



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

Enquiry No.:
B/4066/2019/1437V/2
Item-Oil Purification Unit
Project: Bhusawal

Annexure-A

Sl. No.	Pre-Qualification Requirements (Annexure-A)	Vendor's Response
1.	Vendor should have Manufactured and supplied Oil Purification System (Centrifuge Type) having flow capacity of 6000 LPH or higher in at least one power plant / process plant for oil applications.	
2.	Vendor to furnish unpriced PO copy (not older than seven years) in support of point no.-1.	
3.	The performance test certificate of particle size of impurities and moisture contents (not older than five years) for Lube oil (ISO VG-46) as per SL. NO. 5(a) of specification ST39013 Rev. no.-8 of Oil Purification System either shall be furnished for offered model or the same shall be carried out by vendor prior to despatch of the item in the event of ordering subject to BHEL / customer approval. Vendor to confirm.	
4.	Vendor to confirm that their system can be controlled through plant DCS/DDCMIS.	

Note: -

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

Signature of authorized signatory.....

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

[illegible]

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

दिनांक एवं हस्ताक्षर SIGN & DATE		ST39013	
भारती सूची संख्या INVENTORY NO		पृष्ठ 40 का 1 Page 1 of 40	
भारती सूची संख्या को अधिकतम करना है BASED ON ST 22002		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	
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स्वत्वाधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती भारतीकरण लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल भारत भारती भारतीकरण लिमिटेड के द्वारा ही किया जा सकता है। Bharat Heavy Electrical Limited			
दिनांक एवं हस्ताक्षर SIGN & DATE		नाम NAME	
CIE		B. S. Rana	
QAX		S. K. Chauhan	
TSX		DEEPAK	
महामन्त्र विभाग AGREED DEPT.		नाम NAME	
SUPERSEDES		दिनांक एवं हस्ताक्षर DATE & SIGNATURE	
REV. NO.		08	
DI.		29.03.16	
CHANGE ADVICE NO.		STE-14-04 26.03.14	
निर्माण PREPARED : PED		स्वीकृति APPROVED : S. K. Baveja	
जारी ISSUED : TSX		Gr. NO. 8.20	
दिनांक DATE : 25.8.84			

Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	ST39013 पृष्ठ 40 का 2 Page 2 of 40		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	Rev. no. 08
					Rev. no. 08
सूची संख्या INVENTORY NO. P-5538	सूची संख्या को अधिनिर्देश करना है	सूची संख्या को अधिनिर्देश करना है	सूची संख्या को अधिनिर्देश करना है	सूची संख्या को अधिनिर्देश करना है	सूची संख्या को अधिनिर्देश करना है
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सामग्री सूची संख्या INVENTORY NO P-55-98	SUPERSEDES INVENTORY NO	1 INTENT OF SPECIFICATION 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.		
स्वतः अधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत द्वारा स्वतः अधिकार विनिर्देश की सम्पत्ति है इसका प्रयोग एवं प्रसारण अन्य के बिना की जाह प्रमाण जो कि सम्पत्ति के हित में है निम्न प्रकार से किया जाय।	2 SCOPE OF SUPPLY 2.1 One oil purification system (OPS) shall comprise of: a. One centrifuge along with its drive & accessories. b. Indirect type oil heater and accessories c. One dirty oil feed pump complete with its drive & accessories. d. One clean oil discharge pump complete with its drive & accessories (if applicable). e. Polishing filter with suitable bypass arrangement. f. Adequately sized booster pump (if required). g. One overflow sight fitting (loose supply). h. The OPS shall be such that it can be used both as purifier as well as clarifier. i. An arrangement to detect and raise alarm in case of liquid seal breakage. j. All relevant valves, Y-type strainer, fittings and inter-connecting piping. k. All flanged end valves and flanged terminal points of piping along with counter flanges, nuts, bolts and gaskets.			
दिनांक एवं प्रमाण SIGN & DATE 	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
सामग्री सूची संख्या INVENTORY NO P-55-98		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16

भारत का प्रथम SIGN & DATE		भारतीय प्रथम INVENTORY NO		ST39013 पृष्ठ 40 का 4 Page 4 of 40	
भारत का प्रथम SIGN & DATE		भारतीय प्रथम INVENTORY NO		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	
भारत का प्रथम SIGN & DATE		भारतीय प्रथम INVENTORY NO		1. All relevant controls, interlocks and instrumentation. 2.2 Spare Parts: - Spares for satisfactory commissioning of the OPS are to be supplied (apart from mandatory spares). Also, a list of recommended spare parts with price break-up for 3 year satisfactory operation of the system shall also be supplied by vendor. Purchase order on the same shall be placed later by BHEL as per customer's requirement. Validity shall be kept suitable to meet our customer's requirement. 3 GENERAL TECHNICAL REQUIREMENTS 3.1 The OPS shall operate on a bypass system and the capacity of the unit shall as per the Table-A of this specification. The oil in system conforms to Servoprime-46 / ISO VG 46 / Turbinol-47 / BHEL standard practice (refer Annexure -I). The system will be located inside the turbine hall in oil room near oil tank. 3.2 The OPS should be as compact as possible so that it may be installed in the minimum required space and easy to handle. 3.3 The OPS should be suitably designed to operate in tropical climatic conditions. Equipment shall be designed for ambient temperature of 55°C and relative humidity of 95%. 3.4 Base area/ foundation of purifier shall be designed to be as compact as possible without any vibration problem as per IS: 10816-2.Norms as per approved datasheet. 3.5 All valves and instruments should be readily accessible to facilitate maintenance and operation. 3.6 The OPS should be completely vapour tight to prevent fumes and vapours from entering. 3.7 The equipment shall be suitable for continuous operation round the clock. 3.8 On load automatic cleaning of bowl assembly is preferable.	
भारत का प्रथम SIGN & DATE		भारतीय प्रथम INVENTORY NO		Rev. no. 08 निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	
भारत का प्रथम SIGN & DATE		भारतीय प्रथम INVENTORY NO		Anil kumar Kamla Prasant Devesh 18.03.16 18.03.16	

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संपूर्ण सूची संख्या INVENTORY NO 125538	SUPERSEDES 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 Table- A.		
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दिनांक एवं हस्ताक्षर SIGN & DATE 	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	18.03.16 18.03.16	18.03.16 18.03.16



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

SIGN & DATE

SUPERSEDES
INVENTORY NO.

सामग्री सूची संख्या को
अधिष्ठापित करता है।

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स्वत्वाधिकार एवं गोपनीय
इस प्रश्न में दी गई सूचना भारत की गवर्निंगलज लिमिटेड की संपत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष स्वयं में किसी भी तरह प्रयोग और बि बिपनी के हिन में हाविकाक हो न किया जाय।

SIGN & DATE

सामग्री सूची संख्या
INVENTORY

TABLE- A

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

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.

- (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.

Rev. no.
08

निर्माणकर्ता
WORKED BY:

Anil / Kavita

जाँचकर्ता
CHECKED BY:

A. S. Rajput /
Devesh

Anil Kumar
Kavitha

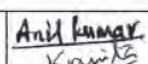
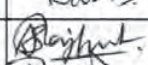
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Playbook
H. 17.12

18.03.16

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सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	(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 (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. (s) Control voltage shall be 110 V AC/220 VAC. This will be informed at the time of detail Engineering. (t) Cables for Motors and heaters shall be adequately sized keeping sufficient margin. Sizes shall be subject to BHEL/Customer approval. (u) Cable glands suitable for incoming 415 V feeder cables shall be provided. Cable Sizes will be intimated later. (v) LCP shall have 20% spare terminals. (w) Polishing filter (if applicable), chock alarm shall be provided through DPS. (x) All instruments/ Devices shall have IP55 degree of protection. (y) For level switches and other instruments, plug and socket type connectors shall be provided. For level switch over range proof pressure shall be 150% of max design pressure. (z) For Pressure gauge, Temperature gauge and level gauge over range test pressure shall be 1.5 times the maximum design pressure at 38 C. Range selection should cover 125% of max of scale. For Rotameter, the housing shall be IP55 protection class. (aa) Reports of type tests shall be those conducted within last five years.			
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सामग्री सूची संख्या INVENTORY NO.	निर्माणकर्ता WORKED BY:	A. S. Rajput / Devesh	18.03.16	जाँचकर्ता CHECKED BY:	

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सापेक्षी सूची संख्या INVENTORY NO.	(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.			
सापेक्षी सूची संख्या को अधिकतम करना है	(cc) Interconnection diagram shall be provided along with offer.			
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	(ee) Instruments/ equipments used in parallel system of 2x4500LPH system shall be of same make & type for both the purifiers in a single project.			
	4.2 For DCS control panel, additional requirements			
	The purification system shall be operated from control room as well as local panel having the logic built in BHEL control system instead of relay based control system. It shall also have Local/remote switch, separator start/stop selector Switch, heater on/off sel. Switch Test/Accept/Reset push buttons and 24 V DC interfacing relays with DCS.			
सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता	Control Philosophy			
सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता	(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.			
सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता	(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.			
सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता	(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.			
सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता	(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.			
सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता	(e) Alarms shall be generated in DCS and output shall be given for driving the alarm windows in LCP.			
सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता सापेक्षी सूची संख्या एवं गोपनीयता	(f) Control of individual heaters stages shall be from DCS for maintaining required oil temp using 2 nos. duplex RTDs.			
दिनांक एवं हस्ताक्षर SIGN & DATE 18/03/16	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita 18.03.16
सापेक्षी सूची संख्या INVENTORY NO. P-5538		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput Devesh 18.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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सुपरसेडस 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.			
भारतीय मूल की मशीन को अधिखरीदना चाहिए	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.			
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	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.			
स्वसामग्रीकरण एवं योग्यता पर जाँच में की गई शुद्धता और इस लेखिका द्वारा निर्देश की कार्यविधि है इसका पुष्टि एवं अनुमति प्राप्त हो बिना ही यह प्रमाण की कि कंपनी के लिए ये निर्देशक दो न किए गए।	दिनांक एवं हस्ताक्षर SIGN & DATE 			
सामग्री सूची संख्या INVENTORY NO P-538	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita		18.03.16
		जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh		18.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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सापेक्षी सूची संख्या INVENTORY NO	सापेक्षी सूची संख्या को अधिष्ठापित करना है	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.		
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.				
दिनांक एवं हस्ताक्षर SIGN & DATE	दिनांक एवं हस्ताक्षर SIGN & DATE	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita 18.03.16
सापेक्षी सूची संख्या INVENTORY NO	Rev. no. 08	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A.S. Rajput Devesh 18.03.16

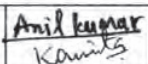
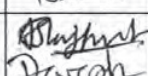
निष्पत्ति एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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सामग्री सूची संख्या INVENTORY NO.	सुपरसेड्स INVENTORY NO.	(a) Check for dimensions of all the component parts including surface finish, radial run out of shaft (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. (c) Static & dynamic balancing test on all rotating elements of the centrifuge. Acceptance Norms for vibration is 5.6 mm/s. (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. (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. (f) Type-test reports detailing the results for motors of similar ratings shall be furnished as called annexure III. (g) Routine test reports of motors to be furnished as per annexure III. (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. (i) Dimensional checks as per approved drawing including proper cut outs, mounting of all instruments/ accessories etc. as per approved general arrangement drawing. (j) Functional/ operational checks of all wiring schematics, operational/ sequential interlocks etc. are applicable as per approved drawing. i) Degree of protection test as per IS: 2147 (Type test) at 2.0 KV. (k) High voltage test & IR measurement not less than 30 mega ohm (MΩ) before and after test. ii) Pick up and drop down test & performance with ±10% voltage variation. (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		
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	A. S. Rajput Devesh

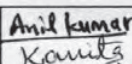
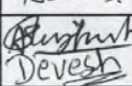
चिह्नक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013	
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सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO.	content at the outlet of oil purification system. Acceptance 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.			
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 Party to furnish certificate of compliance for the instruments which are being installed in the system after P.O. placement. 7.7 <u>STORAGE:-</u> Bidder shall inform to purchaser along with the offer regarding storage facility which they require at the site for their equipment if the unit is to be stored at site for their equipment. If the unit is to be stored at site for next 12 to 18 months after dispatch from manufacturer's works.			
स्वामित्व अधिकार एवं गोपनीयता इस दस्तावेज में दी गई सूचना भारत भारती उपकरणों लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल में ही होना चाहिए। इस दस्तावेज को किसी भी प्रकार से प्रसारित नहीं किया जाये।		8 DOCUMENTS, DATA AND DRAWINGS TO BE FURNISHED BY SUPPLIER 8.1 DRAWINGS/ DOCUMENTS REQUIRED WITH THE OFFER			
चिह्नक एवं 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. 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. 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. 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. h. Electrical single line diagram, control wiring diagram, interlocks schematic, protection scheme, details of motor and starter etc.			
सामग्री सूची संख्या INVENTORY NO.	Rev. no.	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita	18.03.16
सामग्री सूची संख्या INVENTORY NO.	08	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput Devesh	18.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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सामग्री सूची संख्या INVENTORY NO.	सामग्री सूची संख्या को SUPERSEDES 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.		
8.2 DRAWINGS / DOCUMENTS REQUIRED WITHIN 30 DAYS AFTER PLACEMENT OF ORDER				
a. Five sets (paper based) of each of GA drawing, P&ID, filled in data sheet, control panel schematic & write-up etc. shall be furnished for review/ approval by BHEL/CUSTOMER after placement of order. b. Motor datasheet, curves/ graphs, type- test reports, efficiency rating etc. for review/ approval by BHEL/CUSTOMER after placement of order. c. O & M manual (soft/ paper based) shall be furnished for BHEL review/ approval.				
8.3 DRAWINGS/ DOCUMENTS REQUIRED ALONGWITH SUPPLY				
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 &				
दिनांक एवं हस्ताक्षर SIGN & DATE	दिनांक एवं हस्ताक्षर SIGN & DATE	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
सामग्री सूची संख्या INVENTORY NO.	सामग्री सूची संख्या INVENTORY NO.	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013																	
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सामग्री सूची संख्या INVENTORY NO 2558	SUPERSEDES INVENTORY NO	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. <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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दिनांक एवं हस्ताक्षर SIGN & DATE 18/03/16	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kaur 18.03.16																
सामग्री सूची संख्या INVENTORY NO 2558		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A.S. Rajput Devesh 18.03.16																

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सावधानी सूची संख्या को 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.			
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स्वामित्व अधिकार एवं गोपनीयता इस दस्तावेज में दी गई सूचना भारत हीवी इलेक्ट्रिकल्स लिमिटेड की संपत्ति है। इसका प्रयोग केवल उद्देश्य के बिना अन्य किसी भी तरह प्रयोग या फिर संपत्ति के हानि में होना नहीं चाहिए।				
दिनांक एवं हस्ताक्षर SIGN & DATE				
सावधानी सूची संख्या INVENTORY NO.	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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SUPERSEDES INVENTORY NO. सावरी सूची संख्या को प्रतिस्थापित करता है	14 ANNEXURE-I (PROPERTIES OF TURBINE OIL)				
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	S. No.	Properties	Value	Test Method	
	1. a.	Kinematic viscosity at 37.8°C	47.5 c.s. to 49.5 c.s.	IS : 1448-P25	
	b.	Kinematic viscosity at 50.0°C	28 c.s.	IS : 1448-P25	
	2.	Viscosity index	Min 97	IS : 1448-P56	
	3. a.	Inorganic acidity	Nil	IS : 1448-P2	
	b.	Organic acidity	Max. 0.14 mg of KOH	IS : 1448-P2	
	c.	Neutralisation No.	Max. 0.2 mg of KOH per gm of oil	IS : 1012	
	4.	Colour	Max. 2	IS : 1448-P12	
	5.	Specific gravity at 50 °C	0.852	IS : 1448-P32	
	6.	Flash point Cleveland Open cup	Min. 200°C		
	7.	Copper strip corrosion test At 100°C for 3 hours	Not worse than No.1	IS : 1448-P15	
	8.	Pour point	-6 °C max.	IS : 1448-P10	
	9.	Rust preventing characteristics	negative test passed	ASTM : D665	
10.	Emulsion characteristics	40-40-0(20 minutes)	ASTMD : 1401-67		
11.	Total acidity after 1000 hrs. oxidation	Max. 2.0 mg of KOH per gm of the oil.	ASTMD : 943-54/ IP 157/64		
12.	Foaming characteristics Max.				
	(a) At 24°C	Nil	Volume in ml of foam after 10 minutes.		
	(b) At 93.5°C	Nil			
दिनांक एवं हस्ताक्षर SIGN & DATE 	स्वत्वाधिकार एवं गोपनीयता इस दस्तावेज़ में दी गई सूचना भारत भारती लिमिटेड की संपत्ति है। इसका प्रयोग या वितरण के बिना या इसकी प्रतिलिपि के बिना नहीं किया जा सकता।				
सावरी सूची संख्या INVENTORY NO. 2558	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	 Anil Kumar	18.03.16
		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	 Devesh	18.03.16

निर्माण एवं हस्ताक्षर SIGN & DATE भारतीय सूची संख्या INVENTORY NO भारतीय सूची संख्या को अपडेटिंग करना है		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013																													
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भारतीय सूची संख्या INVENTORY NO 25538	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita	जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	Anil kumar Kumar 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 20 Page 20 of 40																																																																											
SUPERSEDES INVENTORY NO भावकी पूर्ती करना हो अधिकृत किया है	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;"> <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 & 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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उत्पाद क्रय विनिर्देश (हीप : हरिद्वार)

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

SIGNATURE AND DATE

SUPERSEDES
INVENTORY NO

सावरीं गुपी राख्या को
अधिकसिख बाला है

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स्वत्वाधिकार एवं गोपनीय

SIGN & DATE

सामग्री सूची संख्या

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	OIL TEMPERATURES	
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	

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

5.0 MATERIALS OF CONSTRUCTION OF CENTRIFUGE (INDICATE STANDARDS)

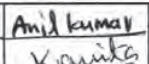
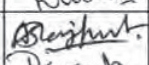
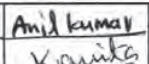
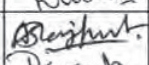
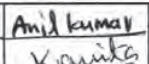
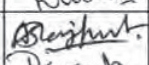
5.1	Bowl body	
5.2	bowl cover	
5.3	Separating discs	
5.4	Drive shaft	
5.5	Bowl nut	
5.6	Worm & Gear /Belt	

Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	<u>Anil kumar</u> <u>Kavita</u>	18.03.16
	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	<u>A. S. Rajput</u> <u>Devesh</u>	18.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013		
				पृष्ठ 40 का 22 Page 22 of 40		
SUPERSEDES INVENTORY NO						
6.0 DESIGN/CONSTRUCTION FEATURES OF ELECTRIC HEATER						
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.	6.1	Heater details				
	6.1.1	Quantity	Nos.			
	6.1.2	Kilowatts	kW			
	6.1.3	Rating of steps (kW)				
	6.1.4	Voltage	Volts (AC)			
	6.1.5	Frequency	C/s			
	6.1.6	Phase				
	6.1.7	Number of thermostat	3 (2Nos. for oil temp. and one for water temp.)			
	6.1.8	Range				
	6.1.9	Model				
	6.1.10	Manufacturer				
	6.2	Heater control thermostat setting	Cut in at °C/ Cut out at °C			
	6.2.1	Rating of thermostat contacts	5 amps 240V A.C 0.25 amps 240V D.C			
	6.2.2	No. of contacts	2 No + 2 N C			
	6.3	Heater tubes				
	6.3.1	Material				
	6.3.2	Number				
	6.3.3	Length	mm			
	6.3.4	Outside diameter	mm			
	6.3.5	Tube wall thickness	mm			
	6.3.6	Surface area of heater tubes.	mm ²			
	6.4	Tube Sheets				
	6.4.1	Material				
	6.4.2	Number				
	6.4.3	Thickness	mm			
	6.5	Tube bundle type	Removable/non-removable			
	6.6	Capacity of heater tank	M3			
	7.0 CENTRIFUGE FEED PUMP & DISCHARGE PUMP					
			FEED PUMP	DISCHARGE PUMP		
दिनांक एवं हस्ताक्षर SIGN & DATE	Rev. no.	08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita	18.03.16
	सामग्री सूची संख्या INVENTORY NO PSS-98		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A.S. Rajput Devesh	18.03.16

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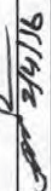
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स्वतंत्राधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारी भारी विद्युत निगम की संपत्ति है। इसका प्रयोग बिना अनुमति के किसी भी तृतीय पक्ष को नहीं करना चाहिए। इस दस्तावेज को किसी भी रूप में प्रसारित नहीं किया जाना चाहिए।				
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सामग्री सूची संख्या INVENTORY NO.				

		to be provided for external cable connection
13.5.4	Sheeting of RTD	Metal sheathed; ceramic packed
13.5.5	Calibration & accuracy	
13.5.6	Thermo well	
13.5.7	Model no.	
13.5.8	Manufacturer	
13.6	LEVEL SWITCH (For detail specification, refer annexure-IV)	
13.6.1	Number	
13.6.2	Type	
13.6.3	Location	Indirect oil heater Anti-flood device
13.6.4	Range	
13.6.5	Manufacturer	
13.6.6	Model no.	
13.6.7	No. of contacts & contact rating	2 NOs. SPDT contacts 5A for 240 VAC 0.25A for 220 VOC
13.7	LEVEL GAUGE	
13.7.1	Number	
13.7.2	Type	
13.7.3	location	
13.7.4	Model No.	
13.7.5	Length	
13.7.6	Manufacturer	
13.8	INDICATING TYPE DIFFERENTIAL PRESSURE SWITCH (across polishing filter)	
13.8.1	Number	
13.8.2	Type	
13.8.3	Model No.	
13.8.4	No. of contacts & contact rating	
13.8.5	Manufacturer	
13.8.6	List of spares furnished for three (3) Years normal operation and maintenance Enclosed with bid.	Yes/No
13.8.7	List of special tools furnished enclosed with bid.	
14.0 LT MOTORS(for details refer Annex III)		
14.1	GENERAL	
14.1.1.	Manufacturer & Country of origin.	
14.1.2.	Equipment driven by motor	
14.1.3.	Motor type	

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

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013																																																																																																													
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सामग्री सूची संख्या INVENTORY NO 25538	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.																																																																																																														
दिनांक एवं हस्ताक्षर SIGN & DATE	स्वामित्व अधिकार एवं गोपनीयता All rights reserved. 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.	<table border="1"> <tr> <td>14.1.4.</td> <td>Quantity</td> <td></td> </tr> <tr> <td>14.2</td> <td>DESIGN AND PERFORMANCE DATA</td> <td></td> </tr> <tr> <td>14.2.1.</td> <td>Frame size</td> <td></td> </tr> <tr> <td>14.2.2.</td> <td>Type of duty</td> <td></td> </tr> <tr> <td>14.2.3.</td> <td>Type of enclosure /Method of cooling/ Degree of protection</td> <td></td> </tr> <tr> <td>14.2.4.</td> <td>Applicable standard to which motor generally conforms</td> <td></td> </tr> <tr> <td>14.2.5.</td> <td>Efficiency class as per IS 12615</td> <td></td> </tr> <tr> <td>14.2.6.</td> <td>(a)Whether motor is flame proof</td> <td>Yes/No</td> </tr> <tr> <td></td> <td>(b)If yes, the gas group to which it conforms as per IS:2148</td> <td></td> </tr> <tr> <td>14.2.7.</td> <td>Type of mounting</td> <td></td> </tr> <tr> <td>14.2.8.</td> <td>Direction of rotation as viewed from DE END</td> <td></td> </tr> <tr> <td>14.2.9.</td> <td>Standard continuous rating at 40 deg C. ambient temp. as per Indian Standard (KW)</td> <td></td> </tr> <tr> <td>14.2.10.</td> <td>Derated rating for specified normal condition i.e. 50 deg. C ambient temperature (KW)</td> <td></td> </tr> <tr> <td>14.2.11.</td> <td>Maximum continuous load demand of driven equipment in KW</td> <td></td> </tr> <tr> <td>14.2.12.</td> <td>Rated Voltage (volts)</td> <td></td> </tr> <tr> <td>14.2.13</td> <td>Permissible variation of :</td> <td></td> </tr> <tr> <td></td> <td>a. Voltage (Volts)</td> <td></td> </tr> <tr> <td></td> <td>b. Frequency (Hz)</td> <td></td> </tr> <tr> <td></td> <td>c. Combined voltage and frequency</td> <td></td> </tr> <tr> <td>14.2.14.</td> <td>Rated speed at rated voltage and frequency(RPM)</td> <td></td> </tr> <tr> <td>14.2.15.</td> <td>At Voltage and frequency:</td> <td></td> </tr> <tr> <td></td> <td>a. Full load current</td> <td></td> </tr> <tr> <td></td> <td>b. No load current</td> <td></td> </tr> <tr> <td>14.2.16.</td> <td>Power Factor at</td> <td></td> </tr> <tr> <td></td> <td>a. 100% load</td> <td></td> </tr> <tr> <td></td> <td>b. NO load</td> <td></td> </tr> <tr> <td></td> <td>c. Starting.</td> <td></td> </tr> <tr> <td>14.2.17.</td> <td>Efficiency at rated voltage and frequency,</td> <td></td> </tr> <tr> <td></td> <td>a.100% load</td> <td></td> </tr> <tr> <td></td> <td>b. 75% load</td> <td></td> </tr> <tr> <td></td> <td>c. 50% load</td> <td></td> </tr> <tr> <td>14.2.18.</td> <td>Starting current (amps) at</td> <td></td> </tr> <tr> <td></td> <td>a. 100 % voltage</td> <td></td> </tr> <tr> <td></td> <td>b. 85% voltage</td> <td></td> </tr> <tr> <td></td> <td>c. 80% voltage</td> <td></td> </tr> <tr> <td>14.2.19.</td> <td>Minimum permissible starting Voltage (Volts)</td> <td></td> </tr> </table>			14.1.4.	Quantity		14.2	DESIGN AND PERFORMANCE DATA		14.2.1.	Frame size		14.2.2.	Type of duty		14.2.3.	Type of enclosure /Method of cooling/ Degree of protection		14.2.4.	Applicable standard to which motor generally conforms		14.2.5.	Efficiency class as per IS 12615		14.2.6.	(a)Whether motor is flame proof	Yes/No		(b)If yes, the gas group to which it conforms as per IS:2148		14.2.7.	Type of mounting		14.2.8.	Direction of rotation as viewed from DE END		14.2.9.	Standard continuous rating at 40 deg C. ambient temp. as per Indian Standard (KW)		14.2.10.	Derated rating for specified normal condition i.e. 50 deg. C ambient temperature (KW)		14.2.11.	Maximum continuous load demand of driven equipment in KW		14.2.12.	Rated Voltage (volts)		14.2.13	Permissible variation of :			a. Voltage (Volts)			b. Frequency (Hz)			c. Combined voltage and frequency		14.2.14.	Rated speed at rated voltage and frequency(RPM)		14.2.15.	At Voltage and frequency:			a. Full load current			b. No load current		14.2.16.	Power Factor at			a. 100% load			b. NO load			c. Starting.		14.2.17.	Efficiency at rated voltage and frequency,			a.100% load			b. 75% load			c. 50% load		14.2.18.	Starting current (amps) at			a. 100 % voltage			b. 85% voltage			c. 80% voltage		14.2.19.	Minimum permissible starting Voltage (Volts)	
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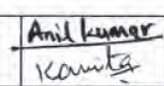
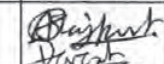
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मासिक सूची संख्या INVENTORY NO.	f. Cable glands & lugs details (shall be suitable for power cable)			
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	14.3.4.	Motor Paint shade		
	14.3.5.	Weight of		
		a. Motor stator (KG)		
		b. Motor Rotor (KG)		
		c. Total weight (KG)		
	14.4	List of accessories.		
	14.4. 1.	Space Heaters (Nos./Power in watts/supply voltage)		
	14.4.2.	Terminal Box for Space Heater (Yes/No)		
	14.4.3.	Speed switch (Yes/No)		
		No of contacts and contact ratings of speed switch		
	14.4.4.	Insulation of bearing (Yes/No)		
	14.4.5.	Noise reducer(Yes/No)		
	14.4.6.	Grounding pads		
		i) No and size on motor body		
		ii) Nos on terminal Box		
	14.4.7.	Any other fitments		
	14.5	List of curves.		
	14.5.1	Torque speed characteristic of the motor		
	14.5.2	Thermal withstand characteristic		
	14.5.3	Starting. current Vs. Time		
	14.5.4	Starting. current Vs speed		
	14.5.5	P.F. and Effie. Vs Load		
	स्वतः अधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारी उपकरण लिमिटेड की संपत्ति है इसका प्रकाश एवं प्रसारण अन्य से किसी भी तरह उपयोग की बिना कम्पनी के लिखित में अनुमति के बिना नहीं होना चाहिए।	Note:- Mark N.A. in motor data sheet whichever is not applicable.		
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सामग्री सूची संख्या को INVENTORY NO	16 ANNEXURE-III (SPECIFICATION OF MOTOR)																																							
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, IS 12615:2011 & IS : 2148 or equipment BS : Specification. The motor shall meet all Indian statutory requirements.																																								
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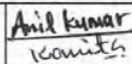
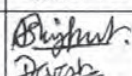
दिनांक एवं हस्ताक्षर SIGN & DATE भारतीय सूची संख्या INVENTORY NO 25538	नौ एम डी एल 	उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 32 Page 32 of 40	
SUPERSEDES INVENTORY NO भारतीय सूची संख्या को प्रतिस्थापित करना है	4.1 Characteristics: (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 GD² 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 TESTS AT MANUFACTURE'S WORKS OF MOTOR: 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 CROSS REFERRED STANDARDS: IS:325 , IS:4722, IS:2253, IS:2254, IS:3202, IS:4029, IS:12065, IS:12075, IS:12615:2011			
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	स्वामित्व अधिकार एवं गोपनीय इस दस्तावेज में दी गई जानकारी भारत भारी मशीननिर्माण लिमिटेड की संपत्ति है। इसका प्रयोग एवं वितरण केवल भारत भारी मशीननिर्माण लिमिटेड की अनुमति के बिना नहीं किया जाय।			
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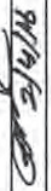
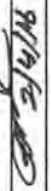
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सामग्री सूची संख्या INVENTORY NO. P-5538	SUPERSEDES INVENTORY NO.	17 ANEXURE-IV (SPECIFICATION OF INSTRUMENTS)																		
1) PRESSURE GAUGE																				
The Pressure gauge should confirm to the following technical specification:-																				
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.																				
2) TEMPERATURE INDICATOR																				
<table border="1"> <tr> <td>Type</td> <td>Bimetallic rigid system type. No use of mercury or any other hazardous/toxic material</td> </tr> <tr> <td>Case</td> <td>Die cast aluminium alloy moisture proof case, heavily enamelled black</td> </tr> <tr> <td>Dial Size</td> <td>100 mm</td> </tr> <tr> <td>Range</td> <td>As per design</td> </tr> <tr> <td>Accuracy</td> <td>1% of total range</td> </tr> <tr> <td>Bulb Material</td> <td>½" bulb diameter made of SS. 316</td> </tr> <tr> <td>Thermo-well</td> <td>SS-AISI316 (with thread size G1/2")</td> </tr> <tr> <td>Ambient Temp</td> <td>60° C max.</td> </tr> </table>					Type	Bimetallic rigid system type. No use of mercury or any other hazardous/toxic material	Case	Die cast aluminium alloy moisture proof case, heavily enamelled black	Dial Size	100 mm	Range	As per design	Accuracy	1% of total range	Bulb Material	½" bulb diameter made of SS. 316	Thermo-well	SS-AISI316 (with thread size G1/2")	Ambient Temp	60° C max.
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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.																				
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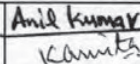
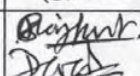
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18.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 36 Page 36 of 40	
सामग्री सूची संख्या INVENTORY NO.	20 ANNEXURE- VII (CHECK LIST) A. CHECK LIST FOR MECHANICAL ITEMS			
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.	Sl. No.	Technical Requirements	Vendor's confirmation (Yes/No)	Remarks (if any)
	1.	Is capacity of oil purifier as per BHEL specifications (i.e. 7500 LPH)?		
	2.	a) Is particle size of impurities in the clean oil as per BHEL specifications in single pass (i.e. class 15/12 or better as per ISO4406)? 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 ($\beta_3 = 1000$ or better) provided as per BHEL specifications?		
	10.	Is supervision during erection & commissioning at site by vendor offered as per BHEL specifications & enquiry?		
	11.	Is lube oil recirculation piping/ piping connection provided as per BHEL specifications & enquiry?		
	12.	Are sufficient spares for satisfactory commissioning and for 3 years satisfactory operation of the purifier provided as per BHEL specifications?		
	13.	Are detailed lists of recommended spares and commissioning spares along with price break up provided as per BHEL specifications & enquiry?		
14.	Is separate offer for conducting test for particle size of impurities and			
दिनांक एवं हस्ताक्षर SIGN & DATE 25/4/16	सामग्री सूची संख्या INVENTORY NO. 25538	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita	18.03.16
		जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	18.03.16	

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013 पृष्ठ 40 का 37 Page 37 of 40																																
सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;"></td> <td style="width: 65%;">moisture content on one oil purification system provided as per BHEL specifications/enquiry?</td> <td style="width: 15%;"></td> <td style="width: 15%;"></td> </tr> <tr> <td>15.</td> <td>Is the painting scheme as per BHEL specifications/enquiry?</td> <td></td> <td></td> </tr> <tr> <td>16.</td> <td>Are all piping of oil purification system shall be stainless steel?</td> <td></td> <td></td> </tr> <tr> <td>17.</td> <td>Deviations taken (Please specify clearly, if any):</td> <td></td> <td></td> </tr> <tr> <td></td> <td>a)</td> <td></td> <td></td> </tr> <tr> <td></td> <td>b)</td> <td></td> <td></td> </tr> <tr> <td></td> <td>c)</td> <td></td> <td></td> </tr> <tr> <td></td> <td>d)</td> <td></td> <td></td> </tr> </table>			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.	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																																			
दिनांक एवं हस्ताक्षर SIGN & DATE	स्वत्व अधिकार एवं गोपनीयता यह दस्तावेज मेरी/हमारी संपत्ति है। इसका उपयोग केवल निर्दिष्ट उद्देश्य के लिए किया जाना चाहिए। इस दस्तावेज को गोपनीय माना जाता है।																																		
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ST39013	08	Anil / Kavita	A. S. Rajput / Devesh																																
																																			
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निष्कापक SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 38 Page 38 of 40	
SUPERSEDES INVENTORY NO आवरी सूची संख्या की अधिदेशन करना है	B. CHECK LIST FOR C&I ITEMS			
Check list for OPU (DCS Based)				
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.				
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 दस्तावेज में दी गई सूचना भारत भारी यंत्र निर्माण लिमिटेड की संपत्ति है, इसका प्रयोग एवं प्रसारण केवल निम्नी नीति पर ही किया जा सकता है कि: इसकी प्रतिलिपि न किया जाए।			
निष्कापक SIGN & DATE 				
सामग्री सूची संख्या INVENTORY NO 25598	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

निष्कर्ष एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013	
				पृष्ठ 40 का 39 Page 39 of 40	
सामग्री सूची संख्या INVENTORY NO 25538	Rev. no. 08	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			
स्वतंत्रता दिवस पर गोपनीय इस प्रलेख में की गई सूचना भारत के सभी नागरिकों के लिए गोपनीय है। इसमें प्रलेख एवं प्रलेखन कार्य में किसी भी तरह के प्रयोग को कि कंपनी के लिए न हानिकारक हो न किया जाए।	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				
निष्कर्ष एवं हस्ताक्षर SIGN & DATE 	निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh  18.03.16  18.03.16				

ADDENDUM- 411928W5100

MANUAL CLEANING TYPE OIL PURIFIER (DCS BASED)

ADDITIONAL SPECIFICATION FOR ST39013 (Rev.no.-08):

1. Capacity of oil purification system (OPS) shall be **6000 LPH**.
2. Heater rating of OPS shall be 72 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 on one oil purification system-of Bhusawal project.
4. Clause 8.1(m) at page no. 13 of Spec-ST39013 is applicable only for motor.
5. 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.
6. Clause 20 A (14) at page no.: 36 of Spec-ST39013 clause shall be ignored.
7. 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.
8. 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.
9. 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.
10. Supervision by vendor during erection & commissioning at site shall be required.
11. List of recommended spares and commissioning spares along with price breakup of individual spares are required.
12. 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.
13. Clause 20 A (1) at page no.: 36 of Spec-ST39013 read as:-Is capacity of oil purifier as per BHEL specifications (**i.e. 6000 LPH**)?
14. 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**.
15. 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.
16. 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.

ADDENDUM- 411928W5100

MANUAL CLEANING TYPE OIL PURIFIER (DCS BASED)

17. 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.
18. Clause 8.1(f) at page no.: 13 of Spec-ST39013 read as:-Characteristic curve of all pumps preferably required.
19. 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.
20. Clause 8.3(b) at page no.:14 read as twelve (12) sets paper based in place of twenty (20) sets of O&M Manual.
21. 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.
22. 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
23. For supply of VAF meter 3 phase 3 wire supply is preferred.
24. Refer sheet no 08 of 40 of specification ST 39013, clause no 4.1.u – cable glands suitable for 3 wire 400 mm² incoming cable shall be provided.
25. 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.
26. Refer sheet no 09 of 40 of specification ST 39013, clause no 4.2 – Alternatively switching of control unit shall be possible from DCS.
27. Refer sheet no 12 of 40 of specification ST 39013, clause no 7.h- Alternatively manufacturers test certificate shall be provided for BHEL review.
28. Refer sheet no 12 of 40 of specification ST 39013, clause no k.i – may be ignored.
29. 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.
30. 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.
31. Refer sheet no 30 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.
32. Refer sheet no 30 of 40 of specification ST 39013, clause no 17.1.i -This clause may be ignored.
33. 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.

ADDENDUM- 411928W5100

MANUAL CLEANING TYPE OIL PURIFIER (DCS BASED)

34. 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.
35. 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.
36. Motor starting current shall be for Direct Online (DOL) shall be as per IS: 12615-2011/IEC 60034.
37. 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.
38. Clause 4.1.e at page no.: 7 of Spec-ST39013 Requirement of flame proof motor as per IS2148 is not essential.
39. Clause 4.1.w at page no.: 8 of Spec-ST39013:- should be read as polishing filter, chock alarm shall be provided through DPS.
40. Control Panel color - (i) Exterior-RAL 7032 (ii) Interior - Brilliant white.
41. Motor Efficiency: - Motor efficiency:-class-IE2 conforming to IS 12615, or IEC: 60034-30.
42. Above requirements supersede the corresponding requirements/clause of spec ST39013.

Kavita
21/05/2020
Kavita/Engr.

(CIE)

Anil Kumar
20/5/2020
Anil Kumar/Sr.Engr.

(TL)