>माली को प्रेषित की अवधि एवं मिति                                                                                                             | <h4>5.0 MATERIALS OF CONSTRUCTION OF CENTRIFUGE (INDICATE STANDARDS)</h4> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">5.1</td> <td style="width: 70%;">Bowl body</td> <td style="width: 20%;"></td> </tr> <tr> <td>5.2</td> <td>bowl cover</td> <td></td> </tr> <tr> <td>5.3</td> <td>Separating discs</td> <td></td> </tr> <tr> <td>5.4</td> <td>Drive shaft</td> <td></td> </tr> <tr> <td>5.5</td> <td>Bowl nut</td> <td></td> </tr> <tr> <td>5.6</td> <td>Worm &amp; Gear /Belt</td> <td></td> </tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                            |                                              | 5.1                  | Bowl body                                                                   |                            | 5.2           | bowl cover                                                                                                      |                      | 5.3 | Separating discs                                                                                                                                     |                          | 5.4                   | Drive shaft                                                                                    |                       | 5.5 | Bowl nut                |                       | 5.6   | Worm & Gear /Belt        |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 5.1                                                                                                                                                                                                                  | Bowl body                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 5.2                                                                                                                                                                                                                  | bowl cover                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 5.3                                                                                                                                                                                                                  | Separating discs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 5.4                                                                                                                                                                                                                  | Drive shaft                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 5.5                                                                                                                                                                                                                  | Bowl nut                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| 5.6                                                                                                                                                                                                                  | Worm & Gear /Belt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                            |                                              |                      |                                                                             |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| Design and Drawing<br>SIGN & DATE<br>                                                                                             | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Rev. no.</td> <td style="width: 40%;">08</td> <td style="width: 15%;">निर्माणकर्ता<br/>WORKED BY:</td> <td style="width: 15%;">Anil / Kavita</td> <td style="width: 10%;">Anil Kumar<br/>Kavita</td> <td style="width: 10%;">18.03.16</td> </tr> <tr> <td></td> <td></td> <td>जाँचकर्ता<br/>CHECKED BY:</td> <td>A. S. Rajput / Devesh</td> <td>Devesh</td> <td>18.03.16</td> </tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                            |                                              | Rev. no.             | 08                                                                          | निर्माणकर्ता<br>WORKED BY: | Anil / Kavita | Anil Kumar<br>Kavita                                                                                            | 18.03.16             |     |                                                                                                                                                      | जाँचकर्ता<br>CHECKED BY: | A. S. Rajput / Devesh | Devesh                                                                                         | 18.03.16              |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
| Rev. no.                                                                                                                                                                                                             | 08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | निर्माणकर्ता<br>WORKED BY:                                                                                 | Anil / Kavita                                | Anil Kumar<br>Kavita | 18.03.16                                                                    |                            |               |                                                                                                                 |                      |     |                                                                                                                                                      |                          |                       |                                                                                                |                       |     |                         |                       |       |                          |                    |       |                             |                         |      |                                      |  |      |            |  |        |      |  |        |      |  |        |              |  |      |                                   |  |
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| Rev. no. /<br>SIGN & DATE<br><br>SUPERVISOR<br>INVENTORY NO.<br><br>जारी की गयी तारीख<br>आवक<br>COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited<br>It must not be used directly or indirectly in any way detrimental to the interest of the company<br>स्वतंत्रता और गोपनीयता<br>यह दस्तावेज भारत भारती लिमिटेड की संपत्ति है। इसमें<br>दी गई जानकारी को किसी भी रूप में बिना<br>लिखित अनुमति के प्रयोग नहीं किया जा सकता है।                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013<br>पृष्ठ 40 का 22<br>Page   22 of 40                           |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;">5.7</td> <td style="width:50%;">Oil injection nozzle</td> <td style="width:40%;"></td> </tr> <tr> <td>5.8</td> <td>Other inlet and outlet parts</td> <td></td> </tr> <tr> <td>5.9</td> <td>Other wetted bowl parts</td> <td></td> </tr> <tr> <td>5.10</td> <td>Valve Body</td> <td></td> </tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                   |                                                                                                            |                                                                        | 5.7 | Oil injection nozzle |  | 5.8   | Other inlet and outlet parts |      | 5.9   | Other wetted bowl parts |    | 5.10  | Valve Body           |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 5.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Oil injection nozzle                                                              |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 5.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Other inlet and outlet parts                                                      |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 5.9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Other wetted bowl parts                                                           |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 5.10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Valve Body                                                                        |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| <b>6.0 DESIGN/CONSTRUCTION FEATURES OF ELECTRIC HEATER</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                   |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;">6.1</td> <td style="width:50%;">Heater details</td> <td style="width:40%;"></td> </tr> <tr> <td>6.1.1</td> <td>Quantity</td> <td>Nos.</td> </tr> <tr> <td>6.1.2</td> <td>Kilowatts</td> <td>kW</td> </tr> <tr> <td>6.1.3</td> <td>Rating of steps (kW)</td> <td></td> </tr> <tr> <td>6.1.4</td> <td>Voltage</td> <td>Volts (AC)</td> </tr> <tr> <td>6.1.5</td> <td>Frequency</td> <td>C/s</td> </tr> <tr> <td>6.1.6</td> <td>Phase</td> <td></td> </tr> <tr> <td>6.1.7</td> <td>Number of thermostat</td> <td>3 (2Nos. for oil temp. and one for water temp.)</td> </tr> <tr> <td>6.1.8</td> <td>Range</td> <td></td> </tr> <tr> <td>6.1.9</td> <td>Model</td> <td></td> </tr> <tr> <td>6.1.10</td> <td>Manufacturer</td> <td></td> </tr> <tr> <td>6.2</td> <td>Heater control thermostat setting</td> <td>Cut in at °C/ Cut out at °C</td> </tr> <tr> <td>6.2.1</td> <td>Rating of thermostat contacts</td> <td>5 amps 240V A.C<br/>0.25 amps 240V D.C</td> </tr> <tr> <td>6.2.2</td> <td>No. of contacts</td> <td>2 No + 2 N C</td> </tr> <tr> <td>6.3</td> <td>Heater tubes</td> <td></td> </tr> <tr> <td>6.3.1</td> <td>Material</td> <td></td> </tr> <tr> <td>6.3.2</td> <td>Number</td> <td></td> </tr> <tr> <td>6.3.3</td> <td>Length</td> <td>mm</td> </tr> <tr> <td>6.3.4</td> <td>Outside diameter</td> <td>mm</td> </tr> <tr> <td>6.3.5</td> <td>Tube wall thickness</td> <td>mm</td> </tr> <tr> <td>6.3.6</td> <td>Surface area of heater tubes.</td> <td>mm<sup>2</sup></td> </tr> <tr> <td>6.4</td> <td>Tube Sheets</td> <td></td> </tr> <tr> <td>6.4.1</td> <td>Material</td> <td></td> </tr> <tr> <td>6.4.2</td> <td>Number</td> <td></td> </tr> <tr> <td>6.4.3</td> <td>Thickness</td> <td>mm</td> </tr> <tr> <td>6.5</td> <td>Tube bundle type</td> <td>Removable/non-removable</td> </tr> <tr> <td>6.6</td> <td>Capacity of heater tank</td> <td>M3</td> </tr> </table> |                                                                                   |                                                                                                            |                                                                        | 6.1 | Heater details       |  | 6.1.1 | Quantity                     | Nos. | 6.1.2 | Kilowatts               | kW | 6.1.3 | Rating of steps (kW) |  | 6.1.4 | Voltage | Volts (AC) | 6.1.5 | Frequency | C/s | 6.1.6 | Phase |  | 6.1.7 | Number of thermostat | 3 (2Nos. for oil temp. and one for water temp.) | 6.1.8 | Range |  | 6.1.9 | Model |  | 6.1.10 | Manufacturer |  | 6.2 | Heater control thermostat setting | Cut in at °C/ Cut out at °C | 6.2.1 | Rating of thermostat contacts | 5 amps 240V A.C<br>0.25 amps 240V D.C | 6.2.2 | No. of contacts | 2 No + 2 N C | 6.3 | Heater tubes |  | 6.3.1 | Material |  | 6.3.2 | Number |  | 6.3.3 | Length | mm | 6.3.4 | Outside diameter | mm | 6.3.5 | Tube wall thickness | mm | 6.3.6 | Surface area of heater tubes. | mm <sup>2</sup> | 6.4 | Tube Sheets |  | 6.4.1 | Material |  | 6.4.2 | Number |  | 6.4.3 | Thickness | mm | 6.5 | Tube bundle type | Removable/non-removable | 6.6 | Capacity of heater tank | M3 |
| 6.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Heater details                                                                    |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.1.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Quantity                                                                          | Nos.                                                                                                       |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.1.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Kilowatts                                                                         | kW                                                                                                         |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.1.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Rating of steps (kW)                                                              |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.1.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Voltage                                                                           | Volts (AC)                                                                                                 |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Frequency                                                                         | C/s                                                                                                        |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.1.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Phase                                                                             |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.1.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Number of thermostat                                                              | 3 (2Nos. for oil temp. and one for water temp.)                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.1.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Range                                                                             |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.1.9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Model                                                                             |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.1.10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Manufacturer                                                                      |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Heater control thermostat setting                                                 | Cut in at °C/ Cut out at °C                                                                                |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.2.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Rating of thermostat contacts                                                     | 5 amps 240V A.C<br>0.25 amps 240V D.C                                                                      |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.2.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | No. of contacts                                                                   | 2 No + 2 N C                                                                                               |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Heater tubes                                                                      |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.3.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Material                                                                          |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.3.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Number                                                                            |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.3.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Length                                                                            | mm                                                                                                         |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.3.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Outside diameter                                                                  | mm                                                                                                         |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.3.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Tube wall thickness                                                               | mm                                                                                                         |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.3.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Surface area of heater tubes.                                                     | mm <sup>2</sup>                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Tube Sheets                                                                       |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.4.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Material                                                                          |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.4.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Number                                                                            |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.4.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Thickness                                                                         | mm                                                                                                         |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Tube bundle type                                                                  | Removable/non-removable                                                                                    |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| 6.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Capacity of heater tank                                                           | M3                                                                                                         |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| <b>7.0 CENTRIFUGE FEED PUMP &amp; DISCHARGE PUMP</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                   |                                                                                                            |                                                                        |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                   | FEED PUMP                                                                                                  | DISCHARGE PUMP                                                         |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |
| Rev. no. /<br>SIGN & DATE<br>SUPERVISOR<br>INVENTORY NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Rev. no.<br>08                                                                    | निर्माणकर्ता<br>WORKED BY: Anil / Kavita<br>जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh                 | Anil Kumar<br>Kavita<br>18.03.16<br>A. S. Rajput<br>Devesh<br>18.03.16 |     |                      |  |       |                              |      |       |                         |    |       |                      |  |       |         |            |       |           |     |       |       |  |       |                      |                                                 |       |       |  |       |       |  |        |              |  |     |                                   |                             |       |                               |                                       |       |                 |              |     |              |  |       |          |  |       |        |  |       |        |    |       |                  |    |       |                     |    |       |                               |                 |     |             |  |       |          |  |       |        |  |       |           |    |     |                  |                         |     |                         |    |

|                              |                                                                                   |                                                                                                            |                                   |
|------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Here is given<br>SIGN & DATE |  | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013                           |
|                              |                                                                                   |                                                                                                            | पृष्ठ 40 का 23<br>Page   23 of 40 |

|                              |                             |                              |        |                                      |                                                                                      |  |  |
|------------------------------|-----------------------------|------------------------------|--------|--------------------------------------|--------------------------------------------------------------------------------------|--|--|
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.1    | Quantity                             | Nos.                                                                                 |  |  |
|                              |                             |                              | 7.2    | Type                                 | Positive displacement ( Rotary i.e. Helical, Herring bone , spur gear or screw type) |  |  |
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.3    | Capacity                             | Lit/hr.                                                                              |  |  |
|                              |                             |                              | 7.4    | Speed                                | RPM                                                                                  |  |  |
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.5    | Discharge pressure                   | Kg/cm2 (g)                                                                           |  |  |
|                              |                             |                              | 7.6    | Relief valve setting                 | Kg/cm2 (g)                                                                           |  |  |
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.7    | Max. allowable pump working pressure | Kg/cm2 (g)                                                                           |  |  |
|                              |                             |                              | 7.8    | Connections                          |                                                                                      |  |  |
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.8.1  | Inlet                                | mm                                                                                   |  |  |
|                              |                             |                              | 7.8.2  | outlet                               | mm                                                                                   |  |  |
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.9    | Material                             |                                                                                      |  |  |
|                              |                             |                              | 7.9.1  | Casing                               |                                                                                      |  |  |
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.9.2  | Shaft                                |                                                                                      |  |  |
|                              |                             |                              | 7.9.3  | Shaft sleeves                        |                                                                                      |  |  |
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.9.4  | Gear/screw                           |                                                                                      |  |  |
|                              |                             |                              | 7.10   | Drive (AC Motor)                     | As per enclosed annexure-3.                                                          |  |  |
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.11   | Motor rating                         | KW                                                                                   |  |  |
|                              |                             |                              | 7.12   | Bearings :                           |                                                                                      |  |  |
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.12.1 | Nos.                                 |                                                                                      |  |  |
|                              |                             |                              | 7.12.2 | Type                                 |                                                                                      |  |  |
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | 7.12.3 | Manufacturer                         |                                                                                      |  |  |
|                              |                             |                              | 7.13   | BHP at rated capacity                |                                                                                      |  |  |

#### 8.0 Y-STRAINER

|     |                     |  |
|-----|---------------------|--|
| 8.1 | Make & Model        |  |
| 8.2 | Number              |  |
| 8.3 | Location            |  |
| 8.4 | Connection sizes    |  |
| 8.5 | Mesh size           |  |
| 8.6 | Material of element |  |

#### 9.0 POLISHING FILTER

|                              |                             |                              |          |    |                            |                       |                        |          |
|------------------------------|-----------------------------|------------------------------|----------|----|----------------------------|-----------------------|------------------------|----------|
| Here is given<br>SIGN & DATE | SUPERBIDES<br>INVENTORY NO. | Here is given<br>SIGN & DATE | Rev. no. | 08 | निर्माणकर्ता<br>WORKED BY: | Anil / Kavita         | Anil Kumar<br>Kavita   | 18.03.16 |
|                              |                             |                              |          |    | जाँचकर्ता<br>CHECKED BY:   | A. S. Rajput / Devesh | A. S. Rajput<br>Devesh | 18.03.16 |

|                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------|------------------------------------------------------------------------|--|--------|--------------------|--|--------|----------|--|--------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------|--|-----|----------------------------|--|-----|------------------|--|-----|------------------------|--------------------|-----|----------------------------------|--------------------|
| Design & Date<br>SIGN & DATE                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>                                       | <b>ST39013</b><br>पृष्ठ 40 का 24<br>Page   24 of 40 |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| SUPERSEDES<br>INVENTORY NO<br>कोई भी अंश भी<br>अधिकार नहीं                                                                                                                                                                                                         | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>9.1</td><td>Capacity</td><td></td></tr> <tr><td>9.2</td><td>Make &amp; Model</td><td></td></tr> <tr><td>9.3</td><td>Type</td><td></td></tr> <tr><td>9.4</td><td>Number</td><td></td></tr> <tr><td>9.5</td><td>Location</td><td></td></tr> <tr><td>9.6</td><td>Material of filter element</td><td></td></tr> <tr><td>9.7</td><td>Connection sizes</td><td></td></tr> <tr><td>9.8</td><td>Design Pressure (body)</td><td>Kg/cm<sup>2</sup></td></tr> <tr><td>9.9</td><td>Pressure differential at choking</td><td>Kg/cm<sup>2</sup></td></tr> </table> |                                                                                                                                                  |                                                     | 9.1  | Capacity                                                               |  | 9.2    | Make & Model       |  | 9.3    | Type     |  | 9.4    | Number           |                                                                                                                                                  | 9.5  | Location         |  | 9.6 | Material of filter element |  | 9.7 | Connection sizes |  | 9.8 | Design Pressure (body) | Kg/cm <sup>2</sup> | 9.9 | Pressure differential at choking | Kg/cm <sup>2</sup> |
| 9.1                                                                                                                                                                                                                                                                | Capacity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 9.2                                                                                                                                                                                                                                                                | Make & Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 9.3                                                                                                                                                                                                                                                                | Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 9.4                                                                                                                                                                                                                                                                | Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 9.5                                                                                                                                                                                                                                                                | Location                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 9.6                                                                                                                                                                                                                                                                | Material of filter element                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 9.7                                                                                                                                                                                                                                                                | Connection sizes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 9.8                                                                                                                                                                                                                                                                | Design Pressure (body)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Kg/cm <sup>2</sup>                                                                                                                               |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 9.9                                                                                                                                                                                                                                                                | Pressure differential at choking                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Kg/cm <sup>2</sup>                                                                                                                               |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| <b>COPYRIGHT AND CONFIDENTIAL</b><br>This information on this document is the property of Bharat Heavy Electricals Limited<br>It must not be used directly or indirectly in any way detrimental to the interests of the company                                    | <b>10.0 INTERCONNECTING PIPINGS OF THE SYSTEM</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
|                                                                                                                                                                                                                                                                    | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>10.1</td><td>Sizes of pipes</td><td></td></tr> <tr><td>10.2</td><td>Material of piping</td><td></td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                  |                                                     | 10.1 | Sizes of pipes                                                         |  | 10.2   | Material of piping |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 10.1                                                                                                                                                                                                                                                               | Sizes of pipes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 10.2                                                                                                                                                                                                                                                               | Material of piping                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| प्रस्तावित एवं गोपनीय<br>इस दस्तावेज में दी गई जानकारी किसी भी अंग्रेजी, हिंदी, या अन्य भाषा में प्रकाशित या अन्य किसी भी माध्यम से प्रसारित नहीं की जा सकती है।<br>This information is confidential and its disclosure in any form or by any means is prohibited. | <b>11.0 ANTI-FLOOD TANK</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
|                                                                                                                                                                                                                                                                    | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>11.1</td><td>Capacity</td><td></td></tr> <tr><td>11.2</td><td>Number</td><td></td></tr> <tr><td>11.3</td><td>Location</td><td></td></tr> <tr><td>11.4</td><td>Connection sizes</td><td></td></tr> </table>                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                  |                                                     | 11.1 | Capacity                                                               |  | 11.2   | Number             |  | 11.3   | Location |  | 11.4   | Connection sizes |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 11.1                                                                                                                                                                                                                                                               | Capacity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 11.2                                                                                                                                                                                                                                                               | Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 11.3                                                                                                                                                                                                                                                               | Location                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 11.4                                                                                                                                                                                                                                                               | Connection sizes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| निर्माणकर्ता एवं जाँचकर्ता<br>WORKED BY<br>जाँचकर्ता<br>CHECKED BY                                                                                                                                                                                                 | <b>12.0 PNEUMATIC/SOLENOID OPERATED THREE-WAY VALVE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
|                                                                                                                                                                                                                                                                    | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>12.1</td><td>Make &amp; Model</td><td></td></tr> <tr><td>12.2</td><td>Type</td><td></td></tr> <tr><td>12.3</td><td>Number</td><td></td></tr> <tr><td>12.4</td><td>Location</td><td></td></tr> <tr><td>12.5</td><td>Connection sizes</td><td></td></tr> </table>                                                                                                                                                                                                                                                                                      |                                                                                                                                                  |                                                     | 12.1 | Make & Model                                                           |  | 12.2   | Type               |  | 12.3   | Number   |  | 12.4   | Location         |                                                                                                                                                  | 12.5 | Connection sizes |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 12.1                                                                                                                                                                                                                                                               | Make & Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 12.2                                                                                                                                                                                                                                                               | Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 12.3                                                                                                                                                                                                                                                               | Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 12.4                                                                                                                                                                                                                                                               | Location                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 12.5                                                                                                                                                                                                                                                               | Connection sizes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| Design & Date<br>SIGN & DATE                                                                                                                                                                                                                                       | <b>13.0 INSTRUMENTS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
|                                                                                                                                                                                                                                                                    | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>13.1</td> <td colspan="2"><b>PRESSURE GAUGES: (For detailed specification refer Annexure-IV)</b></td> </tr> <tr> <td>13.1.1</td> <td>Type</td> <td></td> </tr> <tr> <td>13.1.2</td> <td>Number</td> <td></td> </tr> <tr> <td>13.1.3</td> <td>Location</td> <td>           1) Inlet to pump (Compound gauge)<br/>           2) Outlet from feed pump<br/>           3) Water temperature of indirect heater<br/>           Outlet from discharge Pump. (In case         </td> </tr> </table>                                                         |                                                                                                                                                  |                                                     | 13.1 | <b>PRESSURE GAUGES: (For detailed specification refer Annexure-IV)</b> |  | 13.1.1 | Type               |  | 13.1.2 | Number   |  | 13.1.3 | Location         | 1) Inlet to pump (Compound gauge)<br>2) Outlet from feed pump<br>3) Water temperature of indirect heater<br>Outlet from discharge Pump. (In case |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 13.1                                                                                                                                                                                                                                                               | <b>PRESSURE GAUGES: (For detailed specification refer Annexure-IV)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 13.1.1                                                                                                                                                                                                                                                             | Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 13.1.2                                                                                                                                                                                                                                                             | Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                  |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| 13.1.3                                                                                                                                                                                                                                                             | Location                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1) Inlet to pump (Compound gauge)<br>2) Outlet from feed pump<br>3) Water temperature of indirect heater<br>Outlet from discharge Pump. (In case |                                                     |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |
| निर्माणकर्ता<br>WORKED BY<br>जाँचकर्ता<br>CHECKED BY                                                                                                                                                                                                               | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | निर्माणकर्ता<br>WORKED BY: Anil / Kavita<br>जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh                                                       | 18.03.16<br>18.03.16                                |      |                                                                        |  |        |                    |  |        |          |  |        |                  |                                                                                                                                                  |      |                  |  |     |                            |  |     |                  |  |     |                        |                    |     |                                  |                    |

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|------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Date of issue<br>SIGN & DATE |  | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | <b>ST39013</b>                    |
|                              |                                                                                   |                                                                                                            | पृष्ठ 40 का 25<br>Page   25 of 40 |

|                            |                            |                                                                                                                                                                                                                          |                            |                                                                                                                                     |
|----------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| SUPERSEDES<br>INVENTORY NO | माली की सेवा के<br>अधीनस्थ | COPYRIGHT AND CONFIDENTIALITY<br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company. | माली की सेवा के<br>अधीनस्थ | polishing Filter, outlet from polishing Filter)                                                                                     |
|                            |                            |                                                                                                                                                                                                                          |                            |                                                                                                                                     |
|                            | 13.1.4                     | Range                                                                                                                                                                                                                    |                            | Kg/cm <sup>2</sup>                                                                                                                  |
|                            | 13.1.5                     | Accuracy                                                                                                                                                                                                                 |                            | ± 1% or better                                                                                                                      |
|                            | 13.1.6                     | Manufacturer                                                                                                                                                                                                             |                            |                                                                                                                                     |
|                            | 13.2                       | TEMPERATURE INDICATORS: (For detailed specification refer Annexure-IV)                                                                                                                                                   |                            |                                                                                                                                     |
|                            | 13.2.1                     | Type                                                                                                                                                                                                                     |                            |                                                                                                                                     |
|                            | 13.2.2                     | Number                                                                                                                                                                                                                   |                            |                                                                                                                                     |
|                            | 13.2.3                     | Location                                                                                                                                                                                                                 |                            | 1) Inlet to electric heater<br>2) Outlet from electric heater<br>3) Inlet to centrifuge<br>4) Oil temperature at outlet of purifier |
|                            | 13.2.4                     | Range                                                                                                                                                                                                                    |                            | °C                                                                                                                                  |
|                            | 13.2.5                     | Accuracy                                                                                                                                                                                                                 |                            | ± 1% of span                                                                                                                        |
|                            | 13.2.6                     | Manufacturer                                                                                                                                                                                                             |                            |                                                                                                                                     |
|                            | 13.3                       | FLOW METER                                                                                                                                                                                                               |                            |                                                                                                                                     |
|                            | 13.3.1                     | Type                                                                                                                                                                                                                     |                            |                                                                                                                                     |
|                            | 13.3.2                     | Number                                                                                                                                                                                                                   |                            |                                                                                                                                     |
|                            | 13.3.3                     | Location                                                                                                                                                                                                                 |                            | Downstream of centrifuge feed pump.                                                                                                 |
|                            | 13.3.4                     | Range                                                                                                                                                                                                                    |                            |                                                                                                                                     |
|                            | 13.3.5                     | Accuracy                                                                                                                                                                                                                 |                            |                                                                                                                                     |
|                            | 13.3.6                     | Connections, type & size.                                                                                                                                                                                                |                            |                                                                                                                                     |
|                            | 13.3.7                     | Model No.                                                                                                                                                                                                                |                            |                                                                                                                                     |
|                            | 13.3.8                     | Manufacturer                                                                                                                                                                                                             |                            |                                                                                                                                     |
|                            | 13.4                       | PRESSURE SWITCH                                                                                                                                                                                                          |                            |                                                                                                                                     |
|                            | 13.4.1                     | Type                                                                                                                                                                                                                     |                            |                                                                                                                                     |
|                            | 13.4.2                     | Number                                                                                                                                                                                                                   |                            |                                                                                                                                     |
|                            | 13.4.3                     | location                                                                                                                                                                                                                 |                            | Outlet of centrifuge                                                                                                                |
|                            | 13.4.4                     | Range                                                                                                                                                                                                                    |                            |                                                                                                                                     |
|                            | 13.4.5                     | Accuracy                                                                                                                                                                                                                 |                            |                                                                                                                                     |
|                            | 13.4.6                     | Model No.                                                                                                                                                                                                                |                            |                                                                                                                                     |
|                            | 13.4.7                     | No. of contacts & contact rating                                                                                                                                                                                         |                            |                                                                                                                                     |
|                            | 13.4.8                     | Manufacturer                                                                                                                                                                                                             |                            |                                                                                                                                     |
|                            | 13.4.9                     | End connection                                                                                                                                                                                                           |                            | ½" NPT(F)                                                                                                                           |
|                            | 13.4.10                    | Electrical connection                                                                                                                                                                                                    |                            | Plug in socket                                                                                                                      |
|                            | 13.4.11                    | Repeatability                                                                                                                                                                                                            |                            |                                                                                                                                     |
|                            | 13.5                       | RESISTANT TEMPERATURE DETECTOR (RTD)                                                                                                                                                                                     |                            |                                                                                                                                     |
|                            | 13.5.1                     | Type of RTD                                                                                                                                                                                                              |                            |                                                                                                                                     |
|                            | 13.5.2                     | No. of element                                                                                                                                                                                                           |                            | Duplex                                                                                                                              |
|                            | 13.5.3                     | Housing/ Head                                                                                                                                                                                                            |                            | IP-55/Die cast Al. plug-in connectors are                                                                                           |

|                                 |                |                            |                          |                        |          |
|---------------------------------|----------------|----------------------------|--------------------------|------------------------|----------|
| माली की सेवा के<br>INVENTORY NO | Rev. no.<br>08 | निर्माणकर्ता<br>WORKED BY: | Anil / Kavita            | Anil Kumar<br>Kavita   | 18.03.16 |
|                                 |                | जाँचकर्ता<br>CHECKED BY:   | A. S. Rajput /<br>Devesh | A. S. Rajput<br>Devesh | 18.03.16 |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                  |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
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| Rev. no.<br>SIGN & DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SUPPLEMENTARY INVENTORY NO.                                                                      | COPYRIGHT AND CONFIDENTIAL<br><small>The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.</small> | Rev. no.<br>SIGN & DATE | INVENTORY NO. | Rev. no.<br>SIGN & DATE | INVENTORY NO.                                       | Rev. no.<br>SIGN & DATE | INVENTORY NO. |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                  | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>                                                                                                                          |                         |               |                         | <b>ST39013</b><br>पृष्ठ 40 का 26<br>Page   26 of 40 |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;"></td> <td style="width:45%;"></td> <td style="width:40%;">to be provided for external cable connection</td> </tr> <tr> <td>13.5.4</td> <td>Sheeting of RTD</td> <td>Metal sheathed; ceramic packed</td> </tr> <tr> <td>13.5.5</td> <td>Calibration &amp; accuracy</td> <td></td> </tr> <tr> <td>13.5.6</td> <td>Thermo well</td> <td></td> </tr> <tr> <td>13.5.7</td> <td>Model no.</td> <td></td> </tr> <tr> <td>13.5.8</td> <td>Manufacturer</td> <td></td> </tr> <tr> <td>13.6</td> <td colspan="2"><b>LEVEL SWITCH (For detail specification, refer annexure-IV)</b></td> </tr> <tr> <td>13.6.1</td> <td>Number</td> <td></td> </tr> <tr> <td>13.6.2</td> <td>Type</td> <td></td> </tr> <tr> <td>13.6.3</td> <td>Location</td> <td>Indirect oil heater<br/>Anti-flood device</td> </tr> <tr> <td>13.6.4</td> <td>Range</td> <td></td> </tr> <tr> <td>13.6.5</td> <td>Manufacturer</td> <td></td> </tr> <tr> <td>13.6.6</td> <td>Model no.</td> <td></td> </tr> <tr> <td>13.6.7</td> <td>No. of contacts &amp; contact rating</td> <td>2 NOs. SPDT contacts 5A for 240 VAC<br/>0.25A for 220 VOC</td> </tr> <tr> <td>13.7</td> <td colspan="2"><b>LEVEL GAUGE</b></td> </tr> <tr> <td>13.7.1</td> <td>Number</td> <td></td> </tr> <tr> <td>13.7.2</td> <td>Type</td> <td></td> </tr> <tr> <td>13.7.3</td> <td>location</td> <td></td> </tr> <tr> <td>13.7.4</td> <td>Model No.</td> <td></td> </tr> <tr> <td>13.7.5</td> <td>Length</td> <td></td> </tr> <tr> <td>13.7.6</td> <td>Manufacturer</td> <td></td> </tr> <tr> <td>13.8</td> <td colspan="2"><b>INDICATING TYPE DIFFERENTIAL PRESSURE SWITCH (across polishing filter)</b></td> </tr> <tr> <td>13.8.1</td> <td>Number</td> <td></td> </tr> <tr> <td>13.8.2</td> <td>Type</td> <td></td> </tr> <tr> <td>13.8.3</td> <td>Model No.</td> <td></td> </tr> <tr> <td>13.8.4</td> <td>No. of contacts &amp; contact rating</td> <td></td> </tr> <tr> <td>13.8.5</td> <td>Manufacturer</td> <td></td> </tr> <tr> <td>13.8.6</td> <td>List of spares furnished for three (3) Years normal operation and maintenance Enclosed with bid.</td> <td>Yes/No</td> </tr> <tr> <td>13.8.7</td> <td>List of special tools furnished enclosed with bid.</td> <td></td> </tr> <tr> <td colspan="3"><b>14.0 LT MOTORS (for details refer Annex III)</b></td> </tr> <tr> <td>14.1</td> <td colspan="2"><b>GENERAL</b></td> </tr> <tr> <td>14.1.1.</td> <td colspan="2">Manufacturer &amp; Country of origin.</td> </tr> <tr> <td>14.1.2.</td> <td colspan="2">Equipment driven by motor</td> </tr> <tr> <td>14.1.3.</td> <td colspan="2">Motor type</td> </tr> </table> |                                                                                                  |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  | to be provided for external cable connection | 13.5.4 | Sheeting of RTD | Metal sheathed; ceramic packed | 13.5.5 | Calibration & accuracy |  | 13.5.6 | Thermo well |  | 13.5.7 | Model no. |  | 13.5.8 | Manufacturer |  | 13.6 | <b>LEVEL SWITCH (For detail specification, refer annexure-IV)</b> |  | 13.6.1 | Number |  | 13.6.2 | Type |  | 13.6.3 | Location | Indirect oil heater<br>Anti-flood device | 13.6.4 | Range |  | 13.6.5 | Manufacturer |  | 13.6.6 | Model no. |  | 13.6.7 | No. of contacts & contact rating | 2 NOs. SPDT contacts 5A for 240 VAC<br>0.25A for 220 VOC | 13.7 | <b>LEVEL GAUGE</b> |  | 13.7.1 | Number |  | 13.7.2 | Type |  | 13.7.3 | location |  | 13.7.4 | Model No. |  | 13.7.5 | Length |  | 13.7.6 | Manufacturer |  | 13.8 | <b>INDICATING TYPE DIFFERENTIAL PRESSURE SWITCH (across polishing filter)</b> |  | 13.8.1 | Number |  | 13.8.2 | Type |  | 13.8.3 | Model No. |  | 13.8.4 | No. of contacts & contact rating |  | 13.8.5 | Manufacturer |  | 13.8.6 | List of spares furnished for three (3) Years normal operation and maintenance Enclosed with bid. | Yes/No | 13.8.7 | List of special tools furnished enclosed with bid. |  | <b>14.0 LT MOTORS (for details refer Annex III)</b> |  |  | 14.1 | <b>GENERAL</b> |  | 14.1.1. | Manufacturer & Country of origin. |  | 14.1.2. | Equipment driven by motor |  | 14.1.3. | Motor type |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                  | to be provided for external cable connection                                                                                                                                                                                        |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.5.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Sheeting of RTD                                                                                  | Metal sheathed; ceramic packed                                                                                                                                                                                                      |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.5.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Calibration & accuracy                                                                           |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.5.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Thermo well                                                                                      |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.5.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Model no.                                                                                        |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.5.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Manufacturer                                                                                     |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>LEVEL SWITCH (For detail specification, refer annexure-IV)</b>                                |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.6.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Number                                                                                           |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.6.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Type                                                                                             |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.6.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Location                                                                                         | Indirect oil heater<br>Anti-flood device                                                                                                                                                                                            |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.6.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Range                                                                                            |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.6.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Manufacturer                                                                                     |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.6.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Model no.                                                                                        |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.6.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | No. of contacts & contact rating                                                                 | 2 NOs. SPDT contacts 5A for 240 VAC<br>0.25A for 220 VOC                                                                                                                                                                            |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>LEVEL GAUGE</b>                                                                               |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.7.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Number                                                                                           |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.7.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Type                                                                                             |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.7.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | location                                                                                         |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.7.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Model No.                                                                                        |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Length                                                                                           |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.7.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Manufacturer                                                                                     |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>INDICATING TYPE DIFFERENTIAL PRESSURE SWITCH (across polishing filter)</b>                    |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.8.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Number                                                                                           |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.8.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Type                                                                                             |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.8.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Model No.                                                                                        |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.8.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | No. of contacts & contact rating                                                                 |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.8.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Manufacturer                                                                                     |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.8.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | List of spares furnished for three (3) Years normal operation and maintenance Enclosed with bid. | Yes/No                                                                                                                                                                                                                              |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 13.8.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | List of special tools furnished enclosed with bid.                                               |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| <b>14.0 LT MOTORS (for details refer Annex III)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                  |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 14.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>GENERAL</b>                                                                                   |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 14.1.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Manufacturer & Country of origin.                                                                |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 14.1.2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Equipment driven by motor                                                                        |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| 14.1.3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Motor type                                                                                       |                                                                                                                                                                                                                                     |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                  | निर्माणकर्ता<br>WORKED BY: Anil / Kavita                                                                                                                                                                                            |                         | 18.03.16      |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |
| जॉचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                  | 18.03.16                                                                                                                                                                                                                            |                         |               |                         |                                                     |                         |               |  |  |                                              |        |                 |                                |        |                        |  |        |             |  |        |           |  |        |              |  |      |                                                                   |  |        |        |  |        |      |  |        |          |                                          |        |       |  |        |              |  |        |           |  |        |                                  |                                                          |      |                    |  |        |        |  |        |      |  |        |          |  |        |           |  |        |        |  |        |              |  |      |                                                                               |  |        |        |  |        |      |  |        |           |  |        |                                  |  |        |              |  |        |                                                                                                  |        |        |                                                    |  |                                                     |  |  |      |                |  |         |                                   |  |         |                           |  |         |            |  |

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|-------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------|
| SIGN & DATE<br>18/03/16 |  | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013                           |
|                         |                                                                                   |                                                                                                            | पृष्ठ 40 का 27<br>Page   27 of 40 |

|                                      |                                                                                                                                                                                                                        |                                                                                           |        |
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| SUPPLIES<br>INVENTORY NO<br>18/03/16 | COPYRIGHT AND CONFIDENTIAL<br>This information on this document is the property of Bharat Heavy Electrical Limited<br>It must not be used directly or indirectly in any way detrimental to the interest of the company | 14.1.4. Quantity                                                                          |        |
|                                      |                                                                                                                                                                                                                        | 14.2. DESIGN AND PERFORMANCE DATA                                                         |        |
|                                      |                                                                                                                                                                                                                        | 14.2.1. Frame size                                                                        |        |
|                                      |                                                                                                                                                                                                                        | 14.2.2. Type of duty                                                                      |        |
|                                      |                                                                                                                                                                                                                        | 14.2.3. Type of enclosure /Method of cooling/ Degree of protection                        |        |
|                                      |                                                                                                                                                                                                                        | 14.2.4. Applicable standard to which motor generally conforms                             |        |
|                                      |                                                                                                                                                                                                                        | 14.2.5. Efficiency class as per IS 12615                                                  |        |
|                                      |                                                                                                                                                                                                                        | 14.2.6. (a)Whether motor is flame proof                                                   | Yes/No |
|                                      |                                                                                                                                                                                                                        | (b)If yes, the gas group to which it conforms as per IS:2148                              |        |
|                                      |                                                                                                                                                                                                                        | 14.2.7. Type of mounting                                                                  |        |
|                                      |                                                                                                                                                                                                                        | 14.2.8. Direction of rotation as viewed from DE END                                       |        |
|                                      |                                                                                                                                                                                                                        | 14.2.9. Standard continuous rating at 40 deg C. ambient temp. as per Indian Standard (KW) |        |
|                                      |                                                                                                                                                                                                                        | Derated rating for specified normal condition i.e. 50 deg. C ambient temperature (KW)     |        |
|                                      |                                                                                                                                                                                                                        | 14.2.10. Maximum continuous load demand of driven equipment in KW                         |        |
|                                      |                                                                                                                                                                                                                        | 14.2.12. Rated Voltage (volts)                                                            |        |
|                                      |                                                                                                                                                                                                                        | 14.2.13. Permissible variation of :                                                       |        |
|                                      |                                                                                                                                                                                                                        | a. Voltage (Volts)                                                                        |        |
|                                      |                                                                                                                                                                                                                        | b. Frequency (Hz)                                                                         |        |
|                                      |                                                                                                                                                                                                                        | c. Combined voltage and frequency                                                         |        |
|                                      |                                                                                                                                                                                                                        | 14.2.14. Rated speed at rated voltage and frequency(RPM)                                  |        |
|                                      |                                                                                                                                                                                                                        | 14.2.15. At Voltage and frequency:                                                        |        |
|                                      |                                                                                                                                                                                                                        | a. Full load current                                                                      |        |
|                                      |                                                                                                                                                                                                                        | b. No load current                                                                        |        |
|                                      |                                                                                                                                                                                                                        | 14.2.16. Power Factor at                                                                  |        |
|                                      |                                                                                                                                                                                                                        | a. 100% load                                                                              |        |
|                                      |                                                                                                                                                                                                                        | b. NO load                                                                                |        |
|                                      |                                                                                                                                                                                                                        | c. Starting.                                                                              |        |
|                                      |                                                                                                                                                                                                                        | 14.2.17. Efficiency at rated voltage and frequency,                                       |        |
|                                      |                                                                                                                                                                                                                        | a.100% load                                                                               |        |
|                                      |                                                                                                                                                                                                                        | b. 75% load                                                                               |        |
|                                      |                                                                                                                                                                                                                        | c. 50% load                                                                               |        |
|                                      |                                                                                                                                                                                                                        | 14.2.18. Starting current (amps) at                                                       |        |
|                                      |                                                                                                                                                                                                                        | a. 100 % voltage                                                                          |        |
|                                      |                                                                                                                                                                                                                        | b. 85% voltage                                                                            |        |
|                                      |                                                                                                                                                                                                                        | c. 80% voltage                                                                            |        |
|                                      |                                                                                                                                                                                                                        | 14.2.19. Minimum permissible starting Voltage (Volts)                                     |        |

|                       |                |                                                |          |
|-----------------------|----------------|------------------------------------------------|----------|
| INVENTORY<br>18/03/16 | Rev. no.<br>08 | निर्माणकर्ता<br>WORKED BY: Anil / Kavita       | 18.03.16 |
|                       |                | जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh | 18.03.16 |

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| SIGN & DATE<br>18/03/16                                           |                                                                                                                                          | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>                                                                                                                         |          | ST39013                           |  |
|                                                                   |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                    |          | पृष्ठ 40 का 28<br>Page   28 of 40 |  |
| SUPERSEDES<br>INVENTORY NO<br>18/03/16                            | COPYRIGHT AND CONFIDENTIAL<br>This information on this document is the property of Bharat Heavy Electricals Limited.<br>It must not be used directly or indirectly in any way detrimental to the interest of the company. | 14.2.20. Starting time with minimum permissible voltage                                                                                                                                                                            |          |                                   |  |
|                                                                   |                                                                                                                                                                                                                           | a. Without driven equipment coupled<br>b. With driven equipment coupled                                                                                                                                                            |          |                                   |  |
| 14.2.21. Safe stall time with 100% and 110% of rated voltage      |                                                                                                                                                                                                                           | a. From hot condition<br>b. From cold condition                                                                                                                                                                                    |          |                                   |  |
| 14.2.22. Torques :                                                |                                                                                                                                                                                                                           | a. Starting torque at min. permissible voltage(kg-m)<br>b. Pull up torque at rated voltage.<br>c. Pull out torque<br>d. Min accelerating torque (kg.m) available at lowest permissible<br>e. Rated torque (kg.m)                   |          |                                   |  |
| 14.2.23. Stator winding resistance per phase (ohms at 20 DegC.)   |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                    |          |                                   |  |
| 14.2.24. GD2 value of motors                                      |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                    |          |                                   |  |
| 14.2.25. No of permissible successive starts when motor is in hot |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                    |          |                                   |  |
| 14.2.26. Locked Rotor KVA Input                                   |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                    |          |                                   |  |
| 14.2.27. Locked Rotor KVA/KW                                      |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                    |          |                                   |  |
| 14.2.28. Vibration limit :Velocity (mm/s)                         |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                    |          |                                   |  |
| 14.2.29. Noise level limit (dBA)                                  |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                    |          |                                   |  |
| <b>14.3 CONSTRUCTIONAL FEATURES</b>                               |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                    |          |                                   |  |
| 14.3.1. Stator winding insulation                                 |                                                                                                                                                                                                                           | a. Class & Type<br>b. Winding Insulation Process<br>c. Tropicalized (Yes/No)<br>d. Temperature rise over specified maximum ambient temperature of 50 deg C<br>e. Method of temperature measurement<br>f. Stator winding connection |          |                                   |  |
| 14.3.2. Main Terminal Box                                         |                                                                                                                                                                                                                           | a. Type<br>b. Location(viewed from NDE side)<br>c. Entry of cables(bottom/side)<br>d. Recommended cable size(To be matched with cable size)<br>e. Fault level (MVA),Fault level duration(sec)                                      |          |                                   |  |
| Rev. no.<br>08                                                    | निर्माणकर्ता<br>WORKED BY: Anil / Kavita                                                                                                                                                                                  |                                                                                                                                                                                                                                    | 18.03.16 |                                   |  |
|                                                                   | जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh                                                                                                                                                                            |                                                                                                                                                                                                                                    | 18.03.16 |                                   |  |

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| Rev. no. & DATE<br>SIGN & DATE                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013<br>पृष्ठ 40 का 29<br>Page   29 of 40 |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| SUPPLEMENTARY INVENTORY NO.<br>प्रतिलिपि संख्या के अतिरिक्त संख्या                                                                                                                                                    | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">f. Cable glands &amp; lugs details (shall be suitable for power cable)</td> <td style="width: 85%;"></td> </tr> <tr> <td>14.3.3. Type of DE/NDE Bearing</td> <td></td> </tr> <tr> <td>14.3.4. Motor Paint shade</td> <td></td> </tr> <tr> <td>14.3.5. Weight of</td> <td></td> </tr> <tr> <td>    a. Motor stator (KG)</td> <td></td> </tr> <tr> <td>    b. Motor Rotor (KG)</td> <td></td> </tr> <tr> <td>    c. Total weight (KG)</td> <td></td> </tr> <tr> <td>14.4. List of accessories.</td> <td></td> </tr> <tr> <td>14.4.1. Space Heaters (Nos./Power in watts/supply voltage)</td> <td></td> </tr> <tr> <td>14.4.2. Terminal Box for Space Heater (Yes/No)</td> <td></td> </tr> <tr> <td>14.4.3. Speed switch (Yes/No)</td> <td></td> </tr> <tr> <td>    No of contacts and contact ratings of speed switch</td> <td></td> </tr> <tr> <td>14.4.4. Insulation of bearing (Yes/No)</td> <td></td> </tr> <tr> <td>14.4.5. Noise reducer (Yes/No)</td> <td></td> </tr> <tr> <td>14.4.6. Grounding pads</td> <td></td> </tr> <tr> <td>    i) No and size on motor body</td> <td></td> </tr> <tr> <td>    ii) Nos on terminal Box</td> <td></td> </tr> <tr> <td>14.4.7. Any other fitments</td> <td></td> </tr> <tr> <td>14.5. List of curves.</td> <td></td> </tr> <tr> <td>14.5.1. Torque speed characteristic of the motor</td> <td></td> </tr> <tr> <td>14.5.2. Thermal withstand characteristic</td> <td></td> </tr> <tr> <td>14.5.3. Starting current Vs. Time</td> <td></td> </tr> <tr> <td>14.5.4. Starting current Vs speed</td> <td></td> </tr> <tr> <td>14.5.5. P.F. and Effie. Vs Load</td> <td></td> </tr> </table> |                                                                                                            |                                              | f. Cable glands & lugs details (shall be suitable for power cable) |  | 14.3.3. Type of DE/NDE Bearing |  | 14.3.4. Motor Paint shade |  | 14.3.5. Weight of |  | a. Motor stator (KG) |  | b. Motor Rotor (KG) |  | c. Total weight (KG) |  | 14.4. List of accessories. |  | 14.4.1. Space Heaters (Nos./Power in watts/supply voltage) |  | 14.4.2. Terminal Box for Space Heater (Yes/No) |  | 14.4.3. Speed switch (Yes/No) |  | No of contacts and contact ratings of speed switch |  | 14.4.4. Insulation of bearing (Yes/No) |  | 14.4.5. Noise reducer (Yes/No) |  | 14.4.6. Grounding pads |  | i) No and size on motor body |  | ii) Nos on terminal Box |  | 14.4.7. Any other fitments |  | 14.5. List of curves. |  | 14.5.1. Torque speed characteristic of the motor |  | 14.5.2. Thermal withstand characteristic |  | 14.5.3. Starting current Vs. Time |  | 14.5.4. Starting current Vs speed |  | 14.5.5. P.F. and Effie. Vs Load |  |
| f. Cable glands & lugs details (shall be suitable for power cable)                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.3.3. Type of DE/NDE Bearing                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.3.4. Motor Paint shade                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.3.5. Weight of                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| a. Motor stator (KG)                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| b. Motor Rotor (KG)                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| c. Total weight (KG)                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.4. List of accessories.                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.4.1. Space Heaters (Nos./Power in watts/supply voltage)                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.4.2. Terminal Box for Space Heater (Yes/No)                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.4.3. Speed switch (Yes/No)                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| No of contacts and contact ratings of speed switch                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.4.4. Insulation of bearing (Yes/No)                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.4.5. Noise reducer (Yes/No)                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.4.6. Grounding pads                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| i) No and size on motor body                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| ii) Nos on terminal Box                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.4.7. Any other fitments                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.5. List of curves.                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.5.1. Torque speed characteristic of the motor                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.5.2. Thermal withstand characteristic                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.5.3. Starting current Vs. Time                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.5.4. Starting current Vs speed                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| 14.5.5. P.F. and Effie. Vs Load                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company. | स्वीकृत और गोपनीय<br>यह दस्तावेज केवल भारती भारी विद्युत यंत्रों की शक्ति के लिए है। इसमें कोई भी जानकारी बिना लिखित अनुमति के बिना किसी भी रूप में प्रसारित नहीं की जानी चाहिए।                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| Rev. no. & DATE<br>SIGN & DATE                                                                                                                                                                                        | <div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between;"> <div>             निर्माणकर्ता<br/>             WORKED BY:           </div> <div>             Anil / Kavita           </div> <div>             Anil Kumar<br/>             Kavita           </div> <div>             10.03.16           </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div>             जाँचकर्ता<br/>             CHECKED BY:           </div> <div>             A. S. Rajput / Devesh           </div> <div>             A. S. Rajput<br/>             Devesh           </div> <div>             10.03.16           </div> </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |
| INVENTORY<br>INVENTORY                                                                                                                                                                                                | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                            |                                              |                                                                    |  |                                |  |                           |  |                   |  |                      |  |                     |  |                      |  |                            |  |                                                            |  |                                                |  |                               |  |                                                    |  |                                        |  |                                |  |                        |  |                              |  |                         |  |                            |  |                       |  |                                                  |  |                                          |  |                                   |  |                                   |  |                                 |  |

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| SIGN & DATE<br><br>                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>                             | <b>ST39013</b><br>पृष्ठ 40 का 30<br>Page 30 of 40 |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| SUPERSEDES<br>INVENTORY NO<br><br>                                                                                                                                                                                   | <b>16 ANNEXURE-III (SPECIFICATION OF MOTOR)</b><br><p>1.0 A suitable motor conforming to the purification unit requirement shall be supplied. The motor shall also meet the following requirement broadly. The motor shall confirm to IS : 4722, IS : 325, IS : 2253, IS : 2254, IS : 4029, IS : 3202, IS12615:2011 &amp; IS : 2148 or equipment BS : Specification. The motor shall meet all Indian statutory requirements.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">1.1</td> <td style="width: 40%;">Application</td> <td style="width: 50%;">To drive feed pump (suction &amp; discharge) and centrifuge</td> </tr> <tr> <td>1.2</td> <td>Type of Motor</td> <td>Squirrel cage, induction motor</td> </tr> <tr> <td>1.3</td> <td>KW Rating at 500 ambient temp</td> <td>It shall have at least 10-15% reserve capacity than required for drive the unit when it is discharging max. quantity at max. viscosity</td> </tr> <tr> <td>1.4</td> <td>KW actually required by driven equipment under specified operation/ start-up conditions.</td> <td>Unit capacity</td> </tr> <tr> <td>1.5</td> <td>Min. Voltage required under starting conditions to bring driven equipment up to rated speed.</td> <td>80% rated</td> </tr> <tr> <td>1.6</td> <td>Full load speed</td> <td>It shall be commensurate with pump &amp; centrifuge speed as per design</td> </tr> <tr> <td>1.7</td> <td>Full load current</td> <td>As per design</td> </tr> <tr> <td>1.8</td> <td>Starting current</td> <td>Not to exceed 600% of the rated exclusive of IS tolerance</td> </tr> <tr> <td>1.9</td> <td>Starting Torque</td> <td>1.3 (Min) of rated torque</td> </tr> <tr> <td>1.10</td> <td>Break down torque</td> <td>2.05 times (min) of rated valve.</td> </tr> <tr> <td>1.11</td> <td>Efficiency at full load</td> <td>IE2 AS PER IS 12615:2011</td> </tr> <tr> <td>1.12</td> <td>Power factor at full load</td> <td>0.85 (Min)-</td> </tr> </table> <p>1.13 Motor shall be designed to with stand the voltage and torque stresses developed due to difference between the motor residual voltage and incoming supply voltage equal to 150% of the rated motor voltage during fast changeover of buses.</p> <p><b>2.0 STARTING DATA</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">2.1</td> <td style="width: 40%;">Starting</td> <td style="width: 50%;">Suitable for DOL</td> </tr> <tr> <td>2.2</td> <td>Acceleration time with full load connected.</td> <td>To be furnished by supplier.</td> </tr> <tr> <td>2.3</td> <td>Permissible starting duty cycle, No. of Starts.</td> <td>3-Starts equally spread over an hour. 2-consecutive starts from hot condition without any injurious heating to the winding.</td> </tr> </table> |                                                                                                                                        |                                                   | 1.1 | Application | To drive feed pump (suction & discharge) and centrifuge | 1.2 | Type of Motor | Squirrel cage, induction motor | 1.3 | KW Rating at 500 ambient temp | It shall have at least 10-15% reserve capacity than required for drive the unit when it is discharging max. quantity at max. viscosity | 1.4 | KW actually required by driven equipment under specified operation/ start-up conditions. | Unit capacity | 1.5 | Min. Voltage required under starting conditions to bring driven equipment up to rated speed. | 80% rated | 1.6 | Full load speed | It shall be commensurate with pump & centrifuge speed as per design | 1.7 | Full load current | As per design | 1.8 | Starting current | Not to exceed 600% of the rated exclusive of IS tolerance | 1.9 | Starting Torque | 1.3 (Min) of rated torque | 1.10 | Break down torque | 2.05 times (min) of rated valve. | 1.11 | Efficiency at full load | IE2 AS PER IS 12615:2011 | 1.12 | Power factor at full load | 0.85 (Min)- | 2.1 | Starting | Suitable for DOL | 2.2 | Acceleration time with full load connected. | To be furnished by supplier. | 2.3 | Permissible starting duty cycle, No. of Starts. | 3-Starts equally spread over an hour. 2-consecutive starts from hot condition without any injurious heating to the winding. |
| 1.1                                                                                                                                                                                                                  | Application                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | To drive feed pump (suction & discharge) and centrifuge                                                                                |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.2                                                                                                                                                                                                                  | Type of Motor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Squirrel cage, induction motor                                                                                                         |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.3                                                                                                                                                                                                                  | KW Rating at 500 ambient temp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | It shall have at least 10-15% reserve capacity than required for drive the unit when it is discharging max. quantity at max. viscosity |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.4                                                                                                                                                                                                                  | KW actually required by driven equipment under specified operation/ start-up conditions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Unit capacity                                                                                                                          |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.5                                                                                                                                                                                                                  | Min. Voltage required under starting conditions to bring driven equipment up to rated speed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 80% rated                                                                                                                              |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.6                                                                                                                                                                                                                  | Full load speed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | It shall be commensurate with pump & centrifuge speed as per design                                                                    |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.7                                                                                                                                                                                                                  | Full load current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | As per design                                                                                                                          |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.8                                                                                                                                                                                                                  | Starting current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Not to exceed 600% of the rated exclusive of IS tolerance                                                                              |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.9                                                                                                                                                                                                                  | Starting Torque                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1.3 (Min) of rated torque                                                                                                              |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.10                                                                                                                                                                                                                 | Break down torque                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2.05 times (min) of rated valve.                                                                                                       |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.11                                                                                                                                                                                                                 | Efficiency at full load                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | IE2 AS PER IS 12615:2011                                                                                                               |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 1.12                                                                                                                                                                                                                 | Power factor at full load                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.85 (Min)-                                                                                                                            |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 2.1                                                                                                                                                                                                                  | Starting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Suitable for DOL                                                                                                                       |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 2.2                                                                                                                                                                                                                  | Acceleration time with full load connected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | To be furnished by supplier.                                                                                                           |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| 2.3                                                                                                                                                                                                                  | Permissible starting duty cycle, No. of Starts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3-Starts equally spread over an hour. 2-consecutive starts from hot condition without any injurious heating to the winding.            |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electrical Limited and must not be used directly or indirectly in any way detrimental to the interest of the company. | Rev. no.<br>08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                        |                                                   |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |
| SIGN & DATE<br>9/10/16                                                                                                                                                                                               | निर्माणकर्ता<br>WORKED BY: Anil / Kavita                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh                                                                                         | 18.03.16<br>18.03.16                              |     |             |                                                         |     |               |                                |     |                               |                                                                                                                                        |     |                                                                                          |               |     |                                                                                              |           |     |                 |                                                                     |     |                   |               |     |                  |                                                           |     |                 |                           |      |                   |                                  |      |                         |                          |      |                           |             |     |          |                  |     |                                             |                              |     |                                                 |                                                                                                                             |

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|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------|
| SIGN & DATE<br> | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | <b>ST39013</b>                    |
|                                                                                                  |                                                                                                            | पृष्ठ 40 का 31<br>Page   31 of 40 |

SUPERSEDES  
 INVENTORY NO  
 यदि कोई नया सं  
 अधिकार है

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|      |                                                                                                                                                |                                                                                                                                                                                                                                                 |
|------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.4  | Overload (% of full load) that can be Carried by motor without impairing Overall performance and period for Which this overload is applicable. | Motor shall be capable for running at full load with 80% of rated voltage for 5 minutes and 70% of rated voltage for 1 Sec. Locked rotor with stand time under hot condition at rated voltage shall be at Least 2.5 sec more than starting time |
| 2.5  | Location                                                                                                                                       | Turbine oil room indoor                                                                                                                                                                                                                         |
| 2.6  | Class of Insulation                                                                                                                            | Class-F, fungus resistant as per IS:3202 with temp rise limited to that of class B.                                                                                                                                                             |
| 2.7  | Shaft disposition mountings                                                                                                                    | As per Unit's supplier requirement.                                                                                                                                                                                                             |
| 2.8  | Method of connections driven equipment                                                                                                         | As per Unit's supplier requirement.                                                                                                                                                                                                             |
| 2.9  | Direction of rotation and corresponding terminal designation                                                                                   | To suit pumps & centrifuge                                                                                                                                                                                                                      |
| 2.10 | Enclosure and ventilation                                                                                                                      | Totally enclosed fan cooled and flame proof IP55.                                                                                                                                                                                               |
| 2.11 | Bearing                                                                                                                                        | As per supplier's design, min life 30,000 hrs                                                                                                                                                                                                   |
| 2.12 | Grounding Device                                                                                                                               | Suitable arrangement shall be provided for earthing the motor at two separate and distinct connection points. Design of earthing conductor shall be as per IS: 4722-1992.                                                                       |
| 2.13 | Terminal box                                                                                                                                   | Flame proof terminal box to be provided with double compression Cable gland for AI cable Fault level : 45 KA for 0.01 Sec                                                                                                                       |

### 3.0 SPECIAL REQUIREMENTS:

- 3.1 The motor shall be rewound able
- 3.2 The motor shall have on line greasing facility.
- 3.3 Motor shall be suitable for working in an environment of oil fumes without any hazard.
- 3.4 Separate terminal box for space heater (if applicable) to be provided.
- 3.5 Motor bearings (DE & NDE) shall be sealed type to avoid frequent Re-greasing.
- 3.6 The motor construction shall be suitable for easy disassembly and reassembly.
- 3.7 The terminal box shall be suitable for top and bottom entry of cable and shall be suitable for PVC insulated PVC sheathed armoured aluminium cables and shall be capable of being rotated by 180° in steps of 90°.
- 3.8 Motor vibrations shall be acceptable as per IS: 12075; motor efficiency as per IS 12615:2011 & noise level as per IS: 12065. Also mechanical vibrations shall be under limits as per IS: 10816-2.

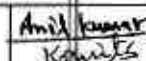
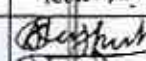
### 4.0 DOCUMENTS TO BE SUPPLIED WITH DELIVERY WITH EACH UNIT. THESE SHALL BE SUPPLIED IN TWO COPIES & WORKABLE SOFT COPY.

|                          |                |                            |                       |                        |          |
|--------------------------|----------------|----------------------------|-----------------------|------------------------|----------|
| INVENTORY<br>NO<br>P-558 | Rev. no.<br>08 | निर्माणकर्ता<br>WORKED BY: | Anil / Kavita         | Anil Kumar<br>Kavita   | 10.03.16 |
|                          |                | जाँचकर्ता<br>CHECKED BY:   | A. S. Rajput / Devesh | A. S. Rajput<br>Devesh | 10.03.16 |

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समस्त अधिकार एवं गोपनीयता  
यह दस्तावेज भारत भारी विद्युत निगम लिमिटेड की संपत्ति है। इसका उपयोग केवल निगम के हितों के लिए ही किया जाना चाहिए। इसे किसी भी रूप में बिना निगम की अनुमति के प्रसारित नहीं किया जा सकता है।

|                                                                                                                        |                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                              |
|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| FROM THE COMPANY<br>SIGN & DATE                                                                                        |                                                                                                                                       | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ST39013<br>पृष्ठ 40 का 32<br>Page   32 of 40 |
| SUPERSEDES<br>INVENTORY NO<br>जारी की जाएगी<br>अधिकार प्राप्त है                                                       | COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electricals Limited and must not be used directly or indirectly in any way detrimental to the interests of the company. | <p>4.1 <b>Characteristics:</b> (at 80%, 100% and 110% of rated voltage)</p> <p>4.1.1 Starting current v/s time</p> <p>4.1.2 Torque v/s slip</p> <p>4.1.3 Thermal with stand for HOT and Cold condition.</p> <p>4.2 Type and frame size</p> <p>4.3 Starting time</p> <p>4.3.1 With 100% voltage at terminal</p> <p>4.3.2 With 85% voltage at terminal</p> <p>4.3.3 With 80% voltage at terminal</p> <p>4.4 Safe install time at 110% rated voltage under hot condition.</p> <p>4.5 Power rating requirement w.r.t. pump requirement.</p> <p>4.6 Motor GD<sup>2</sup></p> <p>4.7 Total wt. of motor.</p> <p>4.8 Expected life of bearing (but not &lt;30000 hrs.)</p> <p>4.9 Type &amp; size of cable for which gland is provided, in the terminal box.</p> <p>4.10 Type &amp; routine test certificate as per IS: 4722.</p> <p>4.10.1 In addition to cl 4.10, the following tests shall also be carried out</p> <ol style="list-style-type: none"> <li>Degree of protection test as type test</li> <li>20% over speed test for 2 minutes as routine test.</li> <li>Measurement of variation as routine test as per IS: 12075.</li> </ol> <p>5.0 <b>TESTS AT MANUFACTURE'S WORKS OF MOTOR:</b></p> <p>5.1 Motor after complete assembly shall be subjected to both type and routine tests as per IS: 4722</p> <p>5.2 Additional type test:-</p> <p>5.2.1 Degree of protection test to conform to the specified degree of protection.</p> <p>5.2.2 Measurement of noise level as per IS 12065, motor noise level shall be limited so as to achieve combined pump motor noise level as per clause no. 5(c).</p> <p>5.3 Additional routine test:</p> <p>5.3.1 20% over speed test for 2 minutes.</p> <p>5.3.2 Measurement of vibrations per IS 12075.</p> <p>6.0 <b>CROSS REFERRED STANDARDS:</b></p> <p>IS:325 , IS:4722, IS:2253, IS:2254, IS:3202, IS:4029, IS:12065, IS:12075, IS:12615:2011</p> |                                              |
| FROM THE COMPANY<br>SIGN & DATE<br> | Rev. no.<br>08                                                                                                                                                                                                         | निर्माणकर्ता<br>WORKED BY: Anil / Kavita<br>जाँचकर्ता<br>CHECKED BY: A. S. Rajput / Devesh<br><br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 18.03.16<br>18.03.16                         |

|                                    |                                                                                   |                                                                                                            |                                   |
|------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Review and approval<br>SIGN & DATE |  | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013                           |
|                                    |                                                                                   |                                                                                                            | पृष्ठ 40 का 33<br>Page   33 of 40 |

|                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
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| SUPPLEMENTARY INVENTORY NO.<br>माल की सूची नंबर से संबंधित अंतर                                                                                                                                                      | <b>17 ANEXURE-IV (SPECIFICATION OF INSTRUMENTS)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
|                                                                                                                                                                                                                      | <b>1) PRESSURE GAUGE</b><br><p>The Pressure gauge should confirm to the following technical specification:-</p> <ul style="list-style-type: none"> <li>a) The sensing element shall be SS-316 bourden tube.</li> <li>b) The dial size shall be approx. 150 mm diameter.</li> <li>c) The casing shall be epoxy coated die-cast aluminium with threaded bezel ring.</li> <li>d) The movement shall be stainless steel rotary gear with nylon bearings.</li> <li>e) The process connection shall be G1/2"</li> <li>f) The over range protection should be 150% of max. range</li> <li>g) The pointer shall be micrometer adjustable with zero facility on front.</li> <li>h) The accuracy shall be 1% of full scale.</li> <li>i) The gauge is to be provided with pulsation dampeners.</li> </ul> |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| COPYRIGHT AND CONFIDENTIAL<br>The information on this document is the property of Bharat Heavy Electrical Limited and must not be used directly or indirectly in any way detrimental to the interest of the company. | <b>2) TEMPERATURE INDICATOR</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
|                                                                                                                                                                                                                      | <table border="1"> <tr> <td>Type</td> <td>Bimetallic rigid system type. No use of mercury or any other hazardous/toxic material</td> </tr> <tr> <td>Case</td> <td>Die cast aluminium alloy moisture proof case, heavily enamelled black</td> </tr> <tr> <td>Dial Size</td> <td>100 mm</td> </tr> <tr> <td>Range</td> <td>As per design</td> </tr> <tr> <td>Accuracy</td> <td>1% of total range</td> </tr> <tr> <td>Bulb Material</td> <td>½" bulb diameter made of SS. 316</td> </tr> <tr> <td>Thermo-well</td> <td>SS-AISI316 (with thread size G1/2")</td> </tr> <tr> <td>Ambient Temp</td> <td>60° C max.</td> </tr> </table>                                                                                                                                                               |  |              |                       |              | Type     | Bimetallic rigid system type. No use of mercury or any other hazardous/toxic material | Case | Die cast aluminium alloy moisture proof case, heavily enamelled black | Dial Size | 100 mm | Range | As per design | Accuracy | 1% of total range | Bulb Material | ½" bulb diameter made of SS. 316 | Thermo-well | SS-AISI316 (with thread size G1/2") | Ambient Temp |
| Type                                                                                                                                                                                                                 | Bimetallic rigid system type. No use of mercury or any other hazardous/toxic material                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| Case                                                                                                                                                                                                                 | Die cast aluminium alloy moisture proof case, heavily enamelled black                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| Dial Size                                                                                                                                                                                                            | 100 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| Range                                                                                                                                                                                                                | As per design                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| Accuracy                                                                                                                                                                                                             | 1% of total range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| Bulb Material                                                                                                                                                                                                        | ½" bulb diameter made of SS. 316                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| Thermo-well                                                                                                                                                                                                          | SS-AISI316 (with thread size G1/2")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| Ambient Temp                                                                                                                                                                                                         | 60° C max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| स्वतंत्रता के संकेत<br>यह सूचना है कि यह दस्तावेज़ भारत भारी विद्युत लिमिटेड की संपत्ति है और इसका उपयोग केवल हीप के लिए ही किया जा सकता है। अन्य किसी भी उद्देश्य के लिए इसका उपयोग नहीं किया जाना चाहिए।           | <b>3) MAGNETIC LEVEL SWITCH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
|                                                                                                                                                                                                                      | <p>Process Connection: - Nb25</p> <p>Material: All parts coming in contact with the liquid made of stainless steel SS316</p> <p>Electrical characteristics</p> <p>Switch: Single pole double throw change over switch silver contact for handling the following currents</p> <p style="margin-left: 40px;">AC 250V – 5.0A</p> <p style="margin-left: 40px;">DC 250V – 0.25A</p> <p>Operating characteristics</p> <p>Differential – 6 MM i. e. 3 MM on either side of centre line working pr &amp; Temp. : As per design</p> <p>Ambient Temp. : 60°C max.</p>                                                                                                                                                                                                                                   |  |              |                       |              |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| Review and approval<br>SIGN & DATE<br>                                                                                            | Rev. no.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | निर्माणकर्ता | Anil / Kavita         | Anil Kumar   | 10.03.16 |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
| माल की सूची नंबर<br>INVENTORY NO.<br>P-5538                                                                                                                                                                          | 08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | WORKED BY:   |                       | Kavita       |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
|                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | जाँचकर्ता    | A. S. Rajput / Devesh | A. S. Rajput | 18.03.16 |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |
|                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | CHECKED BY:  |                       | Devesh       |          |                                                                                       |      |                                                                       |           |        |       |               |          |                   |               |                                  |             |                                     |              |

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स्वाभाविकता एवं योग्यता

Check the proper  
SIGNATURE DATE  
R 2/4/16

INVENTORY NO. 25338

Rev. no.  
08

निर्माणकर्ता  
WORKED BY:

Anil / Kavita

Am. Insects  
Kamitz

18.03.16

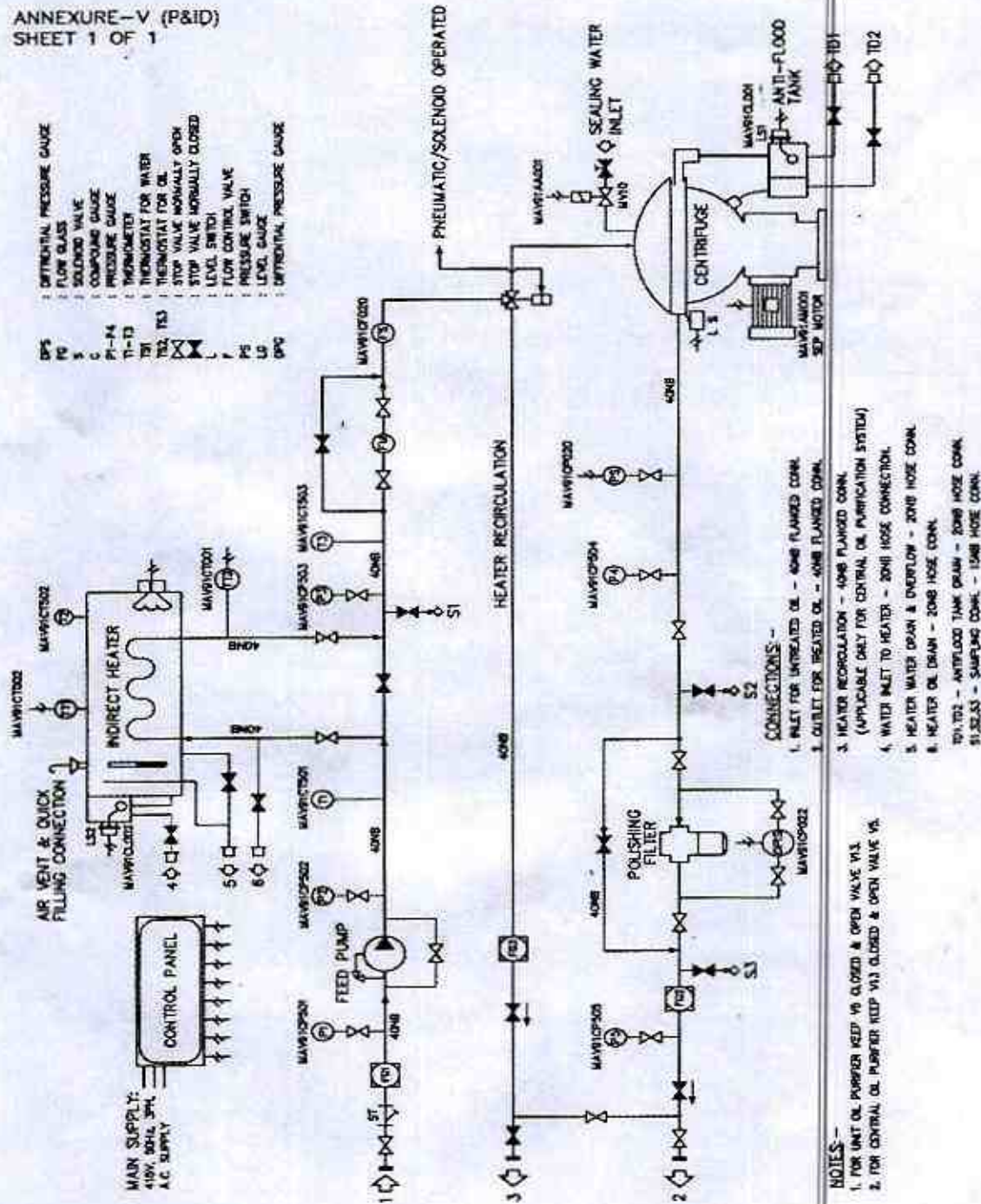
CHECKED BY:

A. S. Rajput

Deuce  
Blaque

18.03.18

ANNEXURE-V (P&ID)  
SHEET 1 OF 1



3. HEATER REGULATOR - 40# PLUNGED COIL  
(APPLICABLE ONLY FOR CENTRAL OIL PURIFICATION SYSTEM)

4. WATER INLET TO HEATER - 20# HOSE CONNECTION

5. HEATER WATER DRAIN & OVERFLOW - 20# HOSE COIL

6. HEATER OIL DRAIN - 20# HOSE COIL

7. TOP TDS - ANTIFLOOD TANK DRAIN - 20# HOSE COIL

8. BOTTOM TDS - SAMPLING COIL - 10# HOSE COIL

**NOTES:-**

1. FOR UNIT OIL PUMP/DR KEEPT VTO CLOSED & OPEN VALVE V11
2. FOR CENTRAL OIL PUMP/DR KEEPT V11 CLOSED & OPEN VALVE V5





उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)  
**PRODUCT PURCHASE SPECIFICATION**  
**(HEEP: HARIDWAR)**

SIGN &amp; DATE

**SUPERSEDES  
INVENTORY NO.**

20 ANNEXURE-VII (CHECK LIST)

### A. CHECK LIST FOR MECHANICAL ITEMS

| Sl. No. | Technical Requirements                                                                                                                                                                                                                                | Vendor's confirmation (Yes/No) | Remarks (if any) |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------|
| 1.      | Is capacity of oil purifier as per BHEL specifications (i.e. 7500 LPH)?                                                                                                                                                                               |                                |                  |
| 2.      | a) Is particle size of impurities in the clean oil as per BHEL specifications in single pass (i.e. class 15/12 or better as per ISO4406)?<br>b) Is moisture content in the clean oil as per BHEL specifications in single pass (i.e. $\leq 500$ ppm)? |                                |                  |
| 3.      | Is the test certificate for particle size of impurities & moisture content provided as per BHEL specification?                                                                                                                                        |                                |                  |
| 4.      | Is mode of operation (i.e. purifier/clarifier) as per BHEL specifications & enquiry?                                                                                                                                                                  |                                |                  |
| 5.      | Is noise level as per BHEL specifications?                                                                                                                                                                                                            |                                |                  |
| 6.      | Is overflow sight fitting provided as per BHEL specifications?                                                                                                                                                                                        |                                |                  |
| 7.      | Is capacity of oil feed & discharge Pump (i.e. at least 10% higher than capacity of the purifier) as per BHEL specifications?                                                                                                                         |                                |                  |
| 8.      | a) Is copies of O&M manual (CD based & hard paper based) provided as per BHEL specifications?<br>b) Are 2 copies (hard paper based) of O & M manuals kept inside the dispatch box as per BHEL specifications & enquiry?                               |                                |                  |
| 9.      | Is polishing filter ( $\beta_3 = 1000$ or better) provided as per BHEL specifications?                                                                                                                                                                |                                |                  |
| 10.     | Is supervision during erection & commissioning at site by vendor offered as per BHEL specifications & enquiry?                                                                                                                                        |                                |                  |
| 11.     | Is lube oil recirculation piping/ piping connection provided as per BHEL specifications & enquiry?                                                                                                                                                    |                                |                  |
| 12.     | Are sufficient spares for satisfactory commissioning and for 3 years satisfactory operation of the purifier provided as per BHEL specifications?                                                                                                      |                                |                  |
| 13.     | Are detailed lists of recommended spares and commissioning spares along with price break up provided as per BHEL specifications & enquiry?                                                                                                            |                                |                  |
| 14.     | Is separate offer for conducting test for particle size of impurities and                                                                                                                                                                             |                                |                  |

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इन्द्राधिकांश एवै सोपनीय  
 ॥ जल है ही नई भुजा जल ही नदीकुलम निरिंद की मण्डि है शका  
 इन्द्राधिकांश जल है निरी की मण्डि वरिंद आ कि कापरी के रिंद है  
 इन्द्राधिकांश ही द दिया जल ।

SIGN &amp; DATE

2/4/16

INVENTORY

855-0

Rev. no. 08

निर्माणकर्ता  
WORKED FOR

Anil / Kavita

|            |
|------------|
| Amid Kumar |
| Kanits     |

18.03.16

जाँचकर्ता  
CHECKED BY:

A. S. Rajput /  
Devesh

Styphn.  
Dutch

18.03.16



**PRODUCT PURCHASE SPECIFICATION  
(HEEP: HARIDWAR)**

SIGN &amp; DATE

SUPPLIES  
INVENTORY NO.

पुनः पुनः पुनः पुनः

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सामाजिक कार्य एवं नीति

SIGN &amp; DATE

INVENTORY

Rev. no.  
08

निर्माणकर्ता  
WORKED BY:

Anil / Kavita

Arul Kumar  
Korinthu

18.03.16

जाँचकर्ता  
CHECKED BY

A. S. Rajput /  
Devesh

Bright.  
Dark

18.03.16

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                      |                                                                                                                |                                   |                                                                                            |                      |
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| DESIGN & DRAWING<br>SIGN & DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                     | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b>     | ST39013                           |                                                                                            |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                      |                                                                                                                | पृष्ठ 40 का 38<br>Page   38 of 40 |                                                                                            |                      |
| SUPERSEDES<br>INVENTORY NO<br>अतिरिक्त नमूने नं.<br>अतिरिक्त नमूने नं.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>B. CHECK LIST FOR C&amp;I ITEMS</b>                                                                                                               |                                                                                                                |                                   |                                                                                            |                      |
| <b>Check list for OPU (DCS Based)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                      |                                                                                                                |                                   |                                                                                            |                      |
| 1. OPU is DCS Based with provision of operating from local controls panel as well control room; yes/ no<br>2. Plug and socket type connection for all pressure switch and level switch : yes/no<br>3. DCS/Local selector switch is provided on the Local control panel: yes/no<br>4. Relays shall be of 24 v dc and of vendor scope of supply: yes/no<br>5. List of drives to be operated through DCS is furnished along with list of instruments and alarms.: yes/no<br>6. All field instruments shall be wired to a JB which shall be in vendor scope.: yes/no<br>7. A pressure switch at outlet of centrifuge and a level switch in anti-flood tank shall be provided for detection of liquid seal breakage.<br>8. Arrangement for Liquid seal breakage alarm is provided : yes/no<br>9. Air requirement of pneumatic valves is mentioned: yes/no<br>10. Motor efficiency meeting as per special instruction/project requirement : yes./no<br>11. Control panel is designed for 3 phase (415 v Ac) 3 wire power supply system: yes/no<br>12. Control panel is provided with anti-vibration pads to withstand vibrations: yes/no.<br>13. Motor data sheet shall be subject to customer/ BHEL approval: yes/no<br>14. Cable glands for 415 V AC incomer is provided : yes/no<br>15. On/Off control, indication and alarms is provided in local panel as well as HMI: yes/no<br>16. Painting treatment as per addendum or special instruction mentioned in indent: yes/no.<br>17. Construction of panel as per specification/addendum: yes/no.<br>18. Price break of spare item/spare of LS switchgear given along with offer: yes/no<br>19. 20% spare terminals have been provided at panel: yes/no. |                                                                                                                                                      |                                                                                                                |                                   |                                                                                            |                      |
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|                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                            |                                 |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------|----------|
| SIGN & DATE<br>18.03.16                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                     | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> | ST39013                         |          |
|                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                            | पृष्ठ 40 का 39<br>Page 39 of 40 |          |
| SUPERSEDED<br>INVENTORY NO                                                                                                                                                                                           | 20. All instrument as well as motor data sheet, wiring diagram write up is subject to BHEL/customer approval: yes/no<br>21. panel to be designed for 110 V AC control voltage : yes/no<br>22. For panel color exterior -Opaline green semi glossy finish, interior-glossy white and motor-smoke grey yes/no<br>23. All HT & LT motors shall be energy efficient type with efficiency class 1: yes/no |                                                                                                            |                                 |          |
| Date:<br>Place:                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                            |                                 |          |
| Signature<br>Seal of manufacturer                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                            |                                 |          |
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| INVENTORY NO<br>18.03.16                                                                                                                                                                                             | Rev. no.<br>18                                                                                                                                                                                                                                                                                                                                                                                       | निर्माणकर्ता<br>WORKED BY:                                                                                 | Anil / Kavita                   | 18.03.16 |
|                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                      | जाँचकर्ता<br>CHECKED BY:                                                                                   | A. S. Rajput /<br>Devesh        | 18.03.16 |

|                                                                                                                                                                                                                        |                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                   |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|----------|
| भेल एल ई एल<br><b>BHEL</b>                                                                                                                                                                                             | उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)<br><b>PRODUCT PURCHASE SPECIFICATION</b><br><b>(HEEP: HARIDWAR)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>ST39013</b><br>पृष्ठ 40 का 40<br>Page 40 of 40 |          |
|                                                                                                                                                                                                                        |                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                   |          |
| भेल एल ई एल<br>SIGN & DATE<br>11/03/16                                                                                                                                                                                 | SUPERSEDES<br>INVENTORY NO<br>08                                                                           | <b>Check list for OPU (Relay Based)</b> <ol style="list-style-type: none"> <li>Oil Purification Unit is relay based: yes/no</li> <li>On/Off control, indication and alarms is provided in local panel: yes/no</li> <li>Control panel is designed for 3 phase (415 v Ac) 3 wire incomer power supply system: yes/no</li> <li>Motor efficiency meeting as per special instruction/project requirement : yes /no</li> <li>Air requirement of pneumatic valves is mentioned: yes/no.</li> <li>A pressure switch at outlet of centrifuge and a level switch in anti-flood tank is provided for detection of liquid seal breakage: yes/no</li> <li>Cable glands for 415 V AC incomer is provided : yes/no</li> <li>Adequately sized copper ground bus is provided for each panel: yes/no</li> <li>Painting treatment as per addendum or special instruction mentioned in indent: yes/no</li> <li>Paint shade of control panel as per addendum/special requirement: yes/no</li> <li>Construction of panel as per specification/addendum: yes/no</li> <li>Control panel is provided with anti-vibration pads to withstand vibrations: yes/no</li> <li>Plug and socket type connection for all instruments : yes/no</li> <li>Arrangement for Liquid seal breakage alarm is provided: yes/no</li> <li>Price break of spare item/spare of LS switchgear given along with offer: yes/no</li> <li>Motor data sheet shall be subject to customer/ BHEL approval: yes/no</li> <li>20% spare terminals have been provided at panel: yes/no</li> <li>All instruments shall be of reputed make.</li> </ol> |                                                   |          |
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| भेल एल ई एल<br>SIGN & DATE<br>11/03/16                                                                                                                                                                                 |                                                                                                            | Signature<br>Seal of manufacturer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |          |
| भेल एल ई एल<br>INVENTORY NO<br>08                                                                                                                                                                                      | Rev. no.<br>08                                                                                             | निर्माणकर्ता<br>WORKED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Anil / Kavita                                     | 18.03.16 |
|                                                                                                                                                                                                                        |                                                                                                            | जाँचकर्ता<br>CHECKED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | A. S. Rajput /<br>Devesh                          | 18.03.16 |

**APPLICATION: STEAM TURBINE**

**ITEM: OIL PURIFICATION UNIT**

**ADDITIONAL SPECIFICATION:**

- ✓1. Following requirements mentioned in this document supersede the corresponding requirements of specification ST39013.
- ✓2. Clause j (i) at page no.: 12 of Spec-ST39013 (Rev. no. -08) read as – Degree of protection test as per IS: 2147 (type test) and HV test at 2.0 KV for one minute.
- ✓3. Since unit oil purifier and central oil purifier are same, the drawings/documents to be furnished to BHEL for approval shall be common for both.
- ✓4. If paint requirement is mentioned in special instructions of indent, then the requirement mentioned in indent will supersede the requirement mentioned in this addendum and BHEL specification ST39013.
- ✓5. The sizes of inlet and outlet pipe connections of oil purification system (OPS) shall be NB 50mm in place of NB 40mm mentioned in P&ID of Spec-ST39013. Also, the sizes of inlet and outlet pipe connections of vented sight overflow fitting shall be NB 50mm.
- ✓6. Vendor to provide lube oil recirculation piping/ piping connection in its scope. Vendor to note that unit oil purifier recirculation line shall be connected to outlet of purifier. For central oil purifier, oil recirculation line shall be connected to inlet of purifier.
- ✓7. Control panel of oil purification system shall be DCS based.
- ✓8. Mandatory spare items/instruments shall be supplied in wooden box painted with green colour and written "**Mandatory Spares for OPS**" clearly at all faces of box.
- ✓9. Vendor to keep two copies of O&M manual inside the dispatch box of OPS & also indicate the same in the vendor's shipping list.
- ✓10. Clause 5 (ii) at page no.: 10 of Spec-ST39013 (Rev. no. -08) is to be read as moisture content shall be less than or equal to 500 ppm at the outlet tested by Karl Fisher method, if the total inlet moisture tested by Karl Fisher method is minimum 15000 ppm.

(QAX)

(CIE)

(PED)