

**APPLICABLE MANDATORY SPARE LIST AND ADDITIONAL DETAILS FOR LUB OIL
PURIFICATION UNIT**

DRAWING NO-41810370004 REV 00

PROJECT- **3 X 250 MW BONGAIGAON TPP**

WO: 10254M10805

SNO	ITEM DESC	MATERIAL CODE	QTY	UOM	Make	Model	Remarks
1	PRESSURE INDICATOR (RANGE-0-6 BAR)	W90318103176	1	NO	GIC	BSPG-V-15-S4-S-4-15NTM-(0 to 6)-A-G	
2	FLOW INDICATOR (RANGE-1000-10000 LPH)	W90318103206	1	NO	Eureka Instruments	SVF-MTS-12	
3	VACUUM INDICATOR (RANGE-(-1)-5 BAR)	W90318103354	1	NO	GIC	BSPG-V-15-S4-S-4-15NTM-(-1 to 5)-A-G	
4	TEMPERATURE INDICATOR (0-120 C)	W90318103184	1	NO	GIC	MIS-R-V-15	
5	PRESSURE SWITCH (RANGE-0.4-4 BAR)	W90318103150	1	NO	SWITZER	GM203-02-A6K-WW-3	
6	LEVEL SWITCH (2 SPDT MICRO SWITCH)	W90318103192	1	NO	Pune Techtrol Pvt. Ltd.	FPS-OSO2RWW	
7	FLOW SWITCH	W90318103290	1	NO	SWITZER	HR-40-M-I-2, 50-150 LPM, 1.1/2" BSPF	
8	RTD FOR OPU	W90318103168	2	NO	GIC	RTD-HEAD-ACF-2pt100 - 6mm	

NOTE-1: THIS DOCUMENT SHOULD BE READ ALONGIWITH SPECIFCATIONS AND SPECIAL INSTRUCTIONS MENTIONED IN THE INDENT.

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ADDITIONAL TECHINCAL DETAILS (Minimum):

1. PRESSURE INDICATOR (RANGE-0-6 BAR)- Material code: W90318103176

- i) Type : Bourdon Tube
- ii) Dial Size : 150mm
- iii) Over range : 130%
- iv) Protection : IP67
- v) Process Connection: ½ " NPT(M)
- vi) Range : 0-6 Kg/cm²
- vii) Accuracy : ±1%

2. FLOW INDICATOR (RANGE-1000-10000 LPH) - Material code: W90318103206

- i) Type: Variable area Metal tube Rotameter
- ii) Accuracy : ±2% of full Scale
- iii) Connection, Type, Size: 40 NB Flanged
- iv) Range: upto 10000 LPH for Turbine oil (operating 7500 LPH)

3. VACUUM INDICATOR (RANGE-(-1)-5 BAR) – Material code: W90318103354

- i) Type : Bourdon Tube
- ii) Dial Size : 150mm
- iii) Over range : 130%
- iv) Protection : IP67
- v) Process Connection: ½ " NPT(M)
- vi) Range : (-1)-5 Kg/cm²
- vii) Accuracy : ±1%

4. TEMERATURE INDICATOR (0-120 C) – Material code: W90318103184

- i) Type: Mercury in steel dial thermometer Rigid stem with SS Thermowell
- ii) Dial Size : 150mm
- iii) Over range : 130%
- iv) Protection : IP67
- v) Process Connection: ½ " NPT(M)
- vi) Range : 0-120°C
- vii) Accuracy : ±1%

5. PRESSURE SWITCH (RANGE-0.4-4 BAR) – Material code: W90318103150

- i) Sensing Element: Bellow
- ii) Material of sensing Movement: SS316L
- iii) End Connection: ¼ " NPT(F)
- iv) Over Range Test : 150% of Max Design Pressure
- v) Repeatability : ±0.5% of FSR
- vi) No. of contacts : 2SPCO (2SPDT), Snap action Dry Contacts
- vii) Rating of contacts : 15A at 250V AC, 6A at 24V DC

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- viii) Electrical connection : Plug in socket
- ix) Set point / Dead Band Adjustment : Provided Over Full Range
- x) Housing : Weather and Dust proof, IP66
- xi) Identification : Name plate
- xii) Mounting : Suitable for rack mounting / direct mounting

6. LEVEL SWITCH (2 SPDT MICRO SWITCH) – Material Code: W90318103192

- i) Type: Magnetic Float Operated Pivoted
- ii) Process Connection: 92mm X 92PCD
- iii) Pressure Rating : 10 kg/cm²
- iv) MOC: SS316
- v) Differential : 15±5 mm
- vi) No. of Contacts & Contact rating: 2 Nos. SPDT contacts; 5A at 250V AC, 0.2A at 24V DC
- vii) Electrical Connections: Plug in Socket
- viii) Degree of protection: IP66
- ix) Accuracy: ±2 mm
- x) Repeatability : ±1 mm

7. FLOW SWITCH – Material code: W90318103290

- i) Model no. : HR-40-M-I-2
- ii) Make : Switzer
- iii) Range: 50-150 LPM
- iv) Process connection: 1.1/2" BSPF

8. RTD FOR OPU – Material code: W90318103168

- i) Type of RTD : RTD 100 OHM (as per DIN-43760/IEC-751) , 4 wire
- ii) No. of Elements : Duplex
- iii) Connection: ½ " NPT(M)
- iv) Housing Head : IP-55 / Die cast Aluminum with Hinged Cover
- v) Sheathing of RTD : Metal Sheathed, Magnesium Oxide Packed
- vi) Type of Measuring Insert : spring Loaded for Positive contact with well
- vii) Calibration and Accuracy : As per IEC751 – Class A
- viii) External Dia of sheath : 6mm OD
- ix) Insulation Resistance : Greater than 10 Mega ohm at Room Temp with 500 V DC Megger
- x) Electrical connections : Plug in socket


(Sunil Kumar Gautam)

Dy. Manager


(Deepak Goyal)

Sr. Manager


(Suresh Chandra)

Sr. DGM

PRE-QUALIFICATION REQUIREMENTS FOR CI SPARES ITEMS FOR OPU

1. Vendor to submit experience-list^s (manufacturing/supplying/ testing/ support after sales) for supply of any one Instruments of the enquiry for continuous operation as per details outlined below:-

\$ where experience list means fulfillment of below parameters: -

- a) Supply of at least 1 no. of any one instrument of the enquiry in last 5 (Five) years from the date of Enquiry.
- b) Further details of experience-list to be furnished in the following tabular format: -

Sl No.	Project/Customer Name & Location	Purchase Order Reference No.	Date of referred Purchase Order	Details of items supplied	Contact Details of End-Customer (Name, Full Address, Phone, Email etc.)

2. Vendor to submit unpriced copy of Purchase Orders in support of clause 1 (a) above.
3. BHEL reserve the right to verify the information submitted by bidder. In case the information found to be false /incorrect, the offer shall be rejected. Bidder to confirm.

Sunil
08/07/25

Sunil Kumar Gautam
Dy. Manager/CIE

Deepak Goyal
08/07/25

Sh. Deepak Goyal
Sr. Manager/CIE

Suresh
08/07/25

Sh. Suresh Chandra
SDGM/CIE


MANUFACTURER'S NAME AND ADDRESS			QUALITY PLAN				TO BE FILLED BY BHEL		TO BE FILLED BY BHEL			
BHEL	VENDOR'S NAME	ITEM			QP NO.							
					REV							
		DRG. NO.	AS PER PO									
		SPEC.	AS PER PO									
		REV			Page 1 of 1							
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY			REMARKS
									M	B	N	
1	2	3	4	5	6	7	8	9	D	10		11


Note: All page of inspection documents shall be numbered in chronology with the QAP clause , dully mentioning the corresponding QAP clause nos. at the top of each page. One index page containing the documents descriptions, their page no & QAP clause shall be attached upfront the inspection documents.

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


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दिनांक एवं हस्ताक्षर SIGN & DATE भारतीय नुकी संसाधन INVENTORY NO P-5598	भारतीय नुकी संसाधन को अधिकारित करता 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	<p>1 INTENT OF SPECIFICATION</p> <p>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.</p> <p>RESPONSIBILITY OF BIDDER: 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.</p> <p>2 SCOPE OF SUPPLY</p> <p>2.1 One oil purification system (OPS) shall comprise of:</p> <ol style="list-style-type: none"> One centrifuge along with its drive & accessories. Indirect type oil heater and accessories One dirty oil feed pump complete with its drive & accessories. One clean oil discharge pump complete with its drive & accessories (if applicable). Polishing filter with suitable bypass arrangement. Adequately sized booster pump (if required). One overflow sight fitting (loose supply). The OPS shall be such that it can be used both as purifier as well as clarifier. An arrangement to detect and raise alarm in case of liquid seal breakage. All relevant valves, Y-type strainer, fittings and inter-connecting piping. All flanged end valves and flanged terminal points of piping along with counter flanges, nuts, bolts and gaskets. 	भारतीय नुकी संसाधन INVENTORY NO P-5598
दिनांक एवं हस्ताक्षर SIGN & DATE	दिनांक एवं हस्ताक्षर SIGN & DATE	निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	दिनांक एवं हस्ताक्षर SIGN & DATE 18.03.16 18.03.16

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SUPERSEDES INVENTORY NO.	I. All relevant controls, interlocks and instrumentation. m. Foundation plates, anchor bolts, sleeves, inserts etc. required for installation of the complete system on foundation. n. Necessary lugs and eye bolts of all equipments for lifting the complete system during erection and maintenance. o. A set of required special tools and tackles for erection & commissioning and operation & maintenance of the system. 2.2 Spare Parts: - Spares for satisfactory commissioning of the OPS are to be supplied (apart from mandatory spares). Also, a list of recommended spare parts with price break-up for 3 year satisfactory operation of the system shall also be supplied by vendor. Purchase order on the same shall be placed later by BHEL as per customer's requirement. Validity shall be kept suitable to meet our customer's requirement.			
3 GENERAL TECHNICAL REQUIREMENTS				
3.1 The OPS shall operate on a bypass system and the capacity of the unit shall as per the Table-A of this specification. The oil in system conforms to Servoprim-46 / ISO VG 46 / Turbinol-47 / BHEL standard practice (refer Annexure -I). The system will be located inside the turbine hall in oil room near oil tank.				
3.2 The OPS should be as compact as possible so that it may be installed in the minimum required space and easy to handle.				
3.3 The OPS should be suitably designed to operate in tropical climatic conditions. Equipment shall be designed for ambient temperature of 55°C and relative humidity of 95%.				
3.4 Base area/ foundation of purifier shall be designed to be as compact as possible without any vibration problem as per IS: 10816-2.Norms as per approved datasheet.				
3.5 All valves and instruments should be readily accessible to facilitate maintenance and operation.				
3.6 The OPS should be completely vapour tight to prevent fumes and vapours from entering.				
3.7 The equipment shall be suitable for continuous operation round the clock.				
3.8 On load automatic cleaning of bowl assembly is preferable.				
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15538		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16

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दिनांक एवं हस्ताक्षर SIGN & DATE	सापेक्षी - सूची संख्या INVENTORY NO.	स्वामित्व अधिकार एवं गोपनीयता 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.	सुपरसेडिंग INVENTORY NO.	भारती एल एच ई लि. BHEL	उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013 पृष्ठ 40 का 5 Page 5 of 40
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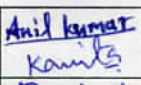
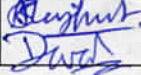
SUPERSEDES INVENTORY NO.	TABLE- A																																																			
	<table border="1"> <thead> <tr> <th>Var. No.</th> <th>Flow capacity of purification system (Litre Per Hour)</th> <th>Control Panel Type</th> <th>Heater Rating (kW)</th> </tr> </thead> <tbody> <tr><td>1.</td><td>7500</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 interest of the company.	4 CONTROL AND INSTRUMENTATION
	4.1 Offer should include all necessary interlocks & instruments along with remote indication facility in the control panel (protection type). Purchaser will review same & necessary addition / subtraction in interlocks & instruments, considered essential for smooth operation of the unit, will be asked to include. Some of the important interlocks/controls, required, are given below.


दिनांक एवं हस्ताक्षर SIGN & DATE	स्वत्वाधिकार एवं गोपनीयता इस दस्तावेज में दी गई प्रतियां भारत भारती लिमिटेड की संपत्ति हैं, इनका प्रयोग एवं प्रसारण अन्य से किसी भी तरह से बिना भारत भारती लिमिटेड की अनुमति के नहीं किया जा सकता।	(a) Separator shall be provided with interlocks to prevent the operation of the unit unless the feed pump & the discharge pump are operating.
		(b) A system of annunciating the flooding of the separator due to loss of water seal shall be provided.
		(c) All instruments i.e. pressure gauges, RTDs etc. should be reliable & of proven design. Purchaser has full right to ask them changed from one supply source to another according to operational experience. All instruments should be calibrated at minimum 5 points throughout the range and accuracy, hysteresis, repeatability etc. shall be within the specified limits i.e. $\pm 1\%$.
		(d) Auxiliary electric supply available at site comprises of 415V, 3 ϕ , 3 wires, 50 Hz ($\pm 10\%$ V, $\pm 5\%$ frequency, $\pm 10\%$ combined). If supplier requires any other supply for his devices, instruments and drives etc. he shall arrange \ to convert 415V, 3 ϕ 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.



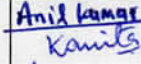
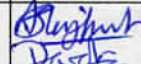
सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil kumar Kavita	18.03.16
	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput Devesh	18.03.16	18.03.16


दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 7 Page 7 of 40	
सुपरसेड्स INVENTORY NO	(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.			
भारी मशीन भारी मशीन का नंबर	(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 & 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 & shall be of indirect type.			
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.	(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 & annunciation system.			
स्वामित्व अधिकार एवं गोपनीयता इस दस्तावेज में दी गई सूचना भारत भारी विद्युत निगम लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल निगम के अधिकार में ही होना चाहिए।	(h) Local instruments for pressure temp. & flow indication shall be provided in accordance with clause 8.0 of Annexure-I.			
दिनांक एवं हस्ताक्षर SIGN & DATE	(i) The unit should be provided with suitable alarm & annunciation system for easy operation & 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.			
दिनांक एवं हस्ताक्षर SIGN & DATE	(j) All control switches, indicating lamps & sound alarm devices shall be mounted on the front face plate of a cubicle (panel) to be supplied with purification unit.			
दिनांक एवं हस्ताक्षर SIGN & DATE	(k) Remote operating facility for all electrically operated components should be provided on control panel.			
दिनांक एवं हस्ताक्षर SIGN & DATE	(l) All motors, heaters included in the offer, should be supplied along with its starter which will be mounted in the same panel.			
दिनांक एवं हस्ताक्षर SIGN & DATE	(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).			
दिनांक एवं हस्ताक्षर SIGN & DATE	(n) Control switches & Indicating lamps shall be as per vendor's standard practice or owner approved vendor/ make (project dependent).			
भारी मशीन INVENTORY NO	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
भारी मशीन INVENTORY NO	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16	18.03.16


निर्माण एवं संशोधन SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 8 Page 8 of 40	
SUPERSEDES INVENTORY NO आगामी पूर्वी संख्या को अधिकारित करना है	<p>(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> <p>(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</p> <p>(q) ON/OFF control, indication, and alarm functions shall be provided on the LCP as well as on HMI system (DCS).</p> <p>(r) Adequately sized copper ground bus shall be provided for each panel.</p> <p>(s) Control voltage shall be 110 V AC/220 VAC. This will be informed at the time of detail Engineering.</p> <p>(t) Cables for Motors and heaters shall be adequately sized keeping sufficient margin. Sizes shall be subject to BHEL/Customer approval.</p> <p>(u) Cable glands suitable for incoming 415 V feeder cables shall be provided. Cable Sizes will be intimated later.</p> <p>(v) LCP shall have 20% spare terminals.</p> <p>(w) Polishing filter (if applicable), chock alarm shall be provided through DPS.</p> <p>(x) All instruments/ Devices shall have IP55 degree of protection.</p> <p>(y) For level switches and other instruments, plug and socket type connectors shall be provided. For level switch over range proof pressure shall be 150% of max design pressure.</p> <p>(z) For Pressure gauge, Temperature gauge and level gauge over range test pressure shall be 1.5 times the maximum design pressure at 38 C. Range selection should cover 125% of max of scale. For Rotameter, the housing shall be IP55 protection class.</p> <p>(aa) Reports of type tests shall be those conducted within last five years.</p>			
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स्वत्व अधिकार एवं गोपनीयता इस दस्तावेज में दी गई सूचना भारत भारती लिमिटेड का संपत्ति है। इसका प्रयोग अन्य किसी भी उद्देश्य के लिए बिना भारत भारती लिमिटेड की अनुमति के नहीं किया जा सकता।				
निर्माण एवं संशोधन SIGN & DATE 	2/3/16			
आगामी पूर्वी संख्या INVENTORY NO 2538	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita	निर्माणकर्ता Anil / Kavita 	18.03.16
		जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	जाँचकर्ता A. S. Rajput / Devesh 	18.03.16

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दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013		
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SUPERSEDES INVENTORY NO.	(g) Limit switch or any other alternate arrangement with BHEL approval shall be provided for separator cover for remote monitoring when operating in DCS. (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.				
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.	5 PERFORMANCE REQUIREMENTS 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.				
स्वत्वाधिकार एवं गोपनीयता इस दस्तावेज में दी गई सूचना भारत भारती उपकरणों लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण अन्य किसी भी व्यक्ति को बिना भारत भारती उपकरणों लिमिटेड की अनुमति के नहीं किया जा सकता।	6 GUARANTEES 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.				
दिनांक एवं हस्ताक्षर SIGN & DATE 18/03/16	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita	18.03.16
भारतीय सूची संख्या INVENTORY NO. P-5338		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	Rajput Devesh	18.03.16



विनाम एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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सामग्री सूची संख्या 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.			
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.	7 QUALITY ASSURANCE, INSPECTION AND TESTING 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.			
स्वत्वाधिकार एवं गोपनीयता इस दस्तावेज में दी गई सूचना भारत भारती मशीनफैक्टरी लिमिटेड की संपत्ति है इसका प्रयोग एवं प्रसारण केवल ही उसी उद्देश्य के लिए किया जा सकता है जो कि इस दस्तावेज के लिए है। (इस दस्तावेज को न बिना बाहर)	विनाम एवं हस्ताक्षर SIGN & DATE 			
सामग्री सूची संख्या INVENTORY NO P-3338	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita 	18.03.16
		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh 	18.03.16




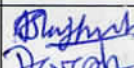
भारत एवं हरद्वार SIGN & DATE भारती भूषी संख्या INVENTORY NO.	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <p>उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)</p> </div> <div style="text-align: right;"> <p>ST39013</p> <p>पृष्ठ 40 का 12</p> <p>Page 12 of 40</p> </div> </div>
SUPERSEDES INVENTORY NO. भारती भूषी संख्या को अतिरिक्त करना है	<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 & DP to ensure freedom from internal & surface defects. All butt welds on oil piping shall be subjected to 10% RT & fillet welds to 100% MP/DP. Norms for acceptance to be informed in the offer for BHEL approval.</p> <p>(c) Static & 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 & 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 & discharge oil pump, purifier motor, heaters, control system & other accessories. Reference & 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 & 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 style="margin-left: 20px;">i) Degree of protection test as per IS: 2147 (Type test) at 2.0 KV.</p> <p>(k) High voltage test & IR measurement not less than 30 mega ohm (MΩ) before and after test.</p> <p style="margin-left: 20px;">ii) Pick up and drop down test & 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 & noise level, sequential operation & interlocks, test for vapour tightness (if applicable), maximum particle size & moisture</p>
भारत एवं हरद्वार SIGN & DATE भारती भूषी संख्या INVENTORY NO.	<div style="display: flex; justify-content: space-between;"> <div> <p>Rev. no.</p> <p>08</p> </div> <div> <p>निर्माणकर्ता WORKED BY:</p> <p>जाँचकर्ता CHECKED BY:</p> </div> <div> <p>Anil / Kavita</p> <p>A. S. Rajput / Devesh</p> </div> <div> <p>Anil Kumar Kavita</p> <p>Ashish Kumar Devesh</p> </div> <div> <p>10.03.16</p> <p>10.03.16</p> </div> </div>

निम्न पर हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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SUPERSEDES INVENTORY NO.	content at the outlet of oil purification system. Acceptance norms for vibration to be informed in the offer for BHEL approval (m) Verification/ BHEL approved type-test report for max. particle size & moisture content.			
भारतीय मूल्य मंत्रालय अधिकारिता के तहत	7.6 Party to furnish certificate of compliance for the instruments which are being installed in the system after P.O. placement.			
COPYRIGHT AND CONFIDENTIAL This 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.	7.7 STORAGE:- Bidder shall inform to purchaser along with the offer regarding storage facility which they require at the site for their equipment if the unit is to be stored at site for their equipment. If the unit is to be stored at site for next 12 to 18 months after dispatch from manufacturer's works.			
	8 DOCUMENTS, DATA AND DRAWINGS TO BE FURNISHED BY SUPPLIER			
स्वतंत्रता एवं गोपनीयता इस दस्तावेज़ में दी गई सूचना भारत की स्वतंत्रता एवं गोपनीयता के हित में है। इसका प्रयोग एवं प्रसारण केवल भारत सरकार के अधिकारियों द्वारा ही किया जायेगा।	8.1 <u>DRAWINGS/ DOCUMENTS REQUIRED WITH THE OFFER</u>			
निम्न पर हस्ताक्षर SIGN & DATE	a. GA drawing of the equipment offered, arrangement and layout drawing showing various equipments with all fittings, accessories and connection as well as clearance necessary for other equipment or structural members for operation and maintenance, loading data and foundation details of oil purification system.			
भारतीय मूल्य मंत्रालय INVENTORY NO.	b. Data sheets of all instruments including RTDs, motor, solenoid valves, instruments and 3-way pneumatic/solenoid valve for oil purification system shall be furnished as per Annexure-II of this specification for BHEL's review.			
	c. P&ID including bill of material indicating piping, valves, all instruments and devices of the system as per BHEL format annexure-VII.			
भारतीय मूल्य मंत्रालय INVENTORY NO.	d. Drawings / Documents of all equipments such as heater, y-strainer, dirty & clean oil pump etc. shall also be included in the offer.			
	e. Detailed technical literature on various equipments/ instruments and GA drawing of control panel.			
भारतीय मूल्य मंत्रालय INVENTORY NO.	f. Characteristic curves of all pumps.			
	g. Manufacturer's descriptive and illustrative literature showing details of equipments and method of operation of the complete system.			
भारतीय मूल्य मंत्रालय INVENTORY NO.	h. Electrical single line diagram, control wiring diagram, interlocks schematic, protection scheme, details of motor and starter etc.			
	Rev. no. 08			
निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita	18.03.16	
जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput Devesh	18.03.16	

[illegible]

दिनांक एवं हस्ताक्षर SIGN & DATE 11/11/2016 [Signature]	स्वत्व अधिकार एवं गोपनीयता 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.	भारतीय प्रती सूचका INVENTORY NO. 12538	भारतीय प्रती सूचका INVENTORY NO. 12538	उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013																
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<p>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.</p> <p>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.</p> <p>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.</p>																					
<p>9 MATERIALS OF CONSTRUCTION</p> <p>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.</p> <p>9.2 All piping, fittings & valves should be suitably selected as per applicable IS, BS or equivalent standard.</p> <p>9.3 Strainers, wherever provided, should be designed to enable them to be cleaned during operation.</p> <p>9.4 All other parts/ components shall be of compatible material to suit the applications.</p>																					
<p>10 CODES AND STANDARDS</p> <p>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).</p>																					
<p>11 CLEANING, PROTECTION AND PAINTING</p> <p>Painting scheme shall be according to BHEL approved/ previously approved scheme. Painting scheme for oil purification system shall be as below.</p> <table border="1"> <thead> <tr> <th>Paint (Coat)</th> <th>Paint Type</th> <th>No. of coat</th> <th>DFT*</th> </tr> </thead> <tbody> <tr> <td>Primer Paint:</td> <td>Epoxy base Zinc rich primer paint</td> <td>2</td> <td>70</td> </tr> <tr> <td>Intermediate Paint:</td> <td>Epoxy TiO2 Pigmented Polyamide Cured Paint</td> <td>1</td> <td>70</td> </tr> <tr> <td>Finish (Final) Paint:</td> <td>Aliphatic Acrylic 2 Pack Polyurethane Finish paint</td> <td>2</td> <td>60</td> </tr> </tbody> </table>						Paint (Coat)	Paint Type	No. of coat	DFT*	Primer Paint:	Epoxy base Zinc rich primer paint	2	70	Intermediate Paint:	Epoxy TiO2 Pigmented Polyamide Cured Paint	1	70	Finish (Final) Paint:	Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2	60
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Rev. no.	08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita	18.03.16																
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निर्माण एवं स्थापना SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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SUPERSEDES INVENTORY NO. आगामी सूची में अतिरिक्त 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"> For Oil purifier- Light Blue (RAL 5012) 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. 			
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.		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.		
स्वत्वाधिकार एवं गोपनीय इस दस्तावेज में दी गई सुचना भारत भारती लिमिटेड का संपत्ति है। इसका प्रयोग अन्य किसी भी उद्देश्य के लिए बिना भारत भारती लिमिटेड की अनुमति के नहीं किया जाये।		12 DESIGN CO-ORDINATION MEETING 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.		
निर्माण एवं स्थापना SIGN & DATE 		13 LIST OF CROSS-REFERRED STANDARDS 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,		
आगामी सूची में INVENTORY NO. 12.5538	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil kamar Kavita 18.03.16
		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	Rajput Devesh 18.03.16


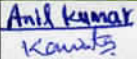

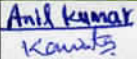

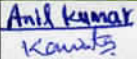

भारत भारती SIGN & DATE भारत भारती INVENTORY NO. 		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 17	Page 17 of 40
SUPERSEDES INVENTORY NO. 	13.7 IS: 5, 13.8 IS: 4722, 13.9 IS: 2253, 13.10 IS: 2254, 13.11 IS: 3202, 13.12 IS: 4722-1992, 13.13 ISO: 4406, 13.14 IS: 12075, 13.15 IS: 12615:2011, 13.16 IS: 10816-2.			
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.				
स्वतंत्रता एवं गोपनीयता इस दस्तावेज़ में दी गई जानकारी भारत भारती लिमिटेड की संपत्ति है। इसका प्रयोग केवल भारत भारती लिमिटेड के ही उपयोग के लिए किया जाना चाहिए। (Confidentiality and Independence)				
भारत भारती SIGN & DATE  				
भारत भारती INVENTORY NO. 	Rev. no.		निर्माणकर्ता WORKED BY:	Anil / Kavita
	१८		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh
				 18.03.16
				 18.03.16


निम्न सूची में SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013
			पृष्ठ 40 का 18
			Page 18 of 40


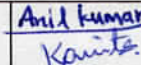
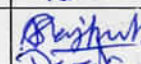
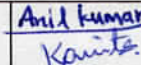
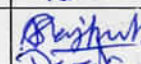
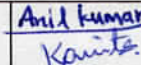
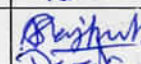
SUPERSEDES INVENTORY NO. भारतीय भारी भारी अधिकारी का नाम	14 ANNEXURE-I (PROPERTIES OF TURBINE OIL)																																																																								
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भारतीय भारी भारी INVENTORY NO. 2538	Rev. no.	निर्माणकर्ता	Anil / Kavita	Anil kumar	18.03.16
	08	WORKED BY:		Kavita	
		जाँचकर्ता	A. S. Rajput /	Devesh	18.03.16
		CHECKED BY:		Devesh	

निम्न पर हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013																													
				पृष्ठ 40 का 19 Page 19 of 40																													
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दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013																																																																												
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SUPERSIDES INVENTORY NO	15 ANNEXURE-II (DATA SHEET OF TURBINE OIL PURIFICATION SYSTEM) 1.0 NUMBER OF UNITS OFFERED: 2.0 SCOPE OF SUPPLY: <table border="1" style="width:100%; border-collapse: collapse; margin-top: 10px;"> <tr><td style="width:10%;">2.1</td><td style="width:70%;">Centrifuge</td><td style="width:20%;">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 & 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 & 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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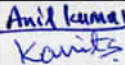
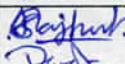
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			Page 23 of 40




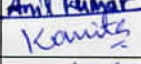

SUPERSEDES INVENTORY NO. सामग्री सूची नम्बर को अधिस्थान करा है	7.1	Quantity	Nos.		
	7.2	Type	Positive displacement (Rotary i.e. Helical, Herring bone , spur gear or screw type)		
	7.3	Capacity	Lit/hr.		
	7.4	Speed	RPM		
	7.5	Discharge pressure	Kg/cm2 (g)		


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	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				


स्वत्वधिकार एवं गोपनीय इस प्रयोग से दी गई प्रस्ताव, चरण, प्रती, संकेत, चिह्न, आदि की प्रतिलिपि लेना, प्रकाशित करना, प्रसारित करना, या किसी भी प्रकार प्रयोग, जो कि कंपनी के हित में हानिकारक हो, न किया जाए।	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			



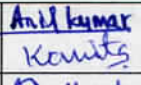

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सामग्री सूची नम्बरा INVENTORY NO. P-5598	Rev. no.	08	निर्माणकर्ता WORKED BY:	Anil / Kavita		18.03.16
			जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh		18.03.16


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9.7	Connection sizes																																																																												
9.8	Design Pressure (body)	Kg/cm ²																																																																											
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भारतीय प्रती संस्था INVENTORY NO. भारतीय प्रती संस्था	<div style="border: 1px solid black; padding: 5px;"> <p>18.03.16</p> </div>																																																																																																										

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निष्पन्न एवं हस्ताक्षर SIGN & DATE ST39013 पृष्ठ 40 का 31 Page 31 of 40	 उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		
SUPERSEDES INVENTORY NO. संपूर्ण सूची संख्या को अधिलेखित करना है	2.4 Overload (% of full load) that can be Carried by motor without impairing Overall performance and period for Which this overload is applicable. Motor shall be capable for running at full load with 80% of rated voltage for 5 minutes and 70% of rated voltage for 1 Sec. Locked rotor with stand time under hot condition at rated voltage shall be at Least 2.5 sec more than starting time		
	2.5 Location Turbine oil room indoor		
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	2.7 Shaft disposition mountings As per Unit's supplier requirement.		
	2.8 Method of connections driven equipment As per Unit's supplier requirement.		
	2.9 Direction of rotation and corresponding terminal designation To suit pumps & centrifuge		
	2.10 Enclosure and ventilation Totally enclosed fan cooled and flame proof IP55.		
	2.11 Bearing As per supplier's design, min life 30,000 hrs		
	2.12 Grounding Device Suitable arrangement shall be provided for earthing the motor at two separate and distinct connection points. Design of earthing conductor shall be as per IS: 4722-1992.		
	2.13 Terminal box Flame proof terminal box to be provided with double compression Cable gland for Al cable Fault level : 45 KA for 0.01 Sec		
	3.0 SPECIAL REQUIREMENTS:		
	3.1 The motor shall be rewound able 3.2 The motor shall have on line greasing facility. 3.3 Motor shall be suitable for working in an environment of oil fumes without any hazard. 3.4 Separate terminal box for space heater (if applicable) to be provided. 3.5 Motor bearings (DE & NDE) shall be sealed type to avoid frequent Re-greasing. 3.6 The motor construction shall be suitable for easy disassembly and reassembly. 3.7 The terminal box shall be suitable for top and bottom entry of cable and shall be suitable for PVC insulated PVC sheathed armoured aluminium cables and shall be capable of being rotated by 180° in steps of 90°. 3.8 Motor vibrations shall be acceptable as per IS: 12075; motor efficiency as per IS 12615:2011& noise level as per IS: 12065. Also mechanical vibrations shall be under limits as per IS: 10816-2.		
4.0 DOCUMENTS TO BE SUPPLIED WITH DELIVERY WITH EACH UNIT. THESE SHALL BE SUPPLIED IN TWO COPIES & WORKABLE SOFT COPY.			
निष्पन्न एवं हस्ताक्षर SIGN & DATE 2/5/16	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	10.03.16 10.03.16

SIGNATURE SIGN & DATE 		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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SUPERSEDES INVENTORY NO. 	<p>4.1 Characteristics: (at 80%, 100% and 110% of rated voltage)</p> <p>4.1.1 Starting current v/s time</p> <p>4.1.2 Torque v/s slip</p> <p>4.1.3 Thermal with stand for HOT and Cold condition.</p> <p>4.2 Type and frame size</p> <p>4.3 Starting time</p> <p>4.3.1 With 100% voltage at terminal</p> <p>4.3.2 With 85% voltage at terminal</p> <p>4.3.3 With 80% voltage at terminal</p> <p>4.4 Safe install time at 110% rated voltage under hot condition.</p> <p>4.5 Power rating requirement w.r.t. pump requirement.</p> <p>4.6 Motor GD²</p> <p>4.7 Total wt. of motor.</p> <p>4.8 Expected life of bearing (but not <30000 hrs.)</p> <p>4.9 Type & size of cable for which gland is provided, in the terminal box.</p> <p>4.10 Type & routine test certificate as per IS: 4722.</p> <p>4.10.1 In addition to cl 4.10, the following tests shall also be carried out</p> <p>i) Degree of protection test as type test</p> <p>ii) 20% over speed test for 2 minutes as routine test.</p> <p>iii) Measurement of variation as routine test as per IS: 12075.</p> <p>5.0 TESTS AT MANUFACTURE'S WORKS OF MOTOR:</p> <p>5.1 Motor after complete assembly shall be subjected to both type and routine tests as per IS: 4722</p> <p>5.2 Additional type test:-</p> <p>5.2.1 Degree of protection test to conform to the specified degree of protection.</p> <p>5.2.2 Measurement of noise level as per IS 12065, motor noise level shall be limited so as to achieve combined pump motor noise level as per clause no. 5(c).</p> <p>5.3 Additional routine test:</p> <p>5.3.1 20% over speed test for 2 minutes.</p> <p>5.3.2 Measurement of vibrations per IS 12075.</p> <p>6.0 CROSS REFERRED STANDARDS:</p> <p>IS:325 , IS:4722, IS:2253, IS:2254, IS:3202, IS:4029, IS:12065, IS:12075, IS:12615:2011</p>			
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स्वत्वाधिकार एवं गोपनीयता इस दस्तावेज में दी गई सूचना भारत भारती लिमिटेड की संपत्ति है। इसका प्रयोग केवल उद्देश्य के बिना अन्य किसी भी उद्देश्य के लिए नहीं किया जा सकता। इस दस्तावेज को गोपनीय माना जाता है।				
SIGNATURE SIGN & DATE 				
INVENTORY NO. P.5538	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil kumar Kaur 18.03.16
		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	Rajput Devesh 18.03.16

SIGNATURE SIGN & DATE SUPERSEDES INVENTORY NO भारतीय प्रौद्योगिकी संस्थान भारतीय प्रौद्योगिकी संस्थान		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013
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17 ANEXURE-IV (SPECIFICATION OF INSTRUMENTS)

1) PRESSURE GAUGE

The Pressure gauge should confirm to the following technical specification:-

- The sensing element shall be SS-316 bourdon tube.
- The dial size shall be approx. 150 mm diameter.
- The casing shall be epoxy coated die-cast aluminium with threaded bezel ring.
- The movement shall be stainless steel rotary gear with nylon bearings.
- The process connection shall be G1/2"
- The over range protection should be 150% of max. range
- The pointer shall be micrometer adjustable with zero facility on front.
- The accuracy shall be 1% of full scale.
- The gauge is to be provided with pulsation dampeners.

2) TEMPERATURE INDICATOR

Type	Bimetallic rigid system type. No use of mercury or any other hazardous/toxic material
Case	Die cast aluminium alloy moisture proof case, heavily enamelled black
Dial Size	100 mm
Range	As per design
Accuracy	1% of total range
Bulb Material	½" bulb diameter made of SS. 316
Thermo-well	SS-AISI316 (with thread size G1/2")
Ambient Temp	60° C max.

3) MAGNETIC LEVEL SWITCH

Process Connection: - Nb25

Material: All parts coming in contact with the liquid made of stainless steel SS316

Electrical characteristics

Switch: 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.



SIGNATURE
SIGN & DATE
20/03/16



भारतीय प्रौद्योगिकी संस्थान 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	A. S. Rajput Devesh	18.03.16

मशीन नुमा नमूना INVENTORY A-5338	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	18.03.16 18.03.16	ST39013 पृष्ठ 40 का 34 Page 34 of 40
दिनांक एवं हस्ताक्षर SIGN & DATE A-5338	स्वत्व अधिकार पर गोपनीय This 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.	SUPERSEDES INVENTORY NO.	दिनांक एवं हस्ताक्षर SIGN & DATE	दिनांक एवं हस्ताक्षर SIGN & DATE
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.	<div data-bbox="250 127 407 255"> </div> <div data-bbox="533 159 1113 297"> <p>उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)</p> <p>PRODUCT PURCHASE SPECIFICATION</p> <p>(HEEP: HARIDWAR)</p> </div> <div data-bbox="297 372 540 436"> <p>ANNEXURE - V (P&ID)</p> <p>SHEET 1 OF 1</p> </div> <div data-bbox="274 383 1387 1755"> <p>LEGEND:</p> <ul style="list-style-type: none"> DPS : DIFFERENTIAL PRESSURE GAUGE FG : FLOW GLASS S : SOLENOID VALVE C : COMPOUND GAUGE PI-PA : PRESSURE GAUGE TI-T3 : THERMOMETER TS1 : THERMOSTAT FOR WATER TS2, TS3 : THERMOSTAT FOR OIL STOP VALVE NORMALLY OPEN STOP VALVE NORMALLY CLOSED L : LEVEL SWITCH F : FLOW CONTROL VALVE PS : PRESSURE SWITCH LG : LEVEL GAUGE DPG : DIFFERENTIAL PRESSURE GAUGE <p>CONNECTIONS:-</p> <ol style="list-style-type: none"> 1. INLET FOR UNTREATED OIL - 40NB FLANGED CONN. 2. OUTLET FOR TREATED OIL - 40NB FLANGED CONN. 3. HEATER RECIRCULATION - 40NB FLANGED CONN. 4. WATER INLET TO HEATER - 20NB HOSE CONNECTION. 5. HEATER WATER DRAIN & OVERFLOW - 20NB HOSE CONN. 6. HEATER OIL DRAIN - 20NB HOSE CONN. TD1, TD2 - ANTI-FLOOD TANK DRAIN - 20NB HOSE CONN. SI, SI2, SI3 - SAMPLING CONN. - 15NB HOSE CONN. <p>NOTES:-</p> <ol style="list-style-type: none"> 1. FOR UNIT OIL PURIFIER KEEP V5 CLOSED & OPEN VALVE V13. 2. FOR CENTRAL OIL PURIFIER KEEP V13 CLOSED & OPEN VALVE V5. </div>			

St. Pauli 18.03.16

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SUPERSEDES INVENTORY NO.	20 ANNEXURE- VII (CHECK LIST) A. CHECK LIST FOR MECHANICAL ITEMS				
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	1.	Is capacity of oil purifier as per BHEL specifications (i.e. 7500 LPH)?			
	2.	a) Is particle size of impurities in the clean oil as per BHEL specifications in single pass (i.e. class 15/12 or better as per ISO4406)? b) Is moisture content in the clean oil as per BHEL specifications in single pass (i.e. ≤ 500 ppm)?			
	3.	Is the test certificate for particle size of impurities & moisture content provided as per BHEL specification?			
	4.	Is mode of operation (i.e. purifier/clarifier) as per BHEL specifications & enquiry?			
	5.	Is noise level as per BHEL specifications?			
	6.	Is overflow sight fitting provided as per BHEL specifications?			
	7.	Is capacity of oil feed & discharge Pump (i.e. at least 10% higher than capacity of the purifier) as per BHEL specifications?			
	8.	a) Is copies of O&M manual (CD based & hard paper based) provided as per BHEL specifications? 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 (β ₃ = 1000 or better) provided as per BHEL specifications?			
	10.	Is supervision during erection & commissioning at site by vendor offered as per BHEL specifications & enquiry?			
	11.	Is lube oil recirculation piping/ piping connection provided as per BHEL specifications & enquiry?			
	12.	Are sufficient spares for satisfactory commissioning and for 3 years satisfactory operation of the purifier provided as per BHEL specifications?			
	13.	Are detailed lists of recommended spares and commissioning spares along with price break up provided as per BHEL specifications & enquiry?			
14.	Is separate offer for conducting test for particle size of impurities and				
SIGNATURE SIGN & DATE 18/03/16	Rev. no.		निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar 18.03.16
सामग्री सूची संख्या INVENTORY NO. P-5538			जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	Devesh 18.03.16

भारत एवं हरियाणा SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013	
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SUPERSEDES INVENTORY NO	moisture content on one oil purification system provided as per BHEL specifications/enquiry?				
	15. Is the painting scheme as per BHEL specifications/enquiry?				
भारतीय नौसेना को अभिहित करना है	16. Are all piping of oil purification system shall be stainless steel?				
	17. Deviations taken (Please specify clearly, if any):				
a) b) c) d)					
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Notes: Vendors shall fill relevant columns with Yes/ No/ Value offered.					
Date: Place:					
Signature & Seal of manufacturer					
स्वतंत्रता दिवस एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत की संपत्ति है। इसे बिना अनुमति के किसी भी प्रकार प्रसारित, प्रकाशित, या अन्यथा उपयोग नहीं किया जा सकता।					
भारत एवं हरियाणा SIGN & DATE					
भारतीय नौसेना INVENTORY NO A-538	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

दिनांक एवं प्रमाण SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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SUPERSEDES INVENTORY NO. आगामी सूची संख्या को अतिरिक्त करना है	B. CHECK LIST FOR C&I ITEMS Check list for OPU (DCS Based)			
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	1. OPU is DCS Based with provision of operating from local controls panel as well 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. 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.			
	स्वत्वधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती लिमिटेड का संपत्ति है, इसका प्रयोग एवं प्रकाशन अन्य से किसी भी प्रकार उचित और कि कंपनी के हित में होना चाहिए।			
दिनांक एवं प्रमाण SIGN & DATE 				
आगामी सूची संख्या INVENTORY NO. P-55398	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita	जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	18.03.16 18.03.16



उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)
PRODUCT PURCHASE SPECIFICATION
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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

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स्वाधिकार एवं गोपनीय

इस दस्तावेज में दी गई सूचना भारत भारी भारी विद्युत निगम की संपत्ति है। इसका प्रयोग एवं प्रकाशन अन्य से किसी भी प्रकार का उपयोग जो कि कंपनी के हित में हानिकारक हो न किया जाए।

हस्ताक्षर एवं तिथि
SIGN & DATE

सामग्री सूची संख्या
INVENTORY
NO.

Rev. no.

निर्माणकर्ता
WORKED BY:

Anil / Kavita

Anil kumar
Kavita




18.03.16

जाँचकर्ता
CHECKED BY:

A. S. Rajput /
Devesh

A. S. Rajput
Devesh

18.03.16

SIGNATURE & DATE 		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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SUPERSEDES INVENTORY NO. मासदी मूली संख्या को प्रतिस्थापित करना है	Check list for OPU (Relay Based)			
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	1. Oil Purification Unit is relay based: yes/no 2. On/Off control, indication and alarms is provided in local panel: yes/no 3. Control panel is designed for 3 phase (415 v Ac) 3 wire incomer power supply system: yes/no 4. Motor efficiency meeting as per special instruction/project requirement : yes /no 5. Air requirement of pneumatic valves is mentioned: yes/no. 6. 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 7. Cable glands for 415 V AC incomer is provided : yes/no 8. Adequately sized copper ground bus is provided for each panel: yes/no 9. Painting treatment as per addendum or special instruction mentioned in indent: yes/no 10. Paint shade of control panel as per addendum/special requirement: yes/no 11. Construction of panel as per specification/addendum: yes/no 12. Control panel is provided with anti-vibration pads to withstand vibrations: yes/no. 13. Plug and socket type connection for all instruments : yes/no 14. Arrangement for Liquid seal breakage alarm is provided: yes/no 15. Price break of spare item/spare of LS switchgear given along with offer: yes/no 16. Motor data sheet shall be subject to customer/ BHEL approval: yes/no 17. 20% spare terminals have been provided at panel: yes/no 18. All instruments shall be of reputed make.			
	Date: &Place:			
SIGNATURE & DATE 	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
मासदी मूली संख्या INVENTORY NO. 25538		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16