

**BUYERS SPECIFIC ADDITIONAL TERMS & CONDITIONS**  
**ITEM NAME: OIL PURIFICATION UNIT ALONG WITH SPARES**

**PROJECTS- 1X800MW SINGARENI TPP SINGARENI COLLIERIES COMPANY LTD**

**1. SCOPE OF ENQUIRY:**

Sl. No.	Material Code & Item Description	Total Qty.	LOT Quantity & Delivery schedule
1.	W90311928870 DRG: 411928J7100 REV:00 UNIT OIL PURIFICATION SYSTEM SPEC: ST39013 REV: 08	1 No.	1X800MW SINGARENI TPP: 1 No. -28/10/2027
2.	W90311928889 DRG: 411928J7100 REV:00 OIL PURIFICATION SYSTEM (CENTRAL) SPEC: ST39013 REV: 08	1 No.	1X800MW SINGARENI TPP: 1 No. -28/10/2027
3.	W90318103427 SEPERATOR MOTOR FOR LUB OIL PURIFIER AS PER ST39013 SPEC: ST39013 REV: 08	1 No.	1X800MW SINGARENI TPP: 1 No. -31/03/2028
4.	W90318103168 RTDS FOR OIL PURIFICATION UNIT:1 NO. EACH TYPE AND RANGE SPEC: ST39013 REV: 08	1 No.	1X800MW SINGARENI TPP: 1 No. -31/03/2028
5.	Supervision of Erection & Commissioning Lump sum per man day charges at site, including every expense at our site i.e. boarding & lodging, local travel etc. (Considering 02 working days per OPU)	04 Days	On Intimation
6.	Supervision of Erection & Commissioning Lump sum per visit charges (to & fro) including travelling time & all expenses up to our project site. (Considering to & fro one visit for each unit)	02 Visit	On Intimation
7.	VENDOR TO CONDUCT PERFORMANCE TEST FOR PARTICLE SIZE OF IMPURITIES AND MOISTURE CONTENTS FOR LUBE OIL (ISO VG-46) AS MENTIONED IN SL.NO.5(a) OF SPEC- ST39013 ON ONE OIL PURIFICATION SYSTEM OF PROJECT.	1 No.	1X800MW SINGARENI TPP: 1 No. -28/07/2028

**2. Project Details with consignee address:**

<b>Project Name</b>	1X800MW SINGARENI TPP
<b>Consignee Address</b>	

**3.BUYERS SPECIFIC ADDITIONAL TERMS & CONDITIONS IN ADDITION TO GTC**

Sl. No.	Terms	Description	Supplier confirmation
1.	<b>Documents Checklist:</b>	Please submit signed and stamped copy of your offer on each page along with following documents; <ul style="list-style-type: none"> <li>• Buyer Specific T&amp;C.</li> <li>• Technical PQR &amp; its supportive document.</li> <li>• Technical drawing &amp; purchase specification.</li> <li>• Certificate/self-certification for minimum local content as per PPP-MII order.</li> <li>• Replica of price bid schedule without prices with part-I offer.</li> </ul>	
2.	<b>Special Instruction of Technical requirement</b>	a) SPECIFICATION ST39013(Rev. no.-08), CHECK LIST FOR DCS, PQR AND ADDENDUM 411928J7100 ARE ENCLOSED. b) OIL PURIFIER SHALL BE 7500LPH, DCS BASED,MANUAL CLEANING TYPE AND HEATER RATING 90 kW. c) VENDOR TO CONDUCT PERFORMANCE TEST FOR PARTICLE SIZE OF IMPURITIES AND MOISTURE CONTENTS FOR LUBE OIL (ISO VG-46) AS MENTIONED IN SL.NO.5(a) OF	

		SPEC- ST39013 ON ONE OIL PURIFICATION SYSTEM OF PROJECT.	
		d) EFFICIENCY OF MOTOR- IE4	
		e) TWO DAYS OF VENDOR ENGINEER IS REQUIRED FOR SUPERVISION DURING ERECTION & COMMISSIONING OF ONE OIL PURIFICATION SYSTEM AT SITE	
		f) PIPING, VALVE BODY & ITS INTERNAL AND ALL OTHER COMPONENT OF OIL PURIFICATION SYSTEM COMING IN CONTACT WITH OIL SHALL BE IN STAINLESS STEEL CONSTRUCTION .	
		g) CONTROL PANEL COLOR SHALL BE - EXTERNAL(FRONT & REAR)-GREY 9002 EXTERNAL (SIDE)-BLUE 5012 INTERNAL-SAME AS INTERNAL COLOR.	
		h) NINE (9) NUMBER HARD COPIES AND TWO (2) NUMBER CDs OF O&M MANUAL TO BE SUPPLIED BY VENDOR AT BHEL HARIDWAR .	
		i) VENDOR TO PROVIDE SUITABLE CABLE GLANDS AND TERMINAL PLATE FOR INCOMING CABLE SIZE 3.5 CX240 SQMM AL CABLE TERMINATION.	
		j) FOR CONTROL PANEL, A MINIMUM OF 600MM ELEVATION OF BASE PLATE TO BE THERE FOR CABLE TO ENTER FROM BOTTOM.	
		k) VENDOR TO SUPPLY DETAIL LIST OF MANDATORY AND OTHER SPARES IN PACKING LIST DURING DISPATCH TO SITE.	
3.	Supervision of erection & commissioning.	Kindly note that the vendor shall carry out supervision work during Erection & Commissioning at site.	
		Kindly Confirm that following charges have been quoted separately in your offer: 1. Per Visit Charges for Supervision during Erection & Commissioning (lumpsum & inclusive of everything). 2. Per day charges inclusive of all i.e. lodging, fooding, boarding, taxes & duties etc.).	
		Payment shall be done for the actual no. of days worked at site which should be certified by BHEL site.	
		Kindly ensure Supervision charges should be quoted including GST in your offer.	
4.	Compliance of GTC on GeM	General Terms and Conditions on GeM 4.0 (Version 1.28) Dtd -22/12/2025 or it's latest revision of GeM portal shall be applicable against this enquiry. Kindly confirm to compliance the same for this tender.	
5.	Pre-Qualification Requirements	The Pre-Qualification Requirements have been compiled. 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.	
6.	Customer approval requirement	<p>Bidders are requested to submit their credentials along with offer (Credentials should include BHEL P.O.s on vendor for the same rating or higher rating turbines, Experience of vendor with state utilities and major PSU like NTPC, End User Certificate wherever available), in order to take up with end customer for approval</p> <p>Supplier to submit following credentials for arranging Customer approval: -</p> <ul style="list-style-type: none"> <li>• Company Profile</li> <li>• List of Order Executed/ on hand for Power Sector/Gov. organization of same /similar items</li> <li>• Copy of Major Supply Orders</li> <li>• Performance Certificates for Satisfactory working of System/ Equipment from end users Item.</li> </ul> <p><b>The offer of only those bidders, who meet Pre-qualification requirement (PQR), Technical requirement and approved by the End Customer, will be considered for price-bid opening &amp; RA for the requirement against this enquiry.</b></p>	
7.	Make in India Clause	<p>"For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local Supplier/ Non-local supplier and purchase preference to Class I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 19.07.2024 issued by DPIIT.</p> <p>In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT".</p> <p>As per Make in India Order, only Class-1 and Class-2 local supplies are eligible to bid in this tender enquiry.</p> <p>For this eligibility criteria, bidders are required to submit certificate of Minimum local content as specified in attached Make In India Declaration format.</p>	
8.	Compliance of Rule 144 (xi) of GFR 2017	Compliance of Restrictions under Rule 144 (xi) of GFR 2017 shall be as per GeM.	
9.	Bid validity/ Validity of offer	Please note that validity of the offer shall be 180 days from the date opening of Techno-Commercial bid (Part-I bid) on GeM portal.	

		Offer of bidder's having validity less than 180 days shall liable to reject. Please confirm.									
		The required validity is considering that offer is complete & clear w.r.t. PQR and all techno-commercial conditions. Vendors need to extend their offer validity for the time taken by them in responding BHEL's comments/clarification sought during techno-commercial scrutiny of the offer. In case regret by any bidder for such validity extension, their offer shall liable to be reject. Please confirm.									
10.	Loading and unloading	Vendor's scope will not cover Loading & Unloading at Final destination of delivery. Unloading at final destination (i.e. BHEL site) is in BHEL 'scope. Loading and unloading at other intermediate places due to any permitted transshipment will be the responsibility of the vendor. Kindly note									
11.	Prices/Basis of Quotation	The offered prices of the items shall remain firm and fixed till the execution of the contract, kindly confirm.									
		Kindly confirm that your quote prices are inclusive of P&F, Freight & GST for Total quantity on GeM portal.									
		Transit Insurance would be arranged by BHEL. Please quote your prices accordingly.									
		The prices are to be quoted on Ex-Works with freight Pre-paid up to project destination basis & inclusive of all taxes & duties, GST (i.e. Inclusive all). 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 basis. 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. Any demurrage / godown rent payable to the transporter /or to godown's owner due to any delay attributed by the supplier shall be recovered from supplier's account.									
12.	Special Instructions:	<ul style="list-style-type: none"><li>• Original (Invoice, GR/LR, Bill of Lading (if applicable), Air Way Bill</li><li>• (if applicable), Pkg. List, Certificate of origin (if applicable),</li><li>• E-Way bill are required for billing.</li><li>• Material is to be despatched on Door Delivery basis to site.</li><li>• Commissioning spares need to be packed in separate boxes. Commissioning spares to be written in Bold Letters on all sides of packing boxes.</li><li>• Mandatory spares need to be packed in separate boxes. Mandatory spares to be written in Bold Letters on all sides of packing boxes. Mandatory spares are to be supplied along with Main Equipment but mandatorily in separate box.</li><li>• The packing list item description are in accordance with the approved BBU or Correlation Certificate approved by Engineering is required for MDCC and billing.</li><li>• Please inform 8 Digit HSN code for Oil Purification along with spares.</li><li>• 08 DIGIT GST HSN CODE to be provided &amp; mentioned in your invoice &amp; packing list.</li><li>• Vendor to ensure submission billing documents in the same month of material despatch. If vendor fail to provide the despatch documents in the same month GST Penalty shall be applicable and bear by vendor as per GST rule.</li></ul>									
13.	Evaluation criteria	Evaluation would be done on the basis of total landed cost for the complete scope/requirement covered in the enquiry Considering total material value, supervision charges, type test charges (if applicable), Packing charges, Forwarding Charges, taxes & duties, Freight & Insurance).									
14.	Evaluation Currency	The evaluation currency for this tender shall be INR.									
15.	Payment terms:	<b>For Material portion:</b> The payment shall be done after receipt of Material at BHEL respective project site, within no. of days as defined in the below table from the date of receipt of Material at site i.e. MRC date).									
		<table><tr><td>Type of Bidder</td><td>Payment Terms (Number of Days)</td></tr><tr><td>Micro &amp; Small Enterprises (MSEs)</td><td>45 days</td></tr><tr><td>Medium Enterprises</td><td>60 days</td></tr><tr><td>Non MSME</td><td>90 days</td></tr></table>	Type of Bidder	Payment Terms (Number of Days)	Micro & Small Enterprises (MSEs)	45 days	Medium Enterprises	60 days	Non MSME	90 days	
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		Micro & Small Enterprises (MSEs)	45 days								
		Medium Enterprises	60 days								
		Non MSME	90 days								
The Payment terms are subject to receipt of non-discrepant document from supplier.											
<b>Payment terms for Supervision charges during Erection &amp; Commissioning:</b> 100% payment against submission of successful Erection & Commissioning certificate from Project Site or MOM and time sheet.											

16.	GeM charges	GeM charges if any shall be either side only i.e. buyer's GeM charges shall be in buyer's account and seller's GeM charges shall be on seller's account. Please confirm.	
17.	Contract execution	Bidder's are advised to read GeM related query & clarification carefully on GeM portal. Order shall be executed through GeM.	
18.	Reverse Auction (E-bidding)	BHEL shall be resorting to Reverse Auction (RA) on GEM portal as per GEM functionalities for this tender. RA shall be conducted among the techno-commercially qualified bidders.	
19.	Quantity Variation	<p>BHEL reserves the right to cancel tender or reject any or all the quotations without assigning any reasons thereof.</p> <p><b>BHEL also reserves the right to Increase or decrease the tendered quantities or quantity of individual material code may be dropped as a whole also.</b></p> <p>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> <p>Vendor has to take manufacturing clearance from BHEL before starting manufacturing of material. In case ordered quantity is reduced at the time of manufacturing clearance, then payment shall be made accordingly as per decreased quantity. Kindly confirm.</p>	
20.	Delivery Period	<p>Please note that BHEL's Delivery requirements are mentioned in point no 1 of above.</p> <p>Early delivery w.r.t. above lot delivery will be accepted only after written confirmation from BHEL. BHEL reserve right to reject early delivery request of bidders / suppliers.</p> <p>Delivery period indicated in GeM bid is only indicative and final delivery of tender shall be taken as mentioned above.</p> <p>Accordingly bidders to confirm the above deliveries or quote their best possible delivery in no of months / weeks from the date of placement of Purchase order, including all activities like document approval, inspection by TPI time etc.</p>	
21.	Technical Document/ Drawing approval conditions	<p>Drawings/Data sheets/documents/QAP etc. as called for in the specifications shall be submitted by Vendor for BHEL/ Customer approval within 30 days of purchase order. BHEL shall approve these drawings/data sheets/ documents / QAP etc. within 30 days of receipt.</p> <p>Any comments on the documents shall be given by BHEL within 7 days of submission and vendor shall submit revised document / reply to comments, within 7 days of BHEL comments. However, total time for Document submission and approval shall not exceed 30 days for respective party.</p> <p>Delivery is from the date of PO, accordingly, delay in submission / revision of the documents by the vendor will automatically account for to vendor. In case of delay on account of BHEL in comments / approval of the documents, the delivery shall be re-scheduled by the no of days taken by BHEL in excess to 30 days. For delay analysis cumulative no of days (including time taken in comments), shall be considered for delivery extension.</p>	
22.	Liquidated Damages (LD) for late delivery	<p>Liquidated Damages shall be lot wise as per clause no. 15 (iii) of General terms and conditions on GeM 4.0 (Version 1.27) as under: kindly confirm.</p> <p>"If the Seller/Service Provider fails to deliver any or all of the Goods/Services within the original/re-fixed delivery period(s) specified in the contract, the Buyer will be entitled to deduct/recover the Liquidated Damages for the delay, unless covered under Force Majeure conditions aforesaid, @ 0.5% of the contract value of delayed quantity per week or part of the week of delayed period as pre-estimated damages not exceeding 10% of the contract value of delayed quantity without any controversy/dispute of any sort whatsoever".</p> <p>The date of LR would be treated as the date of delivery for penalty purposes.</p>	
23.	MDCC clause	<p>Please note that, material shall be dispatched only after issue of Material dispatch clearance certificate (MDCC) from end customer. For issue of MDCC, vendors are required to submit all test certificates (TC) and inspection report of third party (IR) to BHEL. After review &amp; acceptance of the quality document, BHEL will forward the same to end customer for issuance of MDCC.</p> <p>MDCC shall be issued within 7 days of receipt of complete quality documents / TCs,. In case of delay in issuance of MDCC, only delivery shall be extended by no of days taken by BHEL in excess to 7 days and all other terms and conditions of PO shall remains same &amp; binding.</p> <p>In case any material is dispatched without MDCC and any loss is incurred by Supplier/Vendor for any reason whatsoever, BHEL shall not be responsible in any manner to compensate the supplier in this regard.</p> <p>Kindly confirm.</p>	
24.	BREACH OF CONTRACT, REMEDIES AND TERMINATION:	<p><b>The following shall amount to breach of contract:</b></p> <p>I. Non-supply of material/ non-completion of work by the Supplier/Vendor within scheduled delivery/ completion period as per contract or as extended from time to time.</p> <p>II. The Supplier/Vendor fails to perform as per the activity schedule and there are sufficient reasons</p>	



		<p>even before expiry of the delivery/ completion period to justify that supplies shall be inordinately delayed beyond contractual delivery/ completion period.</p> <p>III. The Supplier/Vendor delivers equipment/ material not of the contracted quality.</p> <p>IV. The Supplier/Vendor fails to replace the defective equipment/ material/ component as per guarantee clause.</p> <p>V. Withdrawal from or abandonment of the work by the Supplier/Vendor before completion as per contract.</p> <p>VI. Assignment, transfer, subletting of Contract by the Supplier/Vendor without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.</p> <p>VII. Non-compliance to any contractual condition or any other default attributable to Supplier/Vendor.</p> <p>VIII. Any other reason(s) attributable to Vendor towards failure of performance of contract. In case of breach of contract, BHEL shall have the right to terminate the Purchase Order/ Contract either in whole or in part thereof without any compensation to the Supplier/Vendor.</p> <p>IX. Any of the declarations furnished by the contractor at the time of bidding and/ or entering into the contract for supply are found untruthful and such declarations were of a nature that could have resulted in non-award of contract to the contractor or could expose BHEL and/ or Owner to adverse consequences, financial or otherwise.</p> <p>X. Supplier/Vendor is convicted of any offence involving corrupt business practices, antinational activities or any such offence that compromises the business ethics of BHEL, in violation of the Integrity Pact entered into with BHEL has the potential to harm the overall business of BHEL/ Owner.</p> <p>Note-Once BHEL considers that a breach of contract has occurred on the part of Supplier/Vendor, BHEL shall notify the Supplier/Vendor by way of notice in this regard. Contractor shall be given an opportunity to rectify the reasons causing the breach of contract within a period of 14 days. In case the contractor fails to remedy the breach, as mentioned in the notice, to the satisfaction of BHEL, BHEL shall have the right to take recourse to any of the remedial actions available to it under the relevant provisions of contract.</p> <p><b>Remedies in case of Breach of Contract.</b></p> <p>i) Wherein the period as stipulated in the notice issued under above clause has expired and Supplier/Vendor has failed to remedy the breach, BHEL will have the right to terminate the contract on the ground of "Breach of Contract" without any further notice to contractor.</p> <p>ii) Upon termination of contract, BHEL shall be entitled to recover an amount equivalent to 10% of the Contract Value for the damages on account of breach of contract committed by the Supplier/Vendor. This amount shall be recovered by way of encashing the security instruments like performance bank guarantee etc available with BHEL against the said contract. In case the value of the security instruments available is less than 10% of the contract value, the balance amount shall be recovered from other financial remedies (i.e. available bills of the Supplier/Vendor, retention amount, from the money due to the Supplier/Vendor etc. with BHEL) or the other legal remedies shall be pursued.</p> <p>iii) wherever the value of security instruments like performance bank guarantee available with BHEL against the said contract is 10% of the contract value or more, such security instruments to the extent of 10% contract value will be encashed. In case no security instruments are available or the value of the security instruments available is less than 10% of the contract value, the 10% of the contract value or the balance amount, as the case may be, will be recovered in all or any of the following manners:</p> <p>iv) In case the amount recovered under sub clause (a) above is not sufficient to fulfil the amount recoverable then; a demand notice to deposit the balance amount within 30 days shall be issued to Supplier/Vendor.</p> <p>v) If Supplier/Vendor fails to deposit the balance amount within the period as prescribed in demand notice, following action shall be taken for recovery of the balance amount:</p> <p>a) from dues available in the form of Bills payable to defaulted Supplier/Vendor against the same contract.</p> <p>b) If it is not possible to recover the dues available from the same contract or dues are insufficient to meet the recoverable amount, balance amount shall be recovered from any money(s) payable to Supplier/Vendor under any contract with other Units of BHEL including recovery from security deposits or any other deposit available in the form of security instruments of any kind against Security deposit or EMD.</p> <p>vi) In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against defaulted supplier/Vendor.</p> <p>vii) It is an agreed term of contract that this amount shall be a genuine pre-estimate of damages that BHEL would incur in completion of balance contractual obligation of the contract through any other agency and BHEL will not be required to furnish any other evidence to the Supplier/Vendor for the purpose of estimation of damages.</p> <p>viii) In addition to the above, imposition of liquidated damages, debarment, termination, de-scoping, short-closure, etc., shall be applied as per provisions of the contract.</p> <p>Note:</p> <p>1) The defaulting Supplier/Vendor shall not be eligible for participation in any of the future enquiries floated by BHEL to complete the balance work. The defaulting contractor shall mean and include:</p>	
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25.	<b>Suspension of Business Dealings with Suppliers / Contractors:</b>	<p>The offers of the bidders who are under suspension as also the offers of the bidders, who engage the services of the banned firms / principal / agents, shall be rejected. The list of banned firms is available on BHEL web site <a href="http://www.bhel.com">www.bhel.com</a>.</p> <p>If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution stage indulges in any act, including but not limited to, mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or tampers the tendering process or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860( Bhartiya Nyaya Samhita 2023) or any other law in force in India, or does anything which is actionable under the Guidelines for Suspension of Business dealings, action may be taken against such bidder / supplier / contractor as per extant guidelines of the company available on <a href="http://www.bhel.com">www.bhel.com</a> and / or under applicable legal provisions. Guidelines for suspension of business dealings is available in the webpage:  <a href="http://www.bhel.com/vender_registration/vender.php">http://www.bhel.com/vender_registration/vender.php</a>.</p>	
26.	<b>Settlement of Dispute, CONCILIATION &amp; ARBITRATION:</b>	<p><b>Settlement of Dispute</b></p> <p>If any dispute or difference of any kind whatsoever shall arise between BHEL and the Supplier/Vendor, arising out of the contract for the performance of the work whether during the progress of contract termination, abandonment or breach of the contract, it shall in the first place referred to Designated Officer / IEM for amicable resolution by the parties. Designated Officer / IEM who within 60 days after being requested shall give written notice of his decision to the contractor. Save as hereinafter provided, such decision in respect of every matter so referred shall forthwith be given effect to by the Supplier/Vendor who shall proceed with the work with all due diligence, whether he or BHEL desires to resolve the dispute as hereinafter provided or not. If after the Designated Engineer has given written notice of this decision to the party and no intention to pursue the dispute has been communicated to him by the affected party within 30 days from the receipt of such notice, the said decision shall become final and binding on the parties. In the event the Supplier/Vendor being dissatisfied with any such decision or if amicable settlement cannot be reached then all such disputed issues shall be resolved through conciliation in terms of the BHEL Conciliation Scheme 2018 as per 'CONCILIATION' Clause.</p> <p><b>CONCILIATION:</b></p> <p>Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the "Dispute") shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure as per BHEL Conciliation Scheme 2018. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in - "Procedure for conduct of conciliation proceedings" (as available in <a href="http://www.bhel.com">www.bhel.com</a>).</p> <p><b>ARBITRATION:</b></p> <p>Except as provided elsewhere in this Contract, in case Parties are unable to reach amicable settlement (whether by Conciliation to be conducted as provided herein above or otherwise) in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or, in any manner touching upon the Contract (hereinafter referred to as the 'Dispute'), then, either Party may, refer the disputes to Arbitral Institution and such dispute to be adjudicated by Sole Arbitrator appointed in accordance with the Rules of said Arbitral Institution.</p> <p>A party willing to commence arbitration proceeding shall invoke Arbitration Clause by giving notice to the other party in terms of section 21 of the Arbitration &amp; Conciliation Act, 1996 (hereinafter referred to as the 'Notice') before referring the matter to arbitral institution. The Notice shall be addressed to the Head of the Region, Power Sector/ Unit, BHEL, executing the Contract and shall contain the particulars of all claims to be referred to arbitration with sufficient detail and shall also indicate the monetary amount of such claim including interest, if any.</p> <p>After expiry of 30 days from the date of receipt of aforesaid notice, the party invoking the Arbitration shall submit that dispute to the Arbitral Institutions (shall be identified by the contract issuing agency) and that dispute shall be adjudicated in accordance with their respective Arbitration Rules. The matter shall be adjudicated by a Sole Arbitrator who shall necessarily be a Retd Judge having considerable experience in commercial matters to be appointed/nominated by the respective institution. The cost/expenses pertaining to the said Arbitration shall also be governed in accordance with the Rules of the respective Arbitral Institution. The decision of the party invoking the Arbitration for reference of dispute to a specific Arbitral institution for adjudication of that dispute shall be final</p>	

		<p>and binding on both the parties and shall not be subject to any change thereafter. The institution once selected at the time of invocation of dispute shall remain unchanged.</p> <p>The fee and expenses shall be borne by the parties as per the Arbitral Institutional rules.</p> <p>The Arbitration proceedings shall be in English language and the seat and venue of Arbitration shall be at the court(s) of Haridwar.</p> <p>Subject to the above, the provisions of Arbitration &amp; Conciliation Act 1996 and any amendment thereof shall be applicable. All matters relating to this Contract and arising out of invocation of Arbitration clause are subject to the exclusive jurisdiction of the Court(s) situated at Haridwar, shall have exclusive jurisdiction.</p> <p>Notwithstanding any reference to the Designated Engineer or Conciliation or Arbitration herein, a. the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree. Settlement of Dispute clause cannot be invoked by the Contractor, if the Contract has been mutually closed or 'No Demand Certificate' has been furnished by the Contractor or any Settlement Agreement has been signed between the Employer and the Contractor.</p> <p>It is agreed that Mechanism of resolution of disputes through arbitration shall be available only in the cases where the value of the dispute is less than Rs. 10 Crores.</p> <p>In case the disputed amount Claim, Counter claim including interest is Rs. 10 crores and above, the parties shall be within their rights to take recourse to remedies other than Arbitration, as may be available to them under the applicable laws after prior intimation to the other party. Subject to the aforesaid conditions, provisions of the Arbitration and Conciliation Act, 1996 and any statutory modifications or re-enactment thereof as amended from time to time, shall apply to the arbitration proceedings under this clause.</p> <p>In case, multiple arbitrations are invoked (whether sub-judice or arbitral award passed) by any party to under this contract, then the cumulative value of claims (including interest claimed or awarded) in all such arbitrations shall be taken in account while arriving at the total claim in dispute for the subject contract for the purpose of clause mentioned above. Disputes having cumulative value of less than 10 crores shall be resolved through arbitration and any additional dispute shall be adjudicated by the court of competent jurisdiction.</p>													
27.	<b>Action against Bidders / vendor / supplier / contractor in case of default:</b>	<p>In order to protect the commercial interests of BHEL, BHEL shall take action against supplies / contractors by way of suspension of business dealings, who either fail to perform or are in default without any reasonable cause, cause loss of business/ money/ reputation, indulge in malpractices, cheating, bribery, fraud or any other misconduct or formation of cartels so as to influence the bidding process or influence the price etc.</p> <p>Suspension of Business Dealings could be in the form of "Hold" or "Banning" a supplier/ contractor or a bidder and shall be as per "Guidelines for Suspension of Business Dealings with Suppliers/ Contractors" available at BHEL's website "<a href="https://www.bhel.com/guidelines-suspension-business-dealings-supplierscontractors">https://www.bhel.com/guidelines-suspension-business-dealings-supplierscontractors</a>"</p>													
28.	<b>MICRO AND SMALL ENTERPRISES (MSE):</b>	<p>Any Bidder falling under MSE category shall furnish the following details &amp; submit documentary evidence/ Govt. Certificate etc. in support of the same along with their techno-commercial offer.</p> <table border="1"> <thead> <tr> <th>Type under MSE</th><th>SC/ST owned</th><th>Women owned</th><th>Others (excluding SC/ ST &amp; Women Owned)</th></tr> </thead> <tbody> <tr> <td>Micro</td><td></td><td></td><td></td></tr> <tr> <td>Small</td><td></td><td></td><td></td></tr> </tbody> </table> <p><b>Note:</b> If the bidder does not furnish the above, offer shall be processed construing that the bidder is not falling under MSE category.</p> <p>a) MSE suppliers can avail the intended benefits in respect of the procurements related to the Goods and Services only (Definition of Goods and Services as enumerated by Govt. of India vide Office Memorandum F. No. 21(8)/2011-MA dtd. 09/11/2016 office of AS &amp; DC, MSME) only if they submit along with the offer, attested copies of either Udyam Registration. Date to be reckoned for determining the deemed validity will be the last date of Technical Bid submission. Non-submission of supporting document in GeM portal will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for this enquiry if the above required documents are not uploaded at the time of bid submission. Documents submitted by the bidder shall be verified by BHEL for rendering the applicable benefits.</p>	Type under MSE	SC/ST owned	Women owned	Others (excluding SC/ ST & Women Owned)	Micro				Small				
Type under MSE	SC/ST owned	Women owned	Others (excluding SC/ ST & Women Owned)												
Micro															
Small															
29.	<b>JURISDICTION:</b>	<p>This contract shall be governed by the Law for the time being in force in the Republic of India. Subject to clause(s) mentioned above of this contract, the Civil Court having original Civil Jurisdiction at Haridwar shall alone have exclusive jurisdiction in regard to all matters in respect of the Contract.</p>													
30.	<b>Force Majeure</b>	<p>"Force Majeure" shall mean circumstance which is: a) beyond control of either of the parties to contract, b) either of the parties could not reasonably have provided against the event before entering into the contract, c) having arisen, either of the parties could not reasonably have avoided or overcome, and d) is not substantially attributable to either of the parties And Prevents the</p>													

		<p>performance of the contract, Such circumstances include but shall not be limited to: i) War, hostilities , invasion, act of foreign enemies. ii) Rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war. iii) Riot, commotion or disorder by persons other than the contractor's personnel and other employees of the contractor and sub-contractors. iv) Strike or lockout not solely involving the contractor's personnel and other employees of the contractor and sub-contractors. v) Encountering munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the contractor's use of such munitions, explosives, radiation or radio- activity. vi) Natural catastrophes such as earthquake, tsunami, volcanic activity, hurricane or typhoon, flood, fire, cyclones etc. vii) Epidemic, pandemic etc.</p> <p>The following events are explicitly excluded from Force Majeure and are solely the responsibilities of the non-performing party: a) any strike, work-to-rule action, goslow or similar labour difficulty (b) late delivery of equipment or material (unless caused by Force Majeure event) and (c) economic hardship.</p> <p>If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within 15 (fifteen) days after the occurrence of such event.</p> <p>The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended by a period of time equal to period of delay caused due to such Force Majeure event.</p> <p>Delay or non-performance by either party hereto caused by the occurrence of any event of Force Majeure shall not</p> <p>i) Constitute a default or breach of the Contract. ii) Give rise to any claim for damages or additional cost expense occasioned thereby, if and to the extent that such delay or non-performance is caused by the occurrence of an event of Force Majeure.</p> <p>BHEL at its discretion may consider short closure of contract after 1 year of imposition of Force Majeure in line with extant guidelines. In any case, Supplier/Vendor cannot consider deemed short-closure after 1 year of imposition of Force Majeure</p>	
31.	<b>Cartel Formation</b>	<p>The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.</p>	
32.	<b>Order of Precedence:</b>	<p>In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:</p> <ol style="list-style-type: none"> <li>Amendments/Clarifications/Corrigenda/Errata etc. issued in respect of the tender documents by BHEL.</li> <li>Buyer Added Bid Specific ATC</li> <li>GeM Bid Technical Conditions of Contract (TCC)</li> <li>GeM GTC</li> </ol>	
33.	<b>Conflict of interest:</b>	<p>The bidder notes that a conflict of interest would said to have occurred in the tender process and execution of the resultant contract, in case of any of the following situations:</p> <ol style="list-style-type: none"> <li>If its personnel have a close personal, financial, or business relationship with any personnel of BHEL who are directly or indirectly related to the procurement or execution process of the contract, which can affect the decision of BHEL directly or indirectly;</li> <li>The bidder (or his allied firm) provided services for the need assessment/ procurement planning of the Tender process in which it is participating;</li> <li>Procurement of goods directly from the manufacturers/suppliers shall be preferred. However, if the OEM/Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. In case bids are received from both the manufacturer/ supplier and the agent, bid received from the agent shall be ignored. However, this shall not debar more than one Authorized distributor (with/ or without the OEM) from quoting equipment manufactured by an Original Equipment Manufacturer (OEM) in procurements under a Proprietary Article Certificate.</li> <li>A bidder participates in more than one bid in this tender process. Participation in any capacity by a Bidder (including the participation of a Bidder as a partner/ JV member or sub-contractor in another bid or vice-versa) in more than one bid shall result in the disqualification of all bids in which he is a party. However, this does not limit the participation of an entity as a sub-contractor in more than one bid if he is not bidding independently in his own name or as a member of a JV.</li> </ol>	


		<p>The Bidder declares that they have read and understood the above aspects, and the bidder confirms that such conflict of interest does not exist and undertakes that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s), in this regard. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or nonsubmission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.</p> <p>In case, the Bidder is found having indulged in above activities, the same will be considered as a violation of the tender conditions, and suitable action shall be taken by BHEL as per extant policies/guidelines.</p>	
34.	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 earlier</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> <p>Supplier shall be responsible for free replacement of defective equipment / material at our site</p> <p>Please note that offers with guarantee period lesser than above mentioned guarantee period may result in rejection of the offer.</p>	
35.	Order Acceptance:	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.	
36.	Beneficiary of PO	Kindly confirm on whom the PO will be placed in the event of ordering.	
37.	Dispatch documents	<p>Following dispatch documents to be provided immediately after directly dispatch to BHEL Project site for billing purpose:</p> <ul style="list-style-type: none"> <li>• Guarantee/Warranty Certificates</li> <li>• E- Invoice and commercial invoice</li> <li>• GeM invoice</li> <li>• Original consignee copies of GR/LR/RR (Material shall be dispatched on door delivery basis without consignee copy)</li> <li>• Packing list</li> <li>• Original GST compliance certificate</li> <li>• E-way bill</li> <li>• MRC/POD/Receipted LR/RR/GR copy (as per proof of delivery of material at BHEL Project site)</li> </ul>	
38.	IP Address	The bids received from same IP address shall be outrightly rejected and shall not be considered for further evaluation.	
39.	Additional Conditions for Assessment	BHEL also reserves the right to have on-site assessment of the facilities at supplier's works during the bid evaluation.	
40.	O&M Manuals	<p><b>Kindly confirm that in the event of ordering,</b></p> <p>7 Sets hard copies (Paper based) and 2 Set (in CD ROM) of O &amp; M manual shall be furnished containing all drawings and datasheet, catalogues of all instruments and instructions for storage, erection &amp; commissioning, operation and maintenance after approval. Please submit same to BHEL Haridwar after despatch of material.</p> <p><b>Kindly confirm that in the event of ordering,</b></p> <p>02 Sets of O&amp;M Manuals would be kept inside the dispatch box of Oil Purification Unit &amp; the same shall also be mentioned in your Shipping/Packing List.</p>	
41.	Quality Requirement	<p>VENDOR TO SUBMIT QUALITY PLAN FOR BHEL &amp; CUSTOMER APPROVAL. QP OF THE SUCCESSFUL VENDOR SHALL BE FORWARDED TO CUSTOMER FOR THEIR APPROVAL.</p> <p>JOINT INSPECTION SHALL BE DONE BY BHEL NOMINATED INSPECTION AGENCY QUEST AND CUSTOMER AS PER CUSTOMER APPROVED QP.</p> <p>FOR SPARES: INSPECTION SHALL BE DONE AS MAIN CUSTOMER APPROVED QP. FOR ITEM NOT APPEARING IN CUSTOMER APPROVED QP, TC/COC SHALL BE SUBMITTED.</p> <p>VENDOR TO FOLLOW CUSTOMER APPROVED QP WITHOUT ANY PRICE IMPLICATION.</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>	
	Bidder Contact details	Please provide Contact details of your representative for techno-commercial clarifications: Mobile no. & Email id (minimum 2 person)	

**SPECIAL NOTE FOR BIDDERS:**

- a. In the event of our customer order covering this tender being cancelled /placed on hold /otherwise modified, BHEL would be constrained to accordingly cancel / hold / modify the tender at any stage of execution.
- b. BHEL may negotiate the L1 rate, if not meeting our budget / estimated cost. BHEL may re-float the tender opened, if L1 price is not acceptable to BHEL even after negotiation.
- c. Any change in applicable rates of Tax or any other statutory levies (Direct / Indirect) or any new introduction of any levy by means of statute and its corresponding liability for the deliveries beyond the agreed delivery date for reasons not attributable to BHEL will be to vendors account. BHEL will not reimburse the same and any subsequent claim in this respect will be summarily rejected.
- d. BHEL reserves its right to reject an offer due to unsatisfactory past performance by the respective Vendor in the execution of any contract to any BHEL project / Unit.
- e. The offers of the bidders who are under suspension and also the offers of the bidders, who engage the services of the banned firms /principal/agents, shall be rejected. The list of banned firms is available on BHEL web site [www.bhel.com](http://www.bhel.com).
- f. Recovery / deduction as applicable as per Direct and Indirect taxes as notified by Govt. Of India from time to time will be made and information/certificate for such deduction/recoveries shall be provided by BHEL to the vendor.
- g. If the delivery of supply as detailed above gets delayed beyond the delivery period, the Supplier/Vendor shall request for a delivery extension and BHEL at its discretion may extend the Contract. However, if any 'Delivery extension' is granted to the Supplier/Vendor for completion of supply, due to backlog attributable to the Supplier/Vendor, then it shall be without prejudice to the rights of BHEL to impose LD for the delays attributable to the Supplier/Vendor.
- h. In case BHEL increase the quantity during currency of the contract in line with quantity variation clause of GeM bid, delivery extension on pro-rata basis shall be given for supply of these additional quantity.

Following documents are an integral part of this Tender Enquiry and endorsed copies of these documents (duly signed and stamped on each page, as a token of acceptance) are to be submitted/uploaded along with offer on GeM portal against this bid.

1. Please submit replica of Price schedule (without prices) showing "quoted" in place of price along with techno-commercial bid (Part-I).
2. Please submit signed & Stamped copy (each page) of duly filled of confirmation column of "Buyers Specific Additional Terms & Conditions (ATC)" and its clause wise supporting documents where required.
3. Please submit signed & stamped copy (each page) for qualifying PQR with proper filled information and related supporting documents as mentioned in PQR.
4. Please submit certificate of Minimum local content as specified in the Make In India Certificate of the tender

	PRE-QUALIFICATION REQUIREMENT(PQR) OF OIL PURIFICATION SYSTEM (OPS)		DOCUMENT NO.	
	BHARAT HEAVY ELECTRICALS LIMITED, HARIDWAR		TL-BOI-OPS-PQR-046	
			Date of issue:	05.03.2025
			Rev. no.	00

### Description

The oil purification system (OPS) is complete skid of purifier in which separator is main component used for removing particle impurities and moisture contents from turbine lube oil system. It is centrifuge type with manual cleaning system. The control panel is DCS/PLC based type.

The OPS should be very reliable and proven in design. The OPS inlet and outlet connection are connected to main lube oil tank. The OPS should be designed for achieving purities of oil in a single pass. It should work both as purifier and clarifier.

### Scope of the document:

This document states the pre-qualification requirements (PQR) of Oil purification system (OPS). Vendors desirous of supplying the OPS equipment to BHEL are advised to read this document carefully and furnish required documentation.

### Mandatory requirement for Pre-Qualification

#### 1.0 Experience Requirement –

- Vendor/ its principle should have successfully designed, manufactured, tested & supplied Oil purification system (OPS) for turbine oil applications. Vendor should have supplied at least one (1) no. of OPS in one power plant in last seven (7) years (from the date of issuance of enquiry) satisfying the criteria mentioned in table-1

Table-1

Sl. no.	Product features	Details
1.	Type of Separator	Centrifuge type
2.	Oil grade	Lube oil (ISO VG-46) or equivalent higher grade
3.	Flow Capacity (single machine)	4000LPH or higher
4.	Particle Purity Level	Equal to or better than class -/15/12 as per ISO 4406 at the outlet of OPS
5.	Moisture content	Equal to or less than 500 ppm at the outlet of OPS
6.	Control Panel type	DCS/PLC based

- In case the vendor is a non-manufacturer/trader, valid authorization certificate from principal to be submitted for our reference


#### 2.0 Submission of documents conforming to Clause no. 1 along with offer

Vendor shall furnish the following documents for minimum one oil purification system:

- Vendor to furnish copy of Un-Priced Purchase Orders executed for supply of at least one no. of OPS in one project in last seven (7) years (from the date of issuance of enquiry).

Worked by	ANIL KUMAR/DM-STE(TL) <i>Anil Kumar</i>	S.K. GAUTAM/DM -CIE
Checked	---	DEEPAK GOEL/SM-CIE
Approved	ANUJ JAIN/SDGM-STE(TL) <i>Anuj Jain</i>	SURESH CHANDRA/SDGM-CIE <i>Suresh Chandra</i>
	STE-TL	CIE
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	PRE-QUALIFICATION REQUIREMENT(PQR) OF OIL PURIFICATION SYSTEM (OPS)		DOCUMENT NO.	
	BHARAT HEAVY ELECTRICALS LIMITED, HARIDWAR		TL-BOI-OPS-PQR-046	
			Date of issue:	05.03.2025
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- b) Vendor to furnish the performance test certificate of particle size of impurities and moisture contents for lube oil satisfying in clause-1.0.
- c) Against supply at sl. no 1.0 above, controls for supplied OPS shall have been realised in a DCS/PLC based control panel. PLC shall be kept in a JB along with associated control gear on skid. Vendor to submit control panel scheme for information.
- d) Vendor to provide make/ model/ data sheet of centrifuge motor for information.
- e) Vendor to furnish P&ID, GA drg. and data sheet of OPS.
- f) Vendor to furnish dispatch docs of OPS i.e. tax invoice/ inspection report /Lorry way bill for our information.

**TABLE-2: To be submitted filled by Vendor along with offer**

Sl. no.	Description	Acceptance Criteria	Vendors response for Project Vendor to Tick applicable box.	Does Vendor meet PQR (Vendor to tick Yes or No)
1	Project name and project rating			
2	Purchase Order No. and PO Date			
3	Whether design, manufacturing, testing, supply was done by Vendor/its principle.	Yes	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
4	Whether Type of purifier is centrifuge	Yes	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
5	Whether oil grade is Lube oil (ISO VG-46) or equivalent higher grade	Yes	Oil Grade = ..... (Vendor to fill)	Yes <input type="checkbox"/> No <input type="checkbox"/>
6	Whether flow capacity of OPS >= 4000LPH	Yes	Flow capacity = .....LPH (Vendor to fill)	Yes <input type="checkbox"/> No <input type="checkbox"/>
7	Whether particle purity of oil as per sl. no. 4 of table-1	Yes	particle purity = ..... (Vendor to fill)	Yes <input type="checkbox"/> No <input type="checkbox"/>
8	Whether moisture purity of oil as per sl. no. 5 of table-1	Yes	moisture purity = ..... (Vendor to fill)	Yes <input type="checkbox"/> No <input type="checkbox"/>
9	Whether Control Panel type is DCS/PLC based	Yes	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
10	Contact details, Telephone no's & Email id of End user		Vendor to fill	

Note: -

- a) BHEL reserves the right to verify the information submitted by Vendor. BHEL may visit the factory premises of the Vendor for verification and other purposes submission of false/ incorrect information shall lead to rejection of offer.
- b) BHEL reserves the right to ask for more pertinent information /documents / clarifications.
- c) Vendor shall provide this information to BHEL in a timely manner so that project schedule does not hamper.

Worked by	ANIL KUMAR/DM-STE(TL) <i>Anil Kumar</i>	S.K. GAUTAM/DM -CIE <i>S.K. Gautam</i>
Checked	---	DEEPAK GOEL/SM-CIE <i>Deepak Goel</i>
Approved	ANUJ JAIN/SDGM-STE(TL) <i>Anuj Jain</i>	SURESH CHANDRA/SDGM-CIE <i>Suresh Chandra</i>
	STE-TL	CIE



**MANUAL CLEANING TYPE OIL PURIFIER (DCS BASED)****ADDITIONAL SPECIFICATION FOR ST39013 (Rev.no. -08):**

Requirements mentioned in this addendum shall supersede the corresponding requirements/clause of spec ST39013.

1. Capacity (By single machine) of oil purification system (OPS) shall be **7500 LPH**.
2. Heater rating shall be 90 kW.
3. Vendor has to conduct performance test for particle size of impurities and moisture contents for lube oil (ISO VG-46) as per sl. no. 5(a) of Spec- ST39013 carried out from CMTI lab/NABL accredited on one oil purification system of project.
4. Clause 5 a (ii) at page no.: 10 of Spec-ST39013 read as: - Moisture contents at the outlet of OPS shall be maximum 500 ppm from inlet of greater than or equal to 15000 ppm
5. Piping, valve body & its internal and all other component of oil purification system coming in contact with oil shall be of stainless-steel construction.
6. The material for the rotating parts of the centrifuge shall be high grade stainless steel AISI 316 or equivalent.
7. The oil purification system (OPS) is complete skid of purifier in which centrifuge type separator is main component used for removing particle impurities and moisture contents from turbine lube oil system. Only following make separator are acceptable to BHEL: -

Sl. No.	Item Name	Make of Separator
1	Centrifuge type Separator	<ol style="list-style-type: none"><li>Alfa Laval</li><li>GEA Westfallia</li><li>Alternate make separator is acceptable provided OPS in which it is used meets the particle &amp; moisture criteria mentioned in sl. no.3&amp; 4 above of this doc. and flow 7500LPH. Vendor to furnish customer approved type test report of such OPS for any earlier executed project. In case, vendor fails to furnish customer approved type test report doc. Vendor's offer shall not be considered.</li></ol>

8. Var. nos. 7,8,10 &11 of Table A of clause no 3.17 at sheet no. 06 of 40 of specification ST 39013 shall not be applicable.
9. Clause 20 A (14) & 20 A (16) at page no.36 & 37 of Spec-ST39013 shall be ignored.
10. 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.

**MANUAL CLEANING TYPE OIL PURIFIER (DCS BASED)**

11. 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.
12. The sizes of inlet and outlet pipe connections of oil purification system 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.
13. Supervision by vendor during erection & commissioning at site shall be required.
14. List of recommended spares and commissioning spares along with price breakup of individual spares are required.
15. 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.
16. Clause 5(b) at page no.: 10 and Clause 20 A (9) at page no.: 36 of Spec-ST39013 read as  $\beta_5 \geq 1000$  in place of  $\beta_3 = 1000$  or better.
17. Clause 3.6 at page no.: 4 of Spec-ST39013 read as: -The OPS preferably shall be completely vapor tight to prevent fumes & vapor tight to prevent fumes & vapors from entering.
18. Clause 7.5(2c) at page no.: 12 of Spec-ST39013 read as: -Ignore the clause and consider vibration of machine in use is max vibration 9.0 mm/s.
19. Clause 8.1(f) at page no.: 13 of Spec-ST39013 read as: -Characteristic curve of all pumps preferably required.
20. Clause 8.1(i) at page no.: 4 of Spec-ST39013 read as: -Documents preferably required with offer-cross sectional drawings of all equipment including horizontal & vertical section of the separator.
21. Clause 8.3(b) at page no.:14 read as nine (9) sets paper based in place of twenty (20) sets of O&M Manual.
22. Refer sheet no 10 of specification ST 39013, clause no 4.2.g- alternatively vendor to ensure that separator cover is locked before starting the purifier.
23. Clause j (i) at page no.: 12 of Spec-ST39013 read as – Degree of protection test as per IS: 2147 (type test) and HV test at 2.0 KV for one minute
24. For supply of VAF meter 3 phase 3 wire supply is preferred.
25. Refer sheet no 08 of 40 of specification ST 39013, clause no 4.1.u – cable glands suitable for 3 wire 400 mm<sup>2</sup> incoming cable shall be provided.
26. Refer Sheet no 8 of 40 of clause no 4.1.y., and sheet no 38 of 40 point no 2 of specification ST 39013 may be read as wherever possible Plug and socket type connection should be provided for pressure and level switch.

**MANUAL CLEANING TYPE OIL PURIFIER (DCS BASED)**

27. Refer sheet no 09 of 40 of specification ST 39013, clause no 4.2 – Switching of control unit shall be possible from DCS.
28. Refer sheet no 12 of 40 of specification ST 39013, clause no 7.h- Alternatively manufacturers test certificate shall be provided for BHEL review.
29. Refer sheet no 12 of 40 of specification ST 39013, clause no k.i – may be ignored.
30. Refer sheet no 12 of 40 of specification ST 39013, clause no k.ii – Pick up and drop-down test may be ignored. Alternatively, voltage variation range for all major items shall be indicated with items details in data sheet.
31. Refer sheet no 30 of 40 of specification ST 39013, clause no 16.1.8- starting current: This clause should be read as starting current shall be as per IEC 60034-12 or equivalent.
32. Refer sheet no 33 of 40 of specification ST 39013, clause no 17.1.g should be read as the pressure gauge should have micrometer adjustable facility on front or any other suitable place.
33. Refer sheet no 33 of 40 of specification ST 39013, clause no 17.1.i -This clause may be ignored.
34. Refer sheet no 30 of 40 of specification ST 39013, clause no 16.1.3-ambient temp may be read as 50 degree centigrade instead of 500.
35. Refer sheet no 31 of 40 of specification ST 39013, clause no 3.2 – should be read as motor should essentially have manual or online greasing facility.
36. Refer sheet no 33 of 40 of specification ST 39013, clause no 17.3- process connection of magnetic level switch shall be as per BHEL specification or vendors standard practice.
37. Motor starting current shall be for Direct Online (DOL) shall be as per IS: 12615 -2011/IEC 60034.
38. For DCS based manual cleaning type oil purification system ON/OFF control, indication and alarm functions shall be provided on the LCP as well as on HMI system DCS.
39. Clause 4.1.e at page no.: 7 of Spec-ST39013 Requirement of flame proof motor as per IS2148 is not essential.
40. Clause 4.1.w at page no.: 8 of Spec-ST39013: - should be read as: polishing filter, chock alarm shall be provided through DPS.
41. MOTOR EFFICIENCY: - Continuous duty LT motors upto 50 KW Output rating (at 50 deg.C ambient temperature), shall be super Premium Efficiency class-IE4, 50-200 KW shall be of Premium Efficiency class- IE3, conforming to Is 12615 or IEC:60034-30.
42. Spec. no. ST39013 Clause no. 17 (Page no. 33 of 40) Sl. No. 2: Temperature Indicator  
Type – Inert gas type instead of Bi-Metallic to be provided.

**MANUAL CLEANING TYPE OIL PURIFIER (DCS BASED)**

43. Degree of Protection of motor shall be – IP 55 as per IEC60034-05

44. Paint Shade of Motor shall be: RAL 5012

45. Painting requirement of electrical equipment is as below: -

The thickness of finish coat shall be minimum 50 microns (minimum total DFT shall be 100 microns). However, in case electrostatic process of painting is offered for any electrical equipment, minimum paint thickness of 50 microns shall be acceptable for finish coat. In case procedure is not indicated, Epoxy based paint with suitable additives shall be used.

46. Painting requirement of Panel is as below: -

Two spray coats of inhibitive epoxy primer-surface shall be applied to all exterior and interior surfaces. A minimum of 2 spray coats of final finish color shall be applied to all surfaces. The final finished thickness of paint film on steel shall not be less than 65-75 micron for sheet thickness of 2 mm and 50 microns for sheet thickness of 1.6 mm. As an alternative, single coat of anodic dip coat primer along with single textured powder coating with epoxy polyester meeting the thickness requirement is also acceptable.

47. Paint Shade of Panel:

The finish colors for exterior and interior surfaces shall conform to following shades: Front & Rear- RAL 9002;

End panel side – RAL 5012.

Internal color shall be same as external color.

48. Triple redundancy is required wherever protection is envisaged and dual redundancy is required where control is envisaged

49. End-user's specification of Motor is attached for reference (Annexure-III A, page no. 5-8). Vendor to follow the same in addition of BHEL specification. Any conflict between end-user's specification and BHEL specification, end-user's specification will prevail.

50. End-user's specification of Instruments is attached for reference (Annexure-IV A, page no. 9-12). Vendor to follow the same (whichever is applicable) in addition of BHEL specification. Any conflict between end-user's specification and BHEL specification, end-user's specification will prevail.

-Sd-

Sunil Kumar /Dy. Mgr.

(CIE)

-Sd-

Anil Kumar/Dy. Mgr.

(STE-TL)

	<b>MOTORS</b>																				
<b>1.00.00</b>	<b>GENERAL REQUIREMENTS</b>																				
1.01.00	<p>This chapter has to be read in conjunction with sub-section B-0 "General electrical specification" of Technical specification Section- VI, Part-B and Sub-Section-II B Electrical system/Equipment of Technical Specifications Section-VI, Part-A"</p> <p>Degree of Protection</p> <p>Degree of protection for various enclosures as per IEC60034-05 shall be as follows :-</p> <table><tr><td>i)</td><td>Indoor motors</td><td>-</td><td>IP 55</td></tr><tr><td>ii)</td><td>Outdoor motors</td><td>-</td><td>IP 55 (Additional Canopy to be provided)</td></tr><tr><td>iii)</td><td>Cable box-indoor area</td><td>-</td><td>IP 55</td></tr><tr><td>iv)</td><td>Cable box-Outdoor area</td><td>-</td><td>IP 55</td></tr></table>	i)	Indoor motors	-	IP 55	ii)	Outdoor motors	-	IP 55 (Additional Canopy to be provided)	iii)	Cable box-indoor area	-	IP 55	iv)	Cable box-Outdoor area	-	IP 55				
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iv)	Cable box-Outdoor area	-	IP 55																		
<b>2.00.00</b>	<b>CODES AND STANDARDS</b>																				
	<table><tr><td>1)</td><td>Three phase induction motors</td><td>:</td><td>IS15999/IEC:60034</td></tr><tr><td>2)</td><td>Single phase AC motors</td><td>:</td><td>IS 996/ IEC:60034</td></tr><tr><td>3)</td><td>Crane duty motors</td><td>:</td><td>IS:3177, IS/IEC:60034</td></tr><tr><td>4)</td><td>DC motors/generators</td><td>:</td><td>IS:4722, IS/IEC:60034</td></tr><tr><td>5)</td><td>Energy Efficient motors</td><td>:</td><td>IS 12615, IEC:60034-30</td></tr></table>	1)	Three phase induction motors	:	IS15999/IEC:60034	2)	Single phase AC motors	:	IS 996/ IEC:60034	3)	Crane duty motors	:	IS:3177, IS/IEC:60034	4)	DC motors/generators	:	IS:4722, IS/IEC:60034	5)	Energy Efficient motors	:	IS 12615, IEC:60034-30
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2)	Single phase AC motors	:	IS 996/ IEC:60034																		
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4)	DC motors/generators	:	IS:4722, IS/IEC:60034																		
5)	Energy Efficient motors	:	IS 12615, IEC:60034-30																		
<b>3.00.00</b>	<b>TYPE</b>																				
3.01.00	<b>AC Motors:</b>																				
<div>&lt;50KW IE4</div>	<p>a) Squirrel cage induction motor suitable for direct-on-line starting.</p> <p>b) Continuous duty LT motors upto 50 KW Output rating (at 50 deg.C ambient temperature), shall be <b>super Premium Efficiency class-IE4, 50-200 KW shall be of Premium Efficiency class – IE3</b>, conforming to IS 12615, or IEC:60034-30. HT motors shall have minimum design efficiency of 95 %. However, tolerance on this efficiency value shall be applicable as per IEC 60034</p> <p>c) Motor operating through variable frequency drives shall be suitable for inverter duty with VPI insulation. Also these motors shall comply the requirements stipulated in IEC: 60034-18-41 and IEC: 60034-18-42 as applicable.</p>																				
	<b>DC Motors</b>																				
	<b>Shunt wound.</b>																				
3.02.00																					
<b>4.00.00</b>	<b>RATING</b>																				
	<p>(a) Continuously rated (S1). However, crane motors shall be rated for S4 duty, 40% cyclic duration factor.</p> <p>(b) Whenever the basis for motor or driven equipment ratings are not specified in the corresponding mechanical specification sub-sections, maximum continuous motor ratings shall be at least 10% above the maximum load demand of the driven equipment under entire operating range including voltage and frequency variations.</p>																				
<b>5.00.00</b>	<b>TEMPERATURE RISE</b>																				
	<b>Air cooled motors (AC &amp; DC)</b>																				
	70 deg. C by resistance method for both thermal class 130(B) & 155(F) insulation.																				
	<b>Water cooled</b>																				
	80 deg. C over inlet cooling water temperature mentioned elsewhere, by resistance method for both thermal class 130(B) & 155(F) insulation.																				
<b>6.00.00</b>	<b>OPERATIONAL REQUIREMENTS</b>																				

**Starting Time**

- 6.01.01 For motors with starting time upto 20 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 secs. more than starting time.
- 6.01.02 For motors with starting time more than 20 secs. and upto 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 secs. more than starting time.
- 6.01.03 For motors with starting time more than 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the starting time.
- 6.01.04 Speed switches mounted on the motor shaft shall be provided in cases where above requirements are not met.

6.02.00 **Torque Requirements**

- 6.02.01 Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor rated torque.
- 6.02.02 Pull out torque at rated voltage shall not be less than 205% of rated torque. It shall be 275% for crane duty motors.

6.03.00 NOT USED

**7.00.00 DESIGN AND CONSTRUCTIONAL FEATURES**

- 7.01.00 Suitable single phase space heaters shall be provided on motors rated 30KW and above to maintain windings in dry condition when motor is standstill. Separate terminal box for space heaters & RTDs shall be provided. However for flame proof motors, space heater terminals inside the main terminal box may be acceptable.
- 7.02.00 All motors shall be either Totally enclosed fan cooled (TEFC) or totally enclosed tube ventilated (TETV) or Closed air circuit air cooled (CACW) type. However, motors rated 3000KW or above can be Closed air circuit water cooled (CACW). The method of movement of primary and secondary coolant shall be self-circulated by fan or pump directly mounted on the rotor of the main motor as per IEC 60034-6. However VFD driven motors can be offered with forced cooling type with machine mounted fan or pump driven by separate electric motor. Motors and EPB located in hazardous areas shall have flame proof enclosures conforming to IS:2148 as detailed below
- (a) Fuel oil area : Group – IIB
- (b) Hydrogen generation : Group - IIC or (Group-I, Div-II as per plant area NEC) or (Class-1, Group-B, Div-II as per NEMA /IEC60034)
- 7.03.00 Winding and Insulation
- (a) Type : Electrolytic grade Copper conductor, Non-hygroscopic, oil resistant, flame resistant Insulation.
- (b) Starting duty : Two hot starts in succession, with motor initially at normal running temperature. However , conveyor motors shall be suitable for 3 consecutive hot starts
- (c) 11kV, 6.6 KV & 3.3 kV AC motors : Thermal class 155 (F) insulation.  
The winding insulation process shall be total Vacuum Pressure Impregnated i.e resin poor method. The lightning Impulse & interturn insulation surge withstand level shall be as per IEC-60034 part-15.
- (d) 240VAC, 415V AC & 220V DC motors : Thermal Class ( F ) or better
- 7.04.00 Motors rated above 1000KW shall have insulated bearings/housing to prevent flow of shaft currents.
- 7.05.00 Motors with heat exchangers shall have dial type thermometer with adjustable alarm contacts to indicate inlet and outlet primary air temperature.
- 7.06.00 Noise level for all the motors shall be limited to 85 dB(A) except for BFP motor for which the maximum limit shall be 90dB(A). Vibration shall be limited within the limits prescribed in IS:12075 / IEC 60034-

7.07.00	<p>14 . Motors shall withstand vibrations produced by driven equipment. HT motor bearing housings shall have flat surfaces, in both X and Y directions, suitable for mounting 80mmX80mm vibration pads.</p> <p>In HT motors, at least four numbers simplex / two numbers duplex platinum resistance type temperature detectors shall be provided in each phase stator winding. Each bearing of HT motor shall be provided with 3 numbers duplex RTDs connected to three numbers dual input transmitters with display. However for air compressor, being high speed drive, each motor bearing shall be provided with minimum two numbers of duplex RTDs connected to two numbers dual input transmitters with display unit.</p>
7.08.00	Motor body shall have two earthing points on diagonally opposite sides.
7.09.00	11 KV motors shall be offered with Separable Insulated Connector (SIC) as per IEEE 386. The offered SIC terminations shall be provided with protective cover and trifurcating sleeves. SIC termination kit shall be suitable for fault level of 25 KA for 0.17 seconds.
7.10.00	3.3/6.6 KV motors shall be offered with dust tight phase segregated double walled (metallic as well as insulated barrier) Terminal box. Alternately Elastimold type Terminal box should also be accepted as per OEM standard proven practice. Contractor shall provide termination kit for the offered Terminal box. The offered Terminal Box shall be suitable for fault level of 250 MVA for 0.12 sec. Removable gland plates of thickness 3 mm (hot/cold rolled sheet steel) or 4 mm (non magnetic material for single core cables) shall be provided.
7.11.00	The spacing between gland plate & centre of bottom terminal stud shall be as per Table-I.
7.12.00	All motors shall be so designed that maximum inrush currents and locked rotor and pullout torque developed by them at extreme voltage and frequency variations do not endanger the motor and driven equipment.
7.13.00	The motors shall be suitable for bus transfer schemes provided on the 11kV, 6.6 KV, 3.3 kV /415V systems without any injurious effect on its life.
7.14.00	For motors rated 2000 KW & above, neutral current transformers of PS class shall be provided on each phase in a separate neutral terminal box.
7.15.00	NOT USED.
8.00.00	NOT USED.
10.00.00	<b>TYPE TEST</b>
10.01.00	<p><b>HT MOTORS</b></p> <p><b>LIST OF TYPE TESTS TO BE CONDUCTED</b></p> <p><b>The following type tests shall be conducted on each type and rating of HT motor</b></p> <ol style="list-style-type: none"> <li>No load saturation and loss curves upto approximately 115% of rated voltage</li> <li>Measurement of noise at no load.</li> <li>Momentary excess torque test (subject to test bed constraint).</li> <li>Full load test(subject to test bed constraint)</li> <li>Temperature rise test at rated conditions. During heat run test, bearing temp., winding temp.,coolant flow and its temp. shall also be measured. In case the temperature rise test is carried at load other than rated load, specific approval for the test method and procedure is required to be obtained. Wherever ETD's are provided, the temperature shall be measured by ETD's also for the record purpose.</li> </ol> <p><b>LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED</b></p> <p>The following type test reports shall be submitted for each type and rating of HT motor</p> <ol style="list-style-type: none"> <li>Degree of protection test for the enclosure followed by IR, HV and no load run test.</li> <li>Terminal box-fault level withstand test for each type of terminal box of HT motors only.</li> <li>Lightning Impulse withstand test on the sample coil shall be as per clause no. 4.3 IEC-60034, part-15</li> <li>Surge-withstand test on inter-turn insulation shall be as per clause no. 4.2 of IEC 60034, part-15</li> </ol>

10.02.00	<p><b>LT Motors</b></p> <p><b>LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED</b></p> <p><b>The following type test reports shall be submitted for each type and rating of LT motor of above 100 KW only</b></p> <ol style="list-style-type: none"> <li>1. Measurement of resistance of windings of stator and wound rotor.</li> <li>2. No load test at rated voltage to determine input current power and speed</li> <li>3. Open circuit voltage ratio of wound rotor motors ( in case of Slip ring motors)</li> <li>4. Full load test to determine efficiency power factor and slip</li> <li>5. Temperature rise test</li> <li>6. Momentary excess torque test.</li> <li>7. High voltage test</li> <li>8. Test for vibration severity of motor.</li> <li>9. Test for noise levels of motor(Shall be limited as per clause no 7.06.00 of this section)</li> <li>10. Test for degree of protection and</li> <li>11. Overspeed test.</li> <li>12. Type test reports for motors located in fuel oil area having flame proof enclosures as per IS 2148 / IEC 60079-1</li> </ol>																												
10.03.00	All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.																												
10.04.00	<p>The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and "No design Change". Minor changes if any shall be highlighted on the endorsement sheet.</p> <p style="text-align: center;"><b>TABLE - I</b></p> <p style="text-align: center;"><b>DIMENSIONS OF TERMINAL BOXES FOR LV MOTORS</b></p> <table> <tr> <th>Motor MCR in KW</th><th>Minimum distance between centre of bottom terminal stud and gland plate in mm As per manufacturer's practice.</th></tr> <tr> <td><b>UP to 3 KW</b></td><td></td></tr> <tr> <td>Above 3 KW - upto 7 KW</td><td>85</td></tr> <tr> <td>Above 7 KW - upto 13 KW</td><td>115</td></tr> <tr> <td>Above 13 KW - upto 24 KW</td><td>167</td></tr> <tr> <td>Above 24 KW - upto 37 KW</td><td>196</td></tr> <tr> <td>Above 37 KW - upto 55 KW</td><td>249</td></tr> <tr> <td>Above 55 KW - upto 90 KW</td><td>277</td></tr> <tr> <td>Above 90 KW - upto 125 KW</td><td>331</td></tr> <tr> <td>Above 125 KW-upto 200 KW</td><td>385/203 (For Single core cables only)</td></tr> </table> <p>For HT motors the distance between gland plate and the terminal studs shall not be less than 500 mm.</p> <p><b>PHASE TO PHASE/ PHASE TO EARTH AIR CLEARANCE:</b></p> <p>NOTE: Minimum inter-phase and phase-earth air clearances for LT motors with lugs installed shall be as follows:</p> <table> <tr> <th>Motor MCR in KW</th><th>Clearance</th></tr> <tr> <td>UP to 110 KW</td><td>10mm</td></tr> <tr> <td>Above 110 KW and upto 150 KW</td><td>12.5mm</td></tr> <tr> <td>Above 150 KW</td><td>19mm</td></tr> </table>	Motor MCR in KW	Minimum distance between centre of bottom terminal stud and gland plate in mm As per manufacturer's practice.	<b>UP to 3 KW</b>		Above 3 KW - upto 7 KW	85	Above 7 KW - upto 13 KW	115	Above 13 KW - upto 24 KW	167	Above 24 KW - upto 37 KW	196	Above 37 KW - upto 55 KW	249	Above 55 KW - upto 90 KW	277	Above 90 KW - upto 125 KW	331	Above 125 KW-upto 200 KW	385/203 (For Single core cables only)	Motor MCR in KW	Clearance	UP to 110 KW	10mm	Above 110 KW and upto 150 KW	12.5mm	Above 150 KW	19mm
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Above 110 KW and upto 150 KW	12.5mm																												
Above 150 KW	19mm																												



3.00.00	Temperature Elements and accessories		
3.01.00	Thermocouple		
	Sr. No.	Features	Essential/Minimum Requirements
	1	Type of Thermocouple.	: 16 AWG wire of Chromel-Alumel (Type K) or 24 AWG wire Pt-Rhodium Pt (Type R) depending on operating temperature Range (ungrounded separate junction type).
	2	No. of element	: Duplex
	3	Housing/Head	: IP-65/Diecast Aluminium. Head of TE to be provided with sufficient space and arrangement to mount head mounted temperature transmitter (as applicable). Plug in connectors are to be provided for external signal cable connection. TE terminal head shall be spring loaded for positive contacts with the thermo well.
	4	Insulation and Sheathing of Thermocouple	: Swaged type mineral (magnesium oxide) insulation and SS316 sheath.
	5	Calibration and accuracy	: As per IEC-584/ ANSI-MC-96.1 (special limits of errors/ class1) for T/C.
	6	Accessories	: Thermo well and associated fittings
	7	Standard	: IEC-584/ ANSI MC 96.1 for Thermocouple and ASME PTC-19.3 for Thermo-well
3.02.00	Resistance Temperature Detector ( RTD )		
	Sr. No.	Features	Essential/Minimum Requirements
	1	Type of RTD.	: Four wire, Pt-100 (100 Ohms resistance at zero degree Centigrade).
	2	No. of element	: Duplex
	3	Housing/Head	: IP-65/Diecast Aluminium. Head of TE to be provided with sufficient space and arrangement to mount head mounted temperature transmitter

		(as applicable). Plug in connectors are to be provided for external signal cable connection. TE terminal head shall be spring loaded for positive contacts with the thermo well
	4	Insulation and sheathing of RTD : Mineral (magnesium oxide) insulation and SS316 sheath,
	5	Calibration and accuracy : As per IEC-751/ DIN-43760 Class-A for RTD
	6	Accessories : Thermo well and associated fittings
	7	Standard : IEC-751/ DIN-43760 for RTD and ASME PTC-19.3 for Thermo-well.
	<b>NOTES :</b>	
	1)	The specifications for RTDs of winding/ bearings of motor/pump, can be as per their manufacturer standards. The manufacturer shall submit the adequate supporting documents for establishing their standard practice. However the type of RTD shall be Pt100.
	2)	The specifications of temp elements for air conditioning & ventilation system / process can be as per system manufacturer's standards. The manufacturer shall submit the adequate supporting documents for establishing their standard practice.
<b>3.03.00</b>	<b>Metal Temperature Thermocouples</b>	
	Measuring Medium	Metal Temperature
	Material of Thermocouple.	Chromel Alumel Type K
	Type of Thermocouple	Duplex with ungrounded separate hot junctions
	Insulation	Mineral Insulation (Magnesium Oxide).
	Thermocouple wire gauge	16 AWG
	Protective sheath	SS 321
	Protective sheath dia	4 mm OD (minimum)
	Calibration & accuracy	As per IEC-584/ ANSI-MC-96.1 (special limits of error) for T/C
	Mounting accessories	1/2" BSP SS sliding end connector, weld pad, clamps of heat resistant steel SS310. Adjustable gland fitting for connection at the junction box end as per manufacturer's standard.
	Cold end sealing	SS pot seal with colour coded PTFE Insulated flexible tails. Sealing compound- Epoxy resin. Length of PTFE insulated

	<p>flying leads shall be minimum 750 mm.</p>
	<p>Minimum bending radius                      30 mm</p>
	<p>Length of T/C                              On as required basis considering location of measurement point and the JB/TTJB location.</p>
	<p><b>Notes :</b></p>
	<p>1)      The specification for thermocouples of bearings metal temp measurements can be as per their manufacturer standards. The manufacturer shall submit the adequate supporting documents for establishing their standard practice. However type of thermocouples shall be K-type.</p>
	<p>2)      For boiler metal temperature applications, considering the location of installations and response time, manufacturer's standard and proven specification for metal temperature measurement can also be accepted subject to employer's approval. The manufacturer shall submit adequate supporting documents for establishing their standard and proven practice.</p>
<b>3.04.00</b>	<p><b>Thermo well</b> (for all process temp. elements)</p>
	<p>(a)      Shall be one piece solid bored type of 316 SS of step-less tapered design. (As per ASME PTC 19.3, 1974)</p>
	<p>(b)      For Mill classifier outlet long life solid sintered tungsten carbide material of high abrasion resistance shall be provided.</p>
	<p>(c)      For Air &amp; Flue gas 316 SS protecting tube with welded cap. (However contractor shall provide better material for Flue gas service if required based on the specified boiler design parameters).</p>
	<p>(d)      For furnace zone, impervious ceramic protecting tube of suitable material along with Incoloy supporting tubes and adjustable flanges.</p>

15.00.00

**PROCESS ACTUATED SWITCHES**

FEATURES	ESSENTIAL / MINIMUM REQUIREMENTS		
	Pressure/ Draft Switches/ DP Switches	Temperature switches	Level switches
Sensing Element	Piston actuated for high pressure and diaphragm or bellows for low pr./ vacuum	Vapor pressure sensing, liquid filled bellow type with SS bulb and capillary (5 m minimum, to suit application)	Capacitance types, float type, conductivity type, RF type, Ultrasonic type as per suitability to the application. .
Material	316 SS	Bulb 316 SS/ capillary 304 SS	316 SS
End connection	½ inch NPT (F)	½ inch NPT (F)	Manufacturer standard
Over range/ proof pressure	150% of maximum operating pr.	-	150% of maximum operating pr.
Repeatability	+/- 0.5% of full range		
No. of contacts	2 No.+2NC. SPDT snap action dry contact		
Rating of contacts	60 V DC, 6 VA (or more if required by DDCMIS)		
Elect. Connection	Plug in socket.		
Set point adjustment	Provided over full range.		

# Annexure-IVA to ST39013

Dead band adjustment	Adjustable/ fixed as per requirement of application.		
Enclosure	Weather and dust proof as per IP-55, metallic housing.		
Accessories	Siphon, snubber, chemical seal, pulsation dampeners as required by process	Thermo well of 316 SS and packing glands	All mounting accessories
Mounting	Suitable for enclosure/ rack mounting or direct mounting	Suitable for rack mounting or direct mounting	-
Power Supply (wherever required)	As per Contractor's Standard practice.		
<p>Notes :-</p> <p>1) Where the process fluids are corrosive, viscous, solid bearing or slurry type, diaphragm seals shall be provided. Parts below the diaphragm shall be removable for cleaning. The entire volume above the diaphragm shall be completely filled with an inert liquid suitable for the application.</p> <p>2) Pressure/ Diff pressure switches for very low press/ DP measurements can have sensor material other than SS316 in case of any technical limitation and the offered product is standard product of the manufacture for very low pressure applications.</p> <p>3) Repeatability can be upto +/-1% of full range in case of switches with diaphragm seals or very low pressure/DP range.</p> <p>4) The specifications of switches for air conditioning &amp; ventilation system / process can be as per system manufacturer's standards. The manufacturer shall submit the adequate supporting documents for establishing their standard practice.</p> <p>5) For ESP Level Switches following requirements are to be met:</p> <p>i) ESP Level Switches calibration shall not be affected by changes in ambient temperature.</p> <p>ii) Active build up compensation to be provided to sense and auto correct the effect of ash deposition on level probe.</p> <p>iii) Self- -diagnostic features like health status, maintenance requirement, instrument failure, false alarm etc. to be provided.</p> <p>The manufacturer shall submit adequate supporting documents, catalogues for establishing the above features.</p> <p>6) Vibration Rod type switches to be provided for first two fields of ESP.</p>			

## **Check list for C&I items- OPU (DCS Based)**

**Indent No.:**

**Project Name:**

<b>S.No.</b>	<b>Description</b>	<b>Check</b>
1.	OPU is DCS Based with provision of operating from local controls panel as well as control room	Yes / No
2.	Plug and socket type connection for all pressure switch and level switch	Yes / No
3.	DCS/Local selector switch is provided on the Local control panel	Yes / No
4.	Relays shall be of 24 v dc and of vendor scope of supply	Yes / No
5.	List of drives to be operated through DCS is furnished along with list of instruments and alarms	Yes / No
6.	All field instruments shall be wired to a JB which shall be in vendor scope	Yes / No
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	Yes / No
8.	Arrangement for Liquid seal breakage alarm is provided	Yes / No
9.	Air requirement Of pneumatic valves is mentioned	Yes / No
10.	Motor efficiency meeting as per special instruction/project requirement	Yes / No
11.	Control panel is designed for 3 phase (415 v Ac) 3 wire power supply system	Yes / No
12.	Control panel is provided with anti-vibration pads to withstand vibrations	Yes / No
13.	Motor data sheet shall be subject to customer/ BHEL approval	Yes / No
14.	Cable glands for 415 V AC incomer is provided	Yes / No
15.	On/Off control, indication and alarms is provided in local panel as well as HMI	Yes / No
16.	Painting treatment as per addendum or special instruction mentioned in indent	Yes / No
17.	Construction of panel as per specification/addendum	Yes / No
18.	Price break of spare item/spare of LS switchgear given along with offer	Yes / No
19.	20% spare terminals have been provided at panel	Yes / No
20.	All instrument as well as motor data sheet, wiring diagram write up is subject to BHEL/customer approval	Yes / No
21.	Panel to be designed for 110 V AC control voltage	Yes / No
22.	Panel color as per specification/addendum	Yes / No
23.	LT motors shall be energy efficient type with efficiency class-4	Yes / No

Date:

Signature

Place:

Seal of manufacturer

**CHECK LIST FOR MECHANICAL ITEMS OF OIL PURIFICATION SYSTEM (OPS)**

Ignore check list at annexure-VII(A) at sheet no. 36 & 37 of 40 of spec. ST39013 and refer this check list: -

Sl. No.	Technical Requirements	Vendor's confirmation (Yes/No)	Remarks (if any)
1.	Is capacity of oil purification system (OPS) (i.e. <b>7500 LPH</b> ) and heater rating 90 Kw as per BHEL specifications		
2.	For lube oil (ISO VG-46) at 65 deg. C or at lower temp, purity of oil of oil purifier as following: - a) Is particle content equal to or better than class 15/12 as per ISO 4406 at the outlet of OPS from inlet of class 21/18 or inferior in single pass? b) Is moisture content equal to or less than 500 ppm at the outlet of OPS from inlet of greater than or equal to 15000 ppm in single pass?		
3.	Is the test certificate for particle size of impurities & moisture content provided as per BHEL specifications?		
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. <b>at least 10% higher</b> than capacity of the purifier) as per BHEL specifications?		
8.	a) Are copies of O&M manual (2 nos. CD based & 9 nos. hard paper based) provided as per BHEL specifications? 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 ( <b>β5= 1000 or better</b> ) 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.	Is pipe size (NB 50) of inlet and outlet of Oil purification system?		
13.	Are sufficient spares for satisfactory commissioning and for 3 years satisfactory operation of the purifier provided as per BHEL specifications?		
14.	Are detailed lists of recommended spares and commissioning spares along with price break up provided as per BHEL specifications & enquiry?		
15.	Is particle size impurities test and moisture test as detailed out in sl.no.5(a) of Spec- ST39013 technical specification to be carried out on one oil purification system of project? Procedure of test shall be as per annexure-X of this doc.		
16.	Is the painting scheme as per BHEL specifications/enquiry?		
17.	Are piping, valve body & its internal and all other component of oil purification system coming in contact with oil shall be in stainless steel construction?		

**CHECK LIST FOR MECHANICAL ITEMS OF OIL PURIFICATION SYSTEM (OPS)**

18.	<b>Deviations taken (Please specify clearly, if any):</b>  a) b) c)		

**Notes:** Vendors are supposed to fill relevant columns with Yes/ No/ Value offered.

**Date:**  
**&**  
**Place:**

**Signature**

**Seal of manufacturer**



## **ANNEXURE-X**

### **Procedure and Set-Up of oil purity test for Centrifuge type purifier:**

- a)** Assemble the centrifuge bowl in purifier mode and set up the module as per the schematic flow diagram.
- b)** Start the feed and set the purifier for desired capacity and temperature to maintain during test i.e. desired flow (As per data sheet) and 65 deg C. Check the calibration certificate of all the equipment used in test.
- c)** Start the module and wait till it reaches full speed. The module is started initially in recirculation mode (fresh oil is circulated back to dirty oil tank).
- d)** Add particulate matter (contamination) in dirty oil tank to achieve contamination level of 21/18 as per ISO 4406 by ensuring proper mixing of the particulate matter (contamination).
- e)** Now the module is ready for the Type test. Run the centrifuge.
- f)** The oil flow (capacity) is checked using measuring flask/flow meter. In case of measuring flask desired capacity is measured by collecting the oil in a jar of 5 ltrs. And time taken to fill this jar. At least three readings are taken to adjust the capacity. The capacity is adjusted by flow adjusting inlet valve.
- g)** Collect samples from centrifuge inlet sampling point after one minute of mixing dirt and collect sample at outlet after two minute of mixing dirt.
- h)** In case of purifier where polishing filter is also applicable in such cases first sample will be collected by bypassing the filter and then by passing through polishing filter sample will be collected at the outlet of the polishing filter.
- i)** The samples should be checked for its contamination using CMTI instruments which are made available at the type test venue. All the sample readings are recorded as per the Log Sheet.
- j)** Multiple samples will be collected. Stop the centrifuge after collection of Sample.

## ANNEXURE-X

### Procedure and Set-Up of oil purity test for Centrifuge type purifier:

#### ACCEPTANCE CRITERIA

- Removal of 15,000ppm water down to 500 ppm water or less in one pass.
- Removal of particulate at Code 21/18 on the inlet to Code 15/12 as per ISO 4406 or less on the outlet in one pass

#### Log Sheet

Sl.NO.	Oil Temp. (deg C)	Flow (L/Min)	Solids (ISO 4406)	Water (L/Min)	No. of Sample	Time elapsed since FAT Starts



## **BHARAT HEAVY ELECTRICALS LIMITED**

HEEP-HARIDWAR, UTTARAKHAND (249403)

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

**For Indian Bidders (Version Jun-2025, Rev: 08)**

### **Annexure-3**

#### **Declaration for treatment of cases regarding conflict of interest**

The bidder notes that a conflict of interest would said to have occurred in the tender process and execution of the resultant contract, in case of any of the following situations:

- a) If its personnel have a close personal, financial, or business relationship with any personnel of BHEL who are directly or indirectly related to the procurement or execution process of the contract, which can affect the decision of BHEL directly or indirectly;
- b) The bidder (or his allied firm) provided services for the need assessment/ procurement planning of the Tender process in which it is participating;
- c) Procurement of goods directly from the manufacturers/suppliers shall be preferred. However, if the OEM/Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. In case bids are received from both the manufacturer/ supplier and the agent, bid received from the agent shall be ignored. However, this shall not debar more than one Authorized distributor (with/ or without the OEM) from quoting equipment manufactured by an Original Equipment Manufacturer (OEM) in procurements under a Proprietary Article Certificate.
- d) A bidder participates in more than one bid in this tender process. Participation in any capacity by a Bidder (including the participation of a Bidder as a partner/ JV member or sub-contractor in another bid or vice-versa) in more than one bid shall result in the disqualification of all bids in which he is a party. However, this does not limit the participation of an entity as a sub-contractor in more than one bid if he is not bidding independently in his own name or as a member of a JV.

The Bidder declares that they have read and understood the above aspects, and the bidder confirms that such conflict of interest does not exist and undertakes that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s), in this regard. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

**In case, the Bidder is found having indulged in above activities, the same will be considered as a violation of the tender conditions, and suitable action shall be taken by BHEL as per extant policies/ guidelines.**

(Signature of the authorized signatory of the bidder)

DECLARATION REGARDING MINIMUM LOCAL CONTENT IN LINE WITH  
REVISED PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), ORDER 2017- REVISION  
DATED 19<sup>TH</sup> JULY, 2024 AND SUBSEQUENT ORDER(S)

(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)

-----

To,  
(Write Name & Address of Officer of BHEL inviting the Tender)  
Dear Sir,

Sub: Declaration reg. minimum local content in line with Public Procurement (Preference to Make in India), Order 2017-Revision, dated 19<sup>th</sup> July, 2024 and subsequent order(s).

Ref: 1) Tender Enquiry No: .....

2) All other pertinent issues till date

We hereby certify that the items offered by (specify the name of the organization here) has a local content of \_\_\_\_\_ % and this meets the local content requirement for **'Class-I local supplier' / 'Class II local supplier'** \*\* as defined in Public Procurement (Preference to Make in India), Order 2017Revision dated 19.07.2024 issued by DPIIT and subsequent order(s).

The details of the location(s) at which the local value addition is made are as follows:

1. \_\_\_\_\_ 2. \_\_\_\_\_

3. \_\_\_\_\_ 4. \_\_\_\_\_

...


Thanking you,  
Yours faithfully,


(Signature, Date & Seal of Authorized Signatory of the Bidder)


\*\* - Strike out whichever is not applicable.



Note:

1. Bidders to note that above format, duly filled & signed by authorized signatory, shall be submitted along with the techno-commercial offer.
2. In case the bidder's quoted value is in excess of Rs. 10 crores, the authorized signatory for this declaration shall necessarily be the statutory auditor or cost auditor of the company (in the case of companies) or a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies).
3. In the event of false declaration, actions as per the above order and as per BHEL Guidelines shall be initiated against the bidder.


दिनांक एवं हस्ताक्षर SIGN & DATE				उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>		ST39013																																																							
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सामग्री सूची संख्या INVENTORY NO P-5538		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16

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दिनांक एवं हस्ताक्षर SIGN & DATE	SUPERSEDES INVENTORY NO	<b>1 INTENT OF SPECIFICATION</b>  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.  <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.		
सामग्री सूची संख्या को अधिकृतित करना है	COPYRIGHT AND CONFIDENTIAL 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	<b>2 SCOPE OF SUPPLY</b>  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>		
दिनांक एवं हस्ताक्षर SIGN & DATE	स्वत्वधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हीवी एलेक्ट्रिकल लिमिटेड की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह उपयोग जो कि कंपनी के हित में हानिकारक हो न किया जाए।	Rev. no. 08		
सामग्री सूची संख्या INVENTORY NO P-55398	निर्माणकर्ता WORKED BY: Anil / Kavita	जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	18.03.16	18.03.16

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COPYRIGHT AND CONFIDENTIAL 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.	<p>l. All relevant controls, interlocks and instrumentation.</p> <p>m. Foundation plates, anchor bolts, sleeves, inserts etc. required for installation of the complete system on foundation.</p> <p>n. Necessary lugs and eye bolts of all equipments for lifting the complete system during erection and maintenance.</p> <p>o. A set of required special tools and tackles for erection &amp; commissioning and operation &amp; maintenance of the system.</p> <p>2.2 <b>Spare Parts:</b> - 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.</p> <p><b>3 GENERAL TECHNICAL REQUIREMENTS</b></p> <p>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.</p> <p>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.</p> <p>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%.</p> <p>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.</p> <p>3.5 All valves and instruments should be readily accessible to facilitate maintenance and operation.</p> <p>3.6 The OPS should be completely vapour tight to prevent fumes and vapours from entering.</p> <p>3.7 The equipment shall be suitable for continuous operation round the clock.</p> <p>3.8 On load automatic cleaning of bowl assembly is preferable.</p>			
	स्वत्व अधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत हेवी एलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप में किसी भी तरह का उपयोग, जो कि कंपनी के हित में हानिकारक हो, न किया जाए।			
दिनांक एवं हस्ताक्षर SIGN & DATE 	सामग्री सूची संख्या INVENTORY NO P-5538	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita	18.03.16
		जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	18.03.16	18.03.16

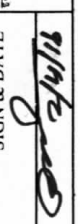


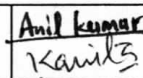
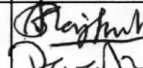
निम्न एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>	ST39013	
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सामग्री सूची संख्या INVENTORY NO.	3.9 The OPS shall be equipped with sight glasses both for the purified oil and the separated water from the collecting pan.  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.  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.  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.  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.  3.14 Pressure at the outlet of oil purification system shall be 1.5 to 2.0 bar (gauge).  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.  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.  3.17 Different variants for combination of Flow capacity of Oil Purification System, Control Panel Type and Heater Rating are given below in <b>Table- A.</b>			
सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16


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SUPERSEDES INVENTORY NO.  सामग्री सूची संख्या को प्रतिस्थापित करता है	<b>TABLE- A</b>																																																			
	<table border="1"> <thead> <tr> <th>Var. No.</th> <th>Flow capacity of purification system (Litre Per Hour)</th> <th>Control Panel Type</th> <th>Heater Rating ( kW)</th> </tr> </thead> <tbody> <tr><td>1.</td><td>7500</td><td>DCS</td><td>90 kW</td></tr> <tr><td>2.</td><td>6000</td><td>DCS</td><td>72 kW</td></tr> <tr><td>3.</td><td>2 x 4500</td><td>DCS</td><td>120 kW</td></tr> <tr><td>4.</td><td>7500</td><td>Relay</td><td>90 kW</td></tr> <tr><td>5.</td><td>6000</td><td>Relay</td><td>72 kW</td></tr> <tr><td>6.</td><td>2 x 4500</td><td>Relay</td><td>120 kW</td></tr> <tr><td>7.</td><td>7500</td><td>DCS</td><td>55 kW</td></tr> <tr><td>8.</td><td>6000</td><td>DCS</td><td>45 kW</td></tr> <tr><td>9.</td><td>2 x 4500</td><td>DCS</td><td>80 kW</td></tr> <tr><td>10.</td><td>7500</td><td>Relay</td><td>55 kW</td></tr> <tr><td>11.</td><td>6000</td><td>Relay</td><td>45 kW</td></tr> <tr><td>12.</td><td>2 x 4500</td><td>Relay</td><td>80 kW</td></tr> </tbody> </table>	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
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COPYRIGHT AND CONFIDENTIAL 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 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>


स्वत्वधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी एलेक्ट्रिकल लिमिटेड की संपत्ति है इसका प्रयुक्त एवं अप्रयुक्त रूप में किसी भी तरह से प्रयोग, जो कि स्वयंसेवी के हित में हानिकारक हो न किया जाए।	<p>(a) Separator shall be provided with interlocks to prevent the operation of the unit unless the feed pump &amp; the discharge pump are operating.</p> <p>(b) A system of annunciating the flooding of the separator due to loss of water seal shall be provided.</p> <p>(c) All instruments i.e. pressure gauges, RTDs etc. should be reliable &amp; 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. <math>\pm 1\%</math>.</p> <p>(d) Auxiliary electric supply available at site comprises of 415V, 3<math>\phi</math>, 3 wires, 50 Hz (<math>\pm 10\%</math> V, <math>\pm 5\%</math> frequency, <math>\pm 10\%</math> combined). If supplier requires any other supply for his devices, instruments and drives etc. he shall arrange \ to convert 415V, 3<math>\phi</math> 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.</p>
	दिनांक एवं हस्ताक्षर SIGN & DATE 


सामग्री सूची संख्या INVENTORY NO. P-5398	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita		18.03.16
		जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh		18.03.16


विनाक एवं हस्ताक्षर SIGN & DATE  सामग्री सूची संख्या INVENTORY NO.		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>	ST39013	
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SUPERSEDES INVENTORY NO.  सामग्री सूची संख्या को अधिकृतित करना है	<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>			
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स्वामित्व अधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती भारतीभारत लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल में किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।				
विनाक एवं हस्ताक्षर SIGN & DATE  सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
सामग्री सूची संख्या INVENTORY NO.	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16	18.03.16


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SUPERSEDES INVENTORY NO. सामग्री सूची संख्या को अधिकारित करता है	(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.			
	(p) Local Panel (LCP) construction: Type: Fabricated from cold rolled sheet steel Frame thickness: 2.0 mm Enclosure thickness: 1.6 mm Gland plate thickness: 3.0 mm			
COPYRIGHT AND CONFIDENTIAL 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	(q) ON/OFF control, indication, and alarm functions shall be provided on the LCP as well as on HMI system (DCS).			
	(r) Adequately sized copper ground bus shall be provided for each panel.			
स्वामित्व अधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स लिमिटेड की संपत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में होतिकाइक हो न किया जाय।	(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.			
दिनांक एवं हस्ताक्षर SIGN & DATE	(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.			
सामग्री सूची संख्या INVENTORY NO. 2538	(w) Polishing filter (if applicable), chock alarm shall be provided through DPS.			
	(x) All instruments/ Devices shall have IP55 degree of protection.			
Rev. no. 08		निर्माणकर्ता WORKED BY: Anil / Kavita		
		जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh		
		18.03.16		



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COPYRIGHT AND CONFIDENTIAL 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	<p>(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.</p> <p>(cc) Interconnection diagram shall be provided along with offer.</p> <p>(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.</p> <p>(ee) Instruments/ equipments used in parallel system of 2x4500LPH system shall be of same make &amp; type for both the purifiers in a single project.</p> <p><b>4.2 For DCS control panel, additional requirements</b></p> <p>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.</p> <p>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.</p> <p><b>Control Philosophy</b></p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(e) Alarms shall be generated in DCS and output shall be given for driving the alarm windows in LCP.</p> <p>(f) Control of individual heaters stages shall be from DCS for maintaining required oil temp using 2 nos. duplex RTDs.</p>			
	स्वत्व अधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है इसका प्रयोग एवं अनावरण केवल उसी की राईट के बिना और कि सम्पत्ति के हित में ही किया जाये।			
दिनांक एवं हस्ताक्षर SIGN & DATE सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
सामग्री सूची संख्या INVENTORY NO.	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16	18.03.16


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SUPERSIDES INVENTORY NO. सामग्री सूची संख्या को अधिकृतित करना है	(g) Limit switch or any other alternate arrangement with BHEL approval shall be provided for separator cover for remote monitoring when operating in DCS. (h) Flow switch shall be provided at centrifuge inlet. (i) List of drives to be operated from DCS, list of instruments and list of alarms shall be furnished along with the offer. (j) Air requirement for 3-way valve shall be furnished with the offer. (k) Functional testing of system shall be done with local control panel and by simulating DCS outputs.				
	<b>5 PERFORMANCE REQUIREMENTS</b> a. The quality of purified oil at outlet of OPS at 65°C shall be as follows. (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. (ii) Moisture contents at the outlet of OPS shall be maximum 300 to 500 ppm from inlet of maximum 15000 ppm. 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. 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. 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.				
COPYRIGHT AND CONFIDENTIAL 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.	<b>6 GUARANTEES</b> 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.				
	निष्कर्ष एवं हस्ताक्षर SIGN & DATE				
सामग्री सूची संख्या INVENTORY NO. P-5538	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita	18.03.16
		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	Rajput Devesh	18.03.16

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सामग्री सूची संख्या को अधिकृतित करना है	SUPERSEDES INVENTORY NO.	6.2 The purification level as indicated in clause 5.2 shall be guaranteed by the supplier.  6.3 The supplier shall guarantee the power consumption of the motor at normal duty point.  6.4 If during erection, commissioning and operation at site any deficiency in a part is detected with in guarantee period, BHEL site representative shall prepare the assessment report and a copy of the same shall be forwarded to the supplier. The supplier shall replace/ rectify the concerned items free of charge. The supplier if, he so desires may depute his representative at site at his own cost, otherwise the finding of BHEL/ Owner representative shall be final and binding on the supplier.  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.		
<b>7 QUALITY ASSURANCE, INSPECTION AND TESTING</b>				
7.1 The manufacture shall conduct all tests required to ensure all the component parts of the oil purification unit offered conform to the requirements of the specification & in compliance with requirements of applicable codes & standards.  7.2 The bidder shall submit along with his offer quality plan in the prescribed BHEL's format as per Annexure-VI.  7.3 The particulars of the proposed shop tests & procedures for the tests shall be submitted to the BHEL / owner for approval along with quality plan.  7.4 The equipments shall be dispatched only after inspection & clearance of material by BHEL/ Owner & approval of tests certificates by BHEL /Owner.  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.				
(1) <u>TESTING OF MATERIALS</u> : The material of each component that is bowl, bowl cover, disc, heater tubes, pump casing Shafts, gear/screw, valve body etc. shall be tested as per relevant specification for its composition & mechanical properties, viz. YS, UTS, impact strength, % elongation, % RA etc. suitable NDT on the above components to ensure freedom from surface & subsurface defects shall be carried out. (2) Following tests shall be carried out during various stages of manufacture at manufacture's works.				
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दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>	ST39013 पृष्ठ 40 का 12 Page   12 of 40	
सामग्री सूची संख्या INVENTORY NO.	सुपरसेडस INVENTORY NO.	<p>(a) Check for dimensions of all the component parts including surface finish, radial run out of shaft</p> <p>(b) <u>NDT</u>:- 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>		
COPYRIGHT AND CONFIDENTIAL 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	स्वतंत्रता एवं गोपनीयता इस दस्तावेज़ में दी गई सूचना भारत भारती गैरनिर्देशित निर्यात की सम्पत्ति है। इसका प्रयोग केवल उद्देश्य के लिए किया जा सकता है जो कि दस्तावेज़ के लिए है। इस दस्तावेज़ को न कپی न किया जाय।			
दिनांक एवं हस्ताक्षर SIGN & DATE	दिनांक एवं हस्ताक्षर SIGN & DATE			
सामग्री सूची संख्या INVENTORY NO.	Rev. no.	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil kumar Kavita
सामग्री सूची संख्या INVENTORY NO.	Rev. no.	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16





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सामग्री सूची संख्या INVENTORY NO.	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. j. Details of standards /codes used for designing of the various equipments and selecting the material of various components. k. Name of the manufacturer and illustrative literature all components which have been out-sourced for purchaser's review. l. All other relevant data and drawings which supplier considers necessary for better understanding of the system. m. Type test Reports for capacity, moisture content, particle size of impurities and motor efficiency conducted within last 5 years. n. Interconnecting diagram of DCS control panel (if required). 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. p. Also, Bidder to shall furnish the filled up check list of BHEL format as per annexure –VII.				
SUPERSEDES INVENTORY NO. सामग्री सूची संख्या को प्रतिस्थापित करना है	<b>8.2 DRAWINGS / DOCUMENTS REQUIRED WITHIN 30 DAYS AFTER PLACEMENT OF ORDER</b>				
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स्वत्वधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती भारतीभारत लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल से निर्यात की तरह प्रयोग जो कि कंपनी के हित में होना चाहिए।	<b>8.3 DRAWINGS/ DOCUMENTS REQUIRED ALONGWITH SUPPLY</b>				
चिह्नक एवं हस्ताक्षर SIGN & DATE	a. All relevant test certificates & full details of the tests carried out as per the requirement of this specification before dispatch. 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 &				
सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil kumar Kavita	18.03.16
सामग्री सूची संख्या INVENTORY NO.	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput / Devesh	18.03.16	18.03.16

SUPERSEDES  
INVENTORY NO.

सामग्री मूली संख्या को  
अधिकमिति करता है

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## स्वत्वाधिकार एवं गोपनीय

स प्रवेश में दी गई सूचना भारत हेवी एलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप में किसी भी तरह प्रयोग जो कि कंपनी के हित में हानिकारक हो न किया जाय।

दिनांक एवं हस्ताक्षर  
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INVENTORY

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.

- 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.

- 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.

## 9 MATERIALS OF CONSTRUCTION

- 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.

## 10 CODES AND STANDARDS

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).

## 11. CLEANING, PROTECTION AND PAINTING

Painting scheme shall be according to BHEL approved/ previously approved scheme. Painting scheme for oil purification system shall be as below.

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

Rev. no.  
08

निर्माणकर्ता  
WORKED BY

Anil / Kavita

Anil Kumar  
Kamitz



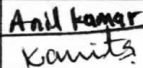
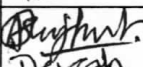
18.03.16

जाँचकर्ता


A. S. Rajput /  
Devesh


Blighm.  
Dewts

18.03.16

विनाक एवं हस्ताक्षर SIGN & DATE  सामग्री सूची संख्या INVENTORY NO.		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>	ST39013		
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SUPERSEDES INVENTORY NO.  सामग्री सूची संख्या को अधिकृतित करना है	Total Minimum DFT= 180 *DFT– Dry Film Thickness (Final) in micron.  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>				
<b>COPYRIGHT AND CONFIDENTIAL</b> 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.	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.				
	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.				
	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 & 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.				
	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.				
स्वत्वधिकार एवं गोपनीय इस प्रलेख में की गई प्रतिलिपि आरक्षित है। इस प्रलेख में किसी भी तरह का प्रकाश, जो कि कंपनी के हित में हो, सुरक्षित रहने के लिए किया जाये।	<b>12 DESIGN CO-ORDINATION MEETING</b>  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.				
विनाक एवं हस्ताक्षर SIGN & DATE 	<b>13 LIST OF CROSS-REFERRED STANDARDS</b>  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,				
सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita		18.03.16
सामग्री सूची संख्या INVENTORY NO.	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh		18.03.16	



<div style="display: flex; justify-content: space-between;"> <div> <p>निष्ठाक एवं हस्ताक्षर SIGN &amp; DATE</p> </div> <div>  </div> <div> <p>उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> (HEEP: HARIDWAR)</p> </div> <div> <p>ST39013</p> <p>पृष्ठ 40 का 17</p> <p>Page   17 of 40</p> </div> </div>	
<p>सुपरसेडिज INVENTORY NO</p> <p>सामग्री सूची संख्या को अधिकृतित करना है</p>	<p>13.7 IS: 5,</p> <p>13.8 IS: 4722,</p> <p>13.9 IS: 2253,</p> <p>13.10 IS: 2254,</p> <p>13.11 IS: 3202,</p> <p>13.12 IS: 4722-1992,</p> <p>13.13 ISO: 4406,</p> <p>13.14 IS: 12075,</p> <p>13.15 IS: 12615:2011,</p> <p>13.16 IS: 10816-2.</p>
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<p>स्वाधिकार एवं गोपनीय</p> <p>इस दस्तावेज में दी गई सूचना भारत हेवी इलेक्ट्रिकल लिमिटेड की संपत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग जो कि कंपनी के हित में हानिकारक हो न किया जाय।</p>	
<p>निष्ठाक एवं हस्ताक्षर SIGN &amp; DATE</p> <p><i>[Signature]</i> 23/4/18</p>	
<p>सामग्री सूची संख्या INVENTORY NO</p> <p>2558</p>	<p>Rev. no.</p> <p>08</p>
<p>निर्माणकर्ता WORKED BY:</p> <p>जाँचकर्ता CHECKED BY:</p>	<p>Anil / Kavita</p> <p>A. S. Rajput / Devesh</p>
<p><i>Anil kumar</i> Kamits</p> <p><i>[Signature]</i> Devesh</p>	<p>18.03.16</p> <p>18.03.16</p>

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SUPERSEDES INVENTORY NO.  मानवी सुची संख्या को अधिकृत करना है	<b>14 ANNEXURE-I (PROPERTIES OF TURBINE OIL)</b>			
<b>COPYRIGHT AND CONFIDENTIAL</b> 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.	<b>S. No.</b>	<b>Properties</b>	<b>Value</b>	<b>Test Method</b>
	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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		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	Rajput Devesh	18.03.16

SUPERSEDES  
INVENTORY NO.

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WORKED BY:

Anil / Kavita

Anil Kumar
Kamita


18.03.16

जाँचकर्ता  
CHECKED BY:

A. S. Rajput /  
Devesh

Blayhunk.  
Dusman

18.10.3.16

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SUPERSEDES INVENTORY NO	<b>15 ANNEXURE-II (DATA SHEET OF TURBINE OIL PURIFICATION SYSTEM)</b>																																																																											
सामग्री सूची संख्या को अधिकारित करना है	<b>1.0 NUMBER OF UNITS OFFERED:</b>																																																																											
COPYRIGHT AND CONFIDENTIAL 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	<b>2.0 SCOPE OF SUPPLY:</b>																																																																											
स्वत्वधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत भारती लिमिटेड की संपत्ति है इसका प्रयुक्त एवं प्रकाशक अन्य में किसी भी तरह प्रयोग को बिना इसकी कृपया से हानिकारक हो न किया जाए।	<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
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सामग्री सूची संख्या INVENTORY NO	Rev. no. 08		निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita	18.03.16
25578			जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput Devesh	18.03.16



ST39013 पृष्ठ 40 का 21 Page   21 of 40	उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>			निष्काप एवं हस्ताक्षर SIGN & DATE
SUPERSEDES INVENTORY NO. सामग्री सूची संख्या को अधिकृतित करता है	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			सामग्री सूची संख्या INVENTORY NO. P-5531
	4.0 CONSTRUCTION FEATURES OF CENTRIFUGE 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			स्वत्वधिकार एवं गोपनीय 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.
5.0 MATERIALS OF CONSTRUCTION OF CENTRIFUGE (INDICATE STANDARDS) 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	5.0 MATERIALS OF CONSTRUCTION OF CENTRIFUGE (INDICATE STANDARDS) 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			निष्काप एवं हस्ताक्षर SIGN & DATE
	Rev. no. 08 निर्माणकर्ता Anil / Kavita जाँचकर्ता A. S. Rajput / Devesh			18.03.16 18.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>		<b>ST39013</b> पृष्ठ 40 का 22 Page   22 of 40																																																																																		
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दिनांक एवं हस्ताक्षर SIGN & DATE	सामग्री सूची संख्या INVENTORY NO.	Rev. no.		निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil kumar Kavita	18.03.16																																																																															
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सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO.			
COPYRIGHT AND CONFIDENTIAL 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				
स्वामित्व अधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स लिमिटेड की संपत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप में किसी भी तरह का उपयोग जो कि कंपनी के हित में हो सके बिना किया जाय।				
चिह्नक एवं हस्ताक्षर SIGN & DATE				
सामग्री सूची संख्या INVENTORY NO.				
Rev. no. 08				
निर्माणकर्ता WORKED BY: Anil / Kavita				
जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh				
18.03.16				

7.1	Quantity	Nos.		
7.2	Type	Positive displacement ( Rotary i.e. Helical, Herring bone , spur gear or screw type)		
7.3	Capacity	Lit/hr.		
7.4	Speed	RPM		
7.5	Discharge pressure	Kg/cm2 (g)		
7.6	Relief valve setting	Kg/cm2 (g)		
7.7	Max. allowable pump working pressure	Kg/cm2 (g)		
7.8	Connections			
7.8.1	Inlet	mm		
7.8.2	outlet	mm		
7.9	Material			
7.9.1	Casing			
7.9.2	Shaft			
7.9.3	Shaft sleeves			
7.9.4	Gear/screw			
7.10	Drive (AC Motor)	As per enclosed annexure-3.		
7.11	Motor rating	KW		
7.12	Bearings :			
7.12.1	Nos.			
7.12.2	Type			
7.12.3	Manufacturer			
7.13	BHP at rated capacity			


  




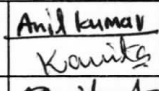
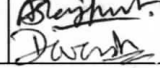
**8.0 Y-STRAINER**

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**



चिह्नक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>	<b>ST39013</b>  पृष्ठ 40 का 24  Page   24 of 40																																																																								
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SUPERSEDES INVENTORY NO.  सामग्री सूची संख्या को अधिकृतित करना है	14.2.20. Starting time with minimum permissible voltage a. Without driven equipment coupled b. With driven equipment coupled 14.2.21. Safe stall time with 100% and 110% of rated voltage a. From hot condition b. From cold condition 14.2.22. Torques : a. Starting torque at min. permissible voltage(kg-m) b. Pull up torque at rated voltage. c. Pull out torque d. Min accelerating torque (kg.m) available at lowest permissible 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 b. Winding Insulation Process c. Tropicalized (Yes/No) d. Temperature rise over specified maximum ambient temperature of 50 deg C e. Method of temperature measurement f. Stator winding connection 14.3.2. Main Terminal Box a. Type b. Location(viewed from NDE side) c. Entry of cables(bottom/side) d. Recommended cable size(To be matched with cable size) e. Fault level (MVA),Fault level duration(sec)				
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दिनांक एवं हस्ताक्षर SIGN & DATE 	सामग्री सूची संख्या INVENTORY NO. <b>11.5598</b>	Rev. no. <b>08</b>	निर्माणकर्ता WORKED BY: Anil / Kavita	जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	दिनांक DATE <b>18.03.16</b>





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

दिनांक एवं हस्ताक्षर  
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SUPERSEDES  
INVENTORY NO.

आमग्री सूची संख्या को अधिकमित करता है

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स्वत्वाधिकार एवं गोपनीय

इस प्रयोग में दी गई सूचना भारत हेवी एलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग जो कि कंपनी के हित में हानिकारक हो न किया जाय।

SIGN & DATE

सामग्री सूची संख्या  
INVENTORY

Rev. no. 08

निर्माणकर्ता  
WORKED BY:

Anil / Kavita

Anil Kumar
Kanits


18.03.16

जाँचकर्ता  
CHECKED BY:

A. S. Rajput /  
Devesh

Anglistik,  
Deutsch


18.03.16


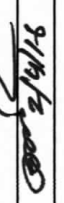
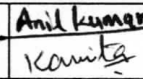
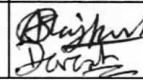
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	<p>1.0 A suitable motor conforming to the purification unit requirement shall be supplied. The motor shall also meet the following requirement broadly. The motor shall confirm to IS : 4722, IS : 325, IS : 2253, IS : 2254, IS : 4029, IS : 3202, IS12615:2011 &amp; IS : 2148 or equipment BS : Specification. The motor shall meet all Indian statutory requirements.</p> <table border="1"> <tr> <td>1.1</td> <td>Application</td> <td>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>2.0 <b>STARTING DATA</b></p> <table border="1"> <tr> <td>2.1</td> <td>Starting</td> <td>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.
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		जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	A. S. Rajput Devesh 18.03.16

चिह्नक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>	<b>ST39013</b>  पृष्ठ 40 का 31  Page   31 of 40																														
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3.1 The motor shall be rewindable 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.																																	
<b>4.0 DOCUMENTS TO BE SUPPLIED WITH DELIVERY WITH EACH UNIT. THESE SHALL BE SUPPLIED IN TWO COPIES &amp; WORKABLE SOFT COPY.</b>																																	
सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita 																														
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सामग्री सूची संख्या INVENTORY NO.	सुपरसेड्स INVENTORY NO.	4.1 <b>Characteristics:</b> (at 80%, 100% and 110% of rated voltage) 4.1.1 Starting current v/s time 4.1.2 Torque v/s slip 4.1.3 Thermal with stand for HOT and Cold condition. 4.2 Type and frame size 4.3 Starting time 4.3.1 With 100% voltage at terminal 4.3.2 With 85% voltage at terminal 4.3.3 With 80% voltage at terminal 4.4 Safe install time at 110% rated voltage under hot condition. 4.5 Power rating requirement w.r.t. pump requirement. 4.6 Motor GD <sup>2</sup> 4.7 Total wt. of motor. 4.8 Expected life of bearing (but not <30000 hrs.) 4.9 Type & size of cable for which gland is provided, in the terminal box. 4.10 Type & routine test certificate as per IS: 4722. 4.10.1 In addition to cl 4.10, the following tests shall also be carried out i) Degree of protection test as type test ii) 20% over speed test for 2 minutes as routine test. iii) Measurement of variation as routine test as per IS: 12075. 5.0 <b>TESTS AT MANUFACTURE'S WORKS OF MOTOR:</b> 5.1 Motor after complete assembly shall be subjected to both type and routine tests as per IS: 4722 5.2 Additional type test:- 5.2.1 Degree of protection test to conform to the specified degree of protection. 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). 5.3 Additional routine test: 5.3.1 20% over speed test for 2 minutes. 5.3.2 Measurement of vibrations per IS 12075. 6.0 <b>CROSS REFERRED STANDARDS:</b> IS:325 , IS:4722, IS:2253, IS:2254, IS:3202, IS:4029, IS:12065, IS:12075, IS:12615:2011		
सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
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सामग्री सूची संख्या INVENTORY NO.	<b>17 <u>ANEXURE-IV (SPECIFICATION OF INSTRUMENTS)</u></b>																		
सामग्री सूची संख्या को अधिकृतित करना है	<b>1) <u>PRESSURE GAUGE</u></b>																		
COPYRIGHT AND CONFIDENTIAL 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	The Pressure gauge should confirm to the following technical specification:- a) The sensing element shall be SS-316 bourden tube. b) The dial size shall be approx. 150 mm diameter. c) The casing shall be epoxy coated die-cast aluminium with threaded bezel ring. d) The movement shall be stainless steel rotary gear with nylon bearings. e) The process connection shall be G1/2" f) The over range protection should be 150% of max. range g) The pointer shall be micrometer adjustable with zero facility on front. h) The accuracy shall be 1% of full scale. i) The gauge is to be provided with pulsation dampeners.																		
स्वामित्व अधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती लिमिटेड का संपत्ति है इसका प्रयोग के बिना या किसी भी तरह प्रयोग को कि कंपनी के हित में हानिकारक हो न किया जाए।	<b>2) <u>TEMPERATURE INDICATOR</u></b>																		
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	<b>3) <u>MAGNETIC LEVEL SWITCH</u></b>																		
	Process Connection: - Nb25 Material: All parts coming in contact with the liquid made of stainless steel SS316 Electrical characteristics <u>Switch:</u> Single pole double throw change over switch silver contact for handling the following currents AC    250V – 5.0A DC    250V – 0.25A Operating characteristics Differential – 6 MM I. e. 3 MM on either side of centre line working pr & Temp. : As per design Ambient Temp. : 60°C max.																		
दिनांक एवं हस्ताक्षर SIGN & DATE	सामग्री सूची संख्या INVENTORY NO.	Rev. no.	निर्माणकर्ता WORKED BY:																
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सामग्री सूची संख्या INVENTORY NO <b>125338</b>	Rev. no. 08	<div> <div>निर्माणकर्ता WORKED BY:</div> <div>जाँचकर्ता CHECKED BY:</div> </div> <div> <div>Anil / Kavita</div> <div>A. S. Rajput / Devesh</div> </div> <div> <div><i>Anil Kumar</i></div> <div><i>Devesh</i></div> </div> <div> <div>18.03.16</div> <div>18.03.16</div> </div>
दिनांक एवं हस्ताक्षर SIGN & DATE <b>24/4/16</b>	COPYRIGHT AND CONFIDENTIAL 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.	
स्वामित्व अधिकार एवं गोपनीयता इस संकेत में से यह सूचना भारत भारती एलेक्ट्रिकल लिमिटेड की सम्पत्ति है। इसका प्रयोग एवं प्रसारण केवल केवल के निर्देशों के बिना नहीं किया जाये।	SUPERSEDES INVENTORY NO. 	ST39013 पृष्ठ 40 का 34 Page   34 of 40
दिनांक एवं हस्ताक्षर SIGN & DATE	ANNEXURE-V (P&ID) SHEET 1 OF 1	<p>       : DIFFERENTIAL PRESSURE GAUGE        : FLOW GLASS        : SOLENOID VALVE        : COMPOUND GAUGE        : PRESSURE GAUGE        : THERMOMETER        : THERMOSTAT FOR WATER        : THERMOSTAT FOR OIL        : STOP VALVE NORMALLY OPEN        : STOP VALVE NORMALLY CLOSED        : LEVEL SWITCH        : FLOW CONTROL VALVE        : PRESSURE SWITCH        : LEVEL GAUGE        : DIFFERENTIAL PRESSURE GAUGE     </p> <p>       DPS : DIFFERENTIAL PRESSURE GAUGE        FG : FLOW GLASS        S : SOLENOID VALVE        C : COMPOUND GAUGE        PI-P4 : PRESSURE GAUGE        TI-T3 : THERMOMETER        TS1 : THERMOSTAT FOR WATER        TS2 : THERMOSTAT FOR OIL        TS3 : STOP VALVE NORMALLY OPEN        L : STOP VALVE NORMALLY CLOSED        F : LEVEL SWITCH        PS : FLOW CONTROL VALVE        LG : PRESSURE SWITCH        DPG : DIFFERENTIAL PRESSURE GAUGE     </p> <p>       CONNECTIONS:-        1. INLET FOR UNTREATED OIL - 40NB FLANGED CONN.        2. OUTLET FOR TREATED OIL - 40NB FLANGED CONN.        3. HEATER RECIRCULATION - 40NB FLANGED CONN.        (APPLICABLE ONLY FOR CENTRAL OIL PURIFICATION SYSTEM)        4. WATER INLET TO HEATER - 20NB HOSE CONNECTION.        5. HEATER WATER DRAIN &amp; OVERFLOW - 20NB HOSE CONN.        6. HEATER OIL DRAIN - 20NB HOSE CONN.        TD1, TD2 - ANTIFLOOD TANK DRAIN - 20NB HOSE CONN.        S1, S2, S3 - SAMPLING CONN. - 15NB HOSE CONN.     </p> <p>       NOTES:-        1. FOR UNIT OIL PURIFIER KEEP V5 CLOSED &amp; OPEN VALVE V13.        2. FOR CENTRAL OIL PURIFIER KEEP V13 CLOSED &amp; OPEN VALVE V5.     </p>

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



दिनांक एवं हस्ताक्षर  
SIGN & DATE

SUPERSEDES  
INVENTORY NO.

मयी मूची संख्या को

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स्वत्वाधिकार एवं गोपनीय

इस प्रलेख में दी गई सूचना भारत हेवी एलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग जो कि कंपनी के हित में हानिकारक हो न किया जाय।

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SIGN & DATE

सामग्री सूची संख्या  
INVENTORY

Rev. no. 08

निर्माणकर्ता  
WORKED BY:

Anil / Kavita

Anil Kumar  
Kumar

18.03.16

जाँचकर्ता  
CHECKED BY:

A. S. Rajput /  
Devesh

Bright.  
Dark


18.03.16

Albany 18.03.16

## 19 ANNEXURE-VI (QUALITY PLAN)

[illegible]


		<p>LEGEND:</p> <p>'RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.</p> <p>M' MANUFACTURER / SUBCONTRACTOR B BHEL / NQMA INSPECTION AGENCY N' CUSTOMER</p> <p>INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION</p> <p>ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CIP' OF CUSTOMER</p>	FOR CUSTOMER USE	
MANUFACTURER/SUBCONTRACTOR			APPROVED BY	

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SUPERSEDES INVENTORY NO.  सामग्री सूची संख्या को अपडेट किया जाता है।	<b>20 ANNEXURE- VII (CHECK LIST)</b>  <b>A. CHECK LIST FOR MECHANICAL ITEMS</b>																																																											
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चिह्नक एवं हस्ताक्षर SIGN & DATE 18/03/16	सामग्री सूची संख्या INVENTORY NO. P-5538	Rev. no.	08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kumar	18.03.16
				जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput Devesh	18.03.16




विनाक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>	ST39013
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SUPERSEDES INVENTORY NO सामग्री सूची संख्या को अधिस्थानित करता है		moisture content on one oil purification system provided as per BHEL specifications/enquiry?		
	15.	Is the painting scheme as per BHEL specifications/enquiry?		
	16.	Are all piping of oil purification system shall be stainless steel?		
	17.	<b>Deviations taken (Please specify clearly, if any):</b>  a) b) c) d)		

**Notes:** Vendors shall fill relevant columns with Yes/ No/ Value offered.

Date:  
Place:

Signature &  
Seal of manufacturer

स्वत्वधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत की गतिविधियों की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह उपयोग जो कि कंपनी के हित में होना चाहिए न किया जाय।	विनाक एवं हस्ताक्षर SIGN & DATE 	सामग्री सूची संख्या INVENTORY NO 4558	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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दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>	ST39013	
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सामग्री सूची संख्या INVENTORY NO.	<b>B. CHECK LIST FOR C&amp;I ITEMS</b> <div style="text-align: center;"><u>Check list for OPU (DCS Based)</u></div> <ol style="list-style-type: none"> <li>OPU is DCS Based with provision of operating from local controls panel as well control room; yes/ no</li> <li>Plug and socket type connection for all pressure switch and level switch : yes/no</li> <li>DCS/Local selector switch is provided on the Local control panel: yes/no</li> <li>Relays shall be of 24 v dc and of vendor scope of supply: yes/no</li> <li>List of drives to be operated through DCS is furnished along with list of instruments and alarms.: yes/no</li> <li>All field instruments shall be wired to a JB which shall be in vendor scope.: yes/no</li> <li>A pressure switch at outlet of centrifuge and a level switch in anti-flood tank shall be provided for detection of liquid seal breakage.</li> <li>Arrangement for Liquid seal breakage alarm is provided : yes/no</li> <li>Air requirement of pneumatic valves is mentioned: yes/no</li> <li>Motor efficiency meeting as per special instruction/project requirement : yes ./no</li> <li>Control panel is designed for 3 phase (415 v Ac) 3 wire power supply system: yes/no</li> <li>Control panel is provided with anti-vibration pads to withstand vibrations: yes/no.</li> <li>Motor data sheet shall be subject to customer/ BHEL approval: yes/no</li> <li>Cable glands for 415 V AC incomer is provided : yes/no</li> <li>On/Off control, indication and alarms is provided in local panel as well as HMI: yes/no</li> <li>Painting treatment as per addendum or special instruction mentioned in indent: yes/no.</li> <li>Construction of panel as per specification/addendum: yes/no.</li> <li>Price break of spare item/spare of LS switchgear given along with offer: yes/no</li> <li>20% spare terminals have been provided at panel: yes/no.</li> </ol>			
सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
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विनाक एवं हस्ताक्षर SIGN & DATE		<div>सी एम डी एम</div> <div>BHEL</div>		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013 पृष्ठ 40 का 39 Page   39 of 40	
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सामग्री सूची संख्या INVENTORY NO		Rev. no.		निर्माणकर्ता WORKED BY:		Anil / Kavita	
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20. All instrument as well as motor data sheet, wiring diagram write up is subject to BHEL/customer approval: yes/no

21. panel to be designed for 110 V AC control voltage : yes/no

22. For panel color exterior -Opaline green semi glossy finish, interior-glossy white and motor-smoke grey yes/no

23. All HT & LT motors shall be energy efficient type with efficiency class 1: yes/no

Date:

Place:

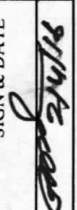
Signature

Seal of manufacturer

स्वाधिकार एवं गोपनीय

इस प्रवेश में की गई सूचना भारत हेवी इलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह उपयोग जो कि कंपनी के हित में हितकारक हो न किया जाय।

विनाक एवं हस्ताक्षर  
SIGN & DATE



सामग्री सूची संख्या  
INVENTORY NO

P-5538

निर्माणकर्ता  
WORKED BY:

जाँचकर्ता  
CHECKED BY:

Anil / Kavita


A. S. Rajput /  
Devesh

Anil kumar  
Kavita

Rajput  
Devesh

18.03.16

18.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) <b>PRODUCT PURCHASE SPECIFICATION</b> <b>(HEEP: HARIDWAR)</b>	ST39013	
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सामग्री सूची संख्या INVENTORY NO.	<p align="center"><b>Check list for OPU (Relay Based)</b></p> <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>			
दिनांक एवं हस्ताक्षर SIGN & DATE 18/03/16	Date: &Place:	Signature Seal of manufacturer		
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