



PPX-BOI DEPARTMENT
BHARAT HEAVY ELECTRICALS LIMITED
HEEP: HARDWAR-249 403 (Uttarakhand)
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PRE-QUALIFICATION REQUIREMENT

Enquiry No.:
B/4066/2019/0977V/1
Item-Oil Purification Unit
Project: Udangudi and
Panki

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 type test certificate of particle size of impurities (not older than five years) as per specification ST39013 Rev. no.-8 at the outlet 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.		AS PER PO	AS PER PO	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS			REMARKS	
		DRG. NO.	SPEC.	REV					DATED	S	B		C
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	6	7	8	9	D	11		
1	2	3	4	5	6	7	8	9	D	11			

[illegible]

		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	FOR CUSTOMER USE	
MANUFACTURER/SUBCONTRACTOR			APPROVED BY	



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

ST39013

पृष्ठ 40 का 1
Page | 1 of 40

दिनांक एवं हस्ताक्षर
SIGN & DATE

मासकी सूची मध्य को
अतिरिक्त करना है
SUPERSEDES
INVENTORY
NO.

BASED ON ST 22002

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स्वाधिकाार एवं गोपनीय
इस दस्तावेज में दी गई पुस्तक भारत हीवी एलेक्ट्रिकल लिमिटेड की सम्पत्ति है। इसका प्रयोग एवं प्रकाशन अन्य में किसी भी तरह दुर्लभ को बिना कम्पनी के लिखित में हस्तिकाार हो न किया जाय।

दिनांक एवं हस्ताक्षर
SIGN & DATE

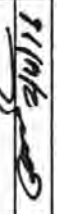
मासकी सूची संख्या
INVENTORY NO.

29/03/16
P.5538

Bid Specification
For
Turbine Oil Purification System
(Centrifuge type)

			नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
CIE	B. S. Rana		अनुवादक TRANSLATED BY	-----
QAX	S. K. Chauhan		निर्माणकर्ता WORKED BY	Anil Kumar 18.03.16
TSX	DEEPAK		जांचकर्ता CHECKED BY	A. S. Rajput 18.03.16
महामत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	R. Panja 18-03-16
SUPERSEDES			स्वीकृति APPROVED : S. K. Baveja	Gr. NO. 8.20
REV. NO.	08		निर्माण PREPARED : PED	दिनांक DATE : 25.8.84
Di.	29.03.16		जारी ISSUED : TSX	
CHANGE ADVICE NO.	STE-14-04	26.03.14		

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 2 Page 2 of 40	
सुपरसेडस INVENTORY NO	LIST OF CONTENTS:			
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.	1) INTENT OF SPECIFICATION		3	
	2) SCOPE OF SUPPLY		3	
	3) GENERAL TECHNICAL REQUIREMENTS		4	
	4) CONTROL & INSTRUMENTATION		6	
	5) PERFORMANCE REQUIREMENTS		10	
	6) GUARANTEES		10	
	7) QUALITY ASSURANCE, INSPECTION AND TESTING		11	
	8) DOCUMENTS, DATA AND DRAWINGS TO BE FURNISHED BY SUPPLIER		13	
	9) MATERIALS OF CONSTRUCTION		15	
	10) CODES AND STANDARDS		15	
	11) CLEANING, PROTECTION AND PAINTING		15	
	12) DESIGN CO-ORDINATION MEETING		16	
	13) LIST OF CROSS-REFERRED STANDARDS		16	
	14) ANNEXURE- I (PROPERTIES OF TURBINE OIL)		18	
	15) ANNEXURE- II (DATA SHEET OF TURBINE OIL SYSTEM)		20	
	16) ANNEXURE- III (SPECIFICATION OF MOTOR)		30	
	17) ANNEXURE- IV (SPECIFICATION OF INSTRUMENTS)		33	
	18) ANNEXURE- V (P&ID)		34	
	19) ANNEXURE- VI (QUALITY PLAN)		35	
	20) ANNEXURE- VII (CHECK LIST)		36	
सामग्री सूची संख्या INVENTORY NO 195538	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16

SIGNATURE SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 3 Page 3 of 40	
SUPERSEDES INVENTORY NO. सामग्री सूची संख्या को अपडेटिंग करना है	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.			
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	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.			
	स्वत्व अधिकार एवं गोपनीय इस दस्तावेज में दी गई जानकारी भारत भारती लिमिटेड की संपत्ति है इसका प्रयोग एवं प्रकाशन के बिना की जाये नहीं जायेगा और बिना लिखित अनुमति के इस दस्तावेज को किसी भी तरह से प्रसारित या प्रकाशित नहीं किया जायेगा।			
SIGNATURE SIGN & DATE 				
सामग्री सूची संख्या INVENTORY NO. P-53398	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 5 Page 5 of 40	
सामग्री सूची संख्या INVENTORY NO.	सामग्री सूची संख्या को अधिपत्ति करता है	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 .	
सामग्री सूची संख्या INVENTORY NO.	दिनांक एवं हस्ताक्षर SIGN & DATE	स्वत्वाधिकार 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.	Copyright and Confidential	
Rev. no. 08	निर्माणकर्ता WORKED BY:	निर्माणकर्ता Anil / Kavita	निर्माणकर्ता Anil Kaur Kavita	18.03.16
जाँचकर्ता CHECKED BY:	जाँचकर्ता A. S. Rajput / Devesh	जाँचकर्ता A. S. Rajput / Devesh	जाँचकर्ता A. S. Rajput / Devesh	18.03.16

SIGN & DATE 18/03/16		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013
			पृष्ठ 40 का 6 Page 6 of 40

SUPERSEDES INVENTORY NO. भारतीय मूल संपत्ति को प्रतिबिम्बित करना है	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
Var. No.	Flow capacity of purification system (Litre Per Hour)	Control Panel Type	Heater Rating (kW)																																																	
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	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.

स्वत्वधिकार एवं गोपनीय इस दस्तावेज में दी गई जानकारी भारत भारती लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल उसी उद्देश्य के लिए किया जा सकता है जो कि दस्तावेज के तहत निर्दिष्ट है।	(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, 3ϕ, 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, 3ϕ supply to the required value for further distribution. Isolating switches, over current protection, fuses, junction boxes with terminal strips etc. as required for sub-distribution shall be deemed to be in bidder's scope.
	SIGN & DATE 18/03/16

भारतीय मूल संपत्ति INVENTORY NO. 18/03/16	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita	Anil kumar 18.03.16
		जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	18.03.16

निष्पन्न एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 7 Page 7 of 40	
सुपरसेडस 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.			
भारतीय नौवहन विभाग भारतीय नौवहन विभाग	(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.			
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स्वतंत्रता दिवस पर गौरव इस प्रतिलिपि में श्री मंत्रालय द्वारा जारी की गई जानकारी का उपयोग केवल के लिए किया जा सकता है। इस प्रतिलिपि का उपयोग अन्य किसी भी उद्देश्य के लिए नहीं किया जा सकता है।	(h) Local instruments for pressure temp. & flow indication shall be provided in accordance with clause 8.0 of Annexure-I.			
निष्पन्न 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.			
भारतीय नौवहन विभाग भारतीय नौवहन विभाग	(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.			
भारतीय नौवहन विभाग भारतीय नौवहन विभाग	(k) Remote operating facility for all electrically operated components should be provided on control panel.			
भारतीय नौवहन विभाग भारतीय नौवहन विभाग	(l) All motors, heaters included in the offer, should be supplied along with its starter which will be mounted in the same panel.			
भारतीय नौवहन विभाग भारतीय नौवहन विभाग	(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).			
भारतीय नौवहन विभाग भारतीय नौवहन विभाग	(n) Control switches & Indicating lamps shall be as per vendor's standard practice or owner approved vendor/ make (project dependent).			
भारतीय नौवहन विभाग भारतीय नौवहन विभाग	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
भारतीय नौवहन विभाग भारतीय नौवहन विभाग	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16	18.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE सावरी सूची संख्या INVENTORY NO.		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 8 Page 8 of 40	
SUPERSEDES INVENTORY NO. सावरी सूची संख्या को प्रतिस्थापित करता है	(o) If a common control panel is provided by vendor for two or more oil purifiers running in parallel, then control panel should be designed in such a way that it allows control of both the separators on the same panel. Control panel & controls shall also be able to work a purifier satisfactorily while one purifier is in shutdown/ breakdown. (p) Local Panel (LCP) construction: Type: Fabricated from cold rolled sheet steel Frame thickness: 2.0 mm Enclosure thickness: 1.6 mm Gland plate thickness: 3.0 mm (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.			
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 हेवी इलेक्ट्रिकल्स लिमिटेड की संपत्ति है इसका प्रयोग के बिना या बिना अनुमति के किसी भी तरह प्रयोग को फिर से कंपनी के हित में प्रसारित करना गैर कानूनी है।			
दिनांक एवं हस्ताक्षर SIGN & DATE सावरी सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
दिनांक एवं हस्ताक्षर SIGN & DATE सावरी सूची संख्या INVENTORY NO.		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16



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

DESIGN & DATE

SUPERSEDES
INVENTORY NO.

आधुनिकी गृही मण्डला को
अभिजित्त मण्डला नि

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स्वत्वाधिकार एवं गोपनीय

SIGN & DATE

सामग्री सूची संख्या
INVENTORY

Rev. no.
08

निर्माणकर्ता
WORKED BY:

Anil / Kavita

Anil Kumar
Kanungo

18.03.16

जाँचकर्ता
CHECKED BY

A. S. Rajput /
Devesh

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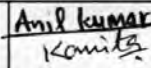
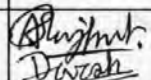
18.03.16

BHEL भारती मशीन संस्था INVENTORY NO.	ST39013 पृष्ठ 40 का 10 Page 10 of 40	उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	
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.		
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.			
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.			
Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita
जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput Devesh	18.03.16 18.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE सामग्री सूची संख्या INVENTORY NO 10-03-16	स्टैम्प एवं हस्ताक्षर SIGN & DATE सामग्री सूची संख्या INVENTORY NO 10-03-16	ST39013 पृष्ठ 40 का 11 Page 11 of 40	उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	
SUPERSEDES INVENTORY NO सामग्री सूची संख्या को अधिकारित करता 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.		
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.		
स्वतंत्रता एवं गोपनीयता इस दस्तावेज में दी गई जानकारी 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।		Rev. no. 08		
निर्माणकर्ता WORKED BY:		निर्माणकर्ता WORKED BY:		Anil / Kavita Anil Kumar Kavita
जाँचकर्ता CHECKED BY:		जाँचकर्ता CHECKED BY:		A. S. Rajput / Devesh A. S. Rajput Devesh
10.03.16		10.03.16		10.03.16 10.03.16

निष्पन्न एवं हस्ताक्षर SIGN & DATE नमूने की सूची INVENTORY NO 1-55-98		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 12 Page 12 of 40	
(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				
नमूने की सूची INVENTORY NO 1-55-98	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16

विनाम एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 13 Page 13 of 40	
सापेक्ष 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. 7.6 Party to furnish certificate of compliance for the instruments which are being installed in the system after P.O. placement. 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 8.1 <u>DRAWINGS/ DOCUMENTS REQUIRED WITH THE OFFER</u> 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.		
सापेक्ष सूची संख्या INVENTORY NO.	Rev. no.	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
सापेक्ष सूची संख्या INVENTORY NO.	08	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16

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			पृष्ठ 40 का 14 Page 14 of 40		
सामग्री सूची संख्या INVENTORY NO	i. Cross-sectional drawings of all equipments including horizontal and vertical section of separator indicating the recommended and mandatory spare parts. Also, list of recommended and mandatory spares with their part no. / model no. and quantity required. j. Details of standards /codes used for designing of the various equipments and selecting the material of various components. k. Name of the manufacturer and illustrative literature all components which have been out-sourced for purchaser's review. l. All other relevant data and drawings which supplier considers necessary for better understanding of the system. m. Type test Reports for capacity, moisture content, particle size of impurities and motor efficiency conducted within last 5 years. n. Interconnecting diagram of DCS control panel (if required). o. Acceptance norms for (i) in process NDT of bowl, shaft, butt welds of piping. (ii) Static & dynamic balancing of shaft. (iii) Performance test on pumps & motors. (iv)Vibration norms for pumps, motor and unit. p. Also, Bidder to shall furnish the filled up check list of BHEL format as per annexure –VII.				
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 &					
चित्रक एवं हस्ताक्षर SIGN & DATE	सामग्री 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



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

commissioning, operation and maintenance after approval. Vendor shall keep 2 copies of O&M manual in the dispatch box & shall also mention the same in its shipping list.

c. Before bidder finalises these manuals, the same will be reviewed by purchaser. After getting approval of purchaser, final manual in required quality shall be dispatched. Manual shall clearly indicate all inspections & tests to be carried out at site and if any check list/ log sheets etc. are required to carry-out specified inspection & test that shall be made part of manual.

d. Data sheets of all instruments, thermostats and motor .The same shall be included in O&M manual of oil purification system along with the catalogues of all instruments.

9 MATERIALS OF CONSTRUCTION

9.1 The material of all rotating parts / components i.e. "bowl, bowl cover, disc, Shaft/spindle, gear/screw shall be of high grade stainless steel (e.g. austenitic) considering the purpose and the extent of contact with oil. Other parts coming in direct contact with water shall be of stainless steel or other corrosion resistant material conforming to applicable standard (IS / BS) or equivalent standard. All those parts that are coming in contact with oil & are not of Stainless steel / other corrosion resistant shall be mentioned in their offer. This should be submitted as a separate document indicating material/ make of all parts.

9.2 All piping, fittings & valves should be suitably selected as per applicable IS, BS or equivalent standard.

9.3 Strainers, wherever provided, should be designed to enable them to be cleaned during operation.

9.4 All other parts/ components shall be of compatible material to suit the applications.

10 CODES AND STANDARDS

In addition to the codes and standards specifically mentioned in the relevant technical specification for the equipment/ plant/ system, all equipment parts, systems and works covered under this specification shall comply with all currently applicable statutory regulations and safety codes (National/International).

11. CLEANING, PROTECTION AND PAINTING

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

Paint (Coat)	Paint Type	No. of coat	DFT*
Primer Paint:	Epoxy base Zinc rich primer paint	2	70
Intermediate Paint:	Epoxy TiO2 Pigmented Polyamide Cured Paint	1	70
Finish (Final) Paint:	Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2	60

Rev. no.
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निर्माणकर्ता
WORKED BY

Anil / Kavita

Anil Kumar
Kamitz

18.03.16

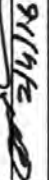
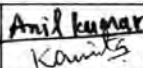
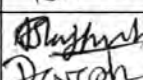
जाँचकर्ता

A. S. Rajput /
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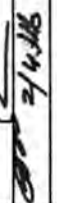
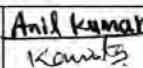
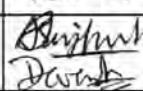
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निष्पन्न एवं हस्ताक्षर SIGN & DATE  उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013 पृष्ठ 40 का 16 Page 16 of 40	
SUPERSEDES INVENTORY NO.		Total Minimum DFT= 180 *DFT- Dry Film Thickness (Final) in micron. Paint Shade shall be as below:- - 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.	
स्वाधिकाार एवं गोपनीय हम अपने अधिकार के अंतर्गत इस दस्तावेज़ को प्रतिलिपि बनाने, प्रसारित करने, या किसी भी तरह से इसका उपयोग करने का अधिकार सुरक्षित रखते हैं।		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.	
निष्पन्न एवं हस्ताक्षर 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,	
निष्पन्न एवं हस्ताक्षर SIGN & DATE		Rev. no. 08	
निष्पन्न एवं हस्ताक्षर SIGN & DATE		निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	
निष्पन्न एवं हस्ताक्षर SIGN & DATE		18.03.16	
निष्पन्न एवं हस्ताक्षर SIGN & DATE		18.03.16	

Bharat Heavy Electricals SIGN & DATE				उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013	
SUPERSEDES INVENTORY NO		ग्राहकी सूची संख्या को अपडेटिंग करना है		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.		पृष्ठ 40 का 17 Page 17 of 40	
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		स्वाधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती लिमिटेड की संपत्ति है इसका प्रकाश एवं प्रसारण अन्य में किसी भी तरह करना जो कि कंपनी के हित में हानिकारक हो न किया जाए।		Bharat Heavy Electricals SIGN & DATE 		सामग्री सूची संख्या 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	

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013		
			पृष्ठ 40 का 18 Page 18 of 40		
सामग्री सूची संख्या INVENTORY NO.	14 ANNEXURE-I (PROPERTIES OF TURBINE OIL)				
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	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	स्वामिनी संख्या INVENTORY NO.	Rev. no.	निर्माणकर्ता WORKED BY:	Anil / Kavita	18.03.16
दिनांक एवं हस्ताक्षर SIGN & DATE	सामग्री सूची संख्या INVENTORY NO.	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	18.03.16	18.03.16

निष्कर्ष एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013	
				पृष्ठ 40 का 19 Page 19 of 40	
सामग्री सूची संख्या को INVENTORY NO	SUPERSEDES				
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स्वतंत्राधिकार एवं गोपनीय This document contains confidential information of BHEL. It is not to be disclosed to anyone without the prior written permission of BHEL.					
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सामग्री सूची संख्या INVENTORY NO					
Rev. no. 08					
निर्माणकर्ता WORKED BY:		Anil / Kavita		Anil kumar Kavita	
जाँचकर्ता CHECKED BY:		A. S. Rajput / Devesh		A.S. Rajput Devesh	
18.03.16		18.03.16		18.03.16	

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SUPERSEDES INVENTORY NO माधुरी सूची संख्या को अतिरिक्त करना 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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माधुरी सूची संख्या INVENTORY NO 25598	निर्माणकर्ता WORKED BY: जाँचकर्ता CHECKED BY:	Anil / Kavita A. S. Rajput / Devesh	  18.03.16 18.03.16																																																																											

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Rev. no. = 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil kumar Kavita	18.03.16
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दिनांक एवं हस्ताक्षर SIGN & DATE	सामग्री सूची संख्या INVENTORY NO.	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;">5.7</td> <td style="width:50%;">Oil injection nozzle</td> <td style="width:40%;"></td> </tr> <tr> <td>5.8</td> <td>Other inlet and outlet parts</td> <td></td> </tr> <tr> <td>5.9</td> <td>Other wetted bowl parts</td> <td></td> </tr> <tr> <td>5.10</td> <td>Valve Body</td> <td></td> </tr> </table>	5.7	Oil injection nozzle		5.8	Other inlet and outlet parts		5.9	Other wetted bowl parts		5.10	Valve Body	
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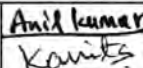
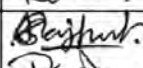
6.0 DESIGN/CONSTRUCTION FEATURES OF ELECTRIC HEATER

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

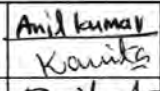
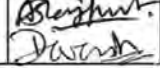
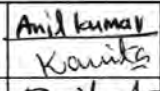
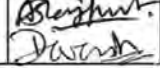
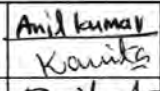
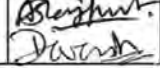
7.0 CENTRIFUGE FEED PUMP & DISCHARGE PUMP

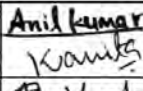
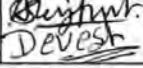
	FEED PUMP	DISCHARGE PUMP
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दिनांक एवं हस्ताक्षर SIGN & DATE	सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita	जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	18.03.16 18.03.16
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7.7	Max. allowable pump working pressure	Kg/cm2 (g)																																																																																																																	
7.8	Connections																																																																																																																		
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7.10	Drive (AC Motor)	As per enclosed annexure-3.																																																																																																																	
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सापेक्ष सूची संख्या INVENTORY NO. सापेक्ष सूची संख्या को अपिबर्तित करना है	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 45%;"></td> <td style="width: 40%;">to be provided for external cable connection</td> </tr> <tr> <td>13.5.4</td> <td>Sheeting of RTD</td> <td>Metal sheathed; ceramic packed</td> </tr> <tr> <td>13.5.5</td> <td>Calibration & accuracy</td> <td></td> </tr> <tr> <td>13.5.6</td> <td>Thermo well</td> <td></td> </tr> <tr> <td>13.5.7</td> <td>Model no.</td> <td></td> </tr> <tr> <td>13.5.8</td> <td>Manufacturer</td> <td></td> </tr> <tr> <td>13.6</td> <td colspan="2">LEVEL SWITCH (For detail specification, refer annexure-IV)</td> </tr> <tr> <td>13.6.1</td> <td>Number</td> <td></td> </tr> <tr> <td>13.6.2</td> <td>Type</td> <td></td> </tr> <tr> <td>13.6.3</td> <td>Location</td> <td>Indirect oil heater Anti-flood device</td> </tr> <tr> <td>13.6.4</td> <td>Range</td> <td></td> </tr> <tr> <td>13.6.5</td> <td>Manufacturer</td> <td></td> </tr> <tr> <td>13.6.6</td> <td>Model no.</td> <td></td> </tr> <tr> <td>13.6.7</td> <td>No. of contacts & contact rating</td> <td>2 NOs. SPDT contacts 5A for 240 VAC 0.25A for 220 VOC</td> </tr> <tr> <td>13.7</td> <td colspan="2">LEVEL GAUGE</td> </tr> <tr> <td>13.7.1</td> <td>Number</td> <td></td> </tr> <tr> <td>13.7.2</td> <td>Type</td> <td></td> </tr> <tr> <td>13.7.3</td> <td>location</td> <td></td> </tr> <tr> <td>13.7.4</td> <td>Model No.</td> <td></td> </tr> <tr> <td>13.7.5</td> <td>Length</td> <td></td> </tr> <tr> <td>13.7.6</td> <td>Manufacturer</td> <td></td> </tr> <tr> <td>13.8</td> <td colspan="2">INDICATING TYPE DIFFERENTIAL PRESSURE SWITCH (across polishing filter)</td> </tr> <tr> <td>13.8.1</td> <td>Number</td> <td></td> </tr> <tr> <td>13.8.2</td> <td>Type</td> <td></td> </tr> <tr> <td>13.8.3</td> <td>Model No.</td> <td></td> </tr> <tr> <td>13.8.4</td> <td>No. of contacts & contact rating</td> <td></td> </tr> <tr> <td>13.8.5</td> <td>Manufacturer</td> <td></td> </tr> <tr> <td>13.8.6</td> <td>List of spares furnished for three (3) Years normal operation and maintenance Enclosed with bid.</td> <td>Yes/No</td> </tr> <tr> <td>13.8.7</td> <td>List of special tools furnished enclosed with bid.</td> <td></td> </tr> <tr> <td colspan="3" style="text-align: center;">14.0 LT MOTORS(for details refer Annex III)</td> </tr> <tr> <td>14.1</td> <td colspan="2">GENERAL</td> </tr> <tr> <td>14.1.1.</td> <td>Manufacturer & Country of origin.</td> <td></td> </tr> <tr> <td>14.1.2.</td> <td>Equipment driven by motor</td> <td></td> </tr> <tr> <td>14.1.3.</td> <td>Motor type</td> <td></td> </tr> </table>					to be provided for external cable connection	13.5.4	Sheeting of RTD	Metal sheathed; ceramic packed	13.5.5	Calibration & accuracy		13.5.6	Thermo well		13.5.7	Model no.		13.5.8	Manufacturer		13.6	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	
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			पृष्ठ 40 का 28 Page 28 of 40	
SUPERSEDES INVENTORY NO. सामग्री सूची संख्या को प्रतिस्थापित करता है	14.2.20. Starting time with minimum permissible voltage a. Without driven equipment coupled b. With driven equipment coupled 14.2.21. Safe stall time with 100% and 110% of rated voltage a. From hot condition b. From cold condition 14.2.22. Torques : a. Starting torque at min. permissible voltage(kg-m) b. Pull up torque at rated voltage. c. Pull out torque d. Min accelerating torque (kg.m) available at lowest permissible e. Rated torque (kg.m) 14.2.23. Stator winding resistance per phase (ohms at 20 DegC.) 14.2.24. GD2 value of motors 14.2.25. No of permissible successive starts when motor is in hot 14.2.26. Locked Rotor KVA Input 14.2.27. Locked Rotor KVA/KW 14.2.28. Vibration limit :Velocity (mm/s) 14.2.29. Noise level limit (dBA) 14.3 CONSTRUCTIONAL FEATURES 14.3.1. Stator winding insulation a. Class & Type b. Winding Insulation Process c. Tropicalized (Yes/No) d. Temperature rise over specified maximum ambient temperature of 50 deg C e. Method of temperature measurement f. Stator winding connection 14.3.2. Main Terminal Box a. Type b. Location(viewed from NDE side) c. Entry of cables(bottom/side) d. Recommended cable size(To be matched with cable size) e. Fault level (MVA),Fault level duration(sec)			
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दिनांक एवं हस्ताक्षर SIGN & DATE सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08 निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh			
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	1.0 A suitable motor conforming to the purification unit requirement shall be supplied. The motor shall also meet the following requirement broadly. The motor shall confirm to IS : 4722, IS : 325, IS : 2253, IS : 2254, IS : 4029, IS : 3202, IS12615:2011 & IS : 2148 or equipment BS : Specification. The motor shall meet all Indian statutory requirements. <table border="1"> <tr> <td>1.1</td> <td>Application</td> <td>To drive feed pump (suction & discharge) and centrifuge</td> </tr> <tr> <td>1.2</td> <td>Type of Motor</td> <td>Squirrel cage, induction motor</td> </tr> <tr> <td>1.3</td> <td>KW Rating at 500 ambient temp</td> <td>It shall have at least 10-15% reserve capacity than required for drive the unit when it is discharging max. quantity at max. viscosity</td> </tr> <tr> <td>1.4</td> <td>KW actually required by driven equipment under specified operation/ start-up conditions.</td> <td>Unit capacity</td> </tr> <tr> <td>1.5</td> <td>Min. Voltage required under starting conditions to bring driven equipment up to rated speed.</td> <td>80% rated</td> </tr> <tr> <td>1.6</td> <td>Full load speed</td> <td>It shall be commensurate with pump & centrifuge speed as per design</td> </tr> <tr> <td>1.7</td> <td>Full load current</td> <td>As per design</td> </tr> <tr> <td>1.8</td> <td>Starting current</td> <td>Not to exceed 600% of the rated exclusive of IS tolerance</td> </tr> <tr> <td>1.9</td> <td>Starting Torque</td> <td>1.3 (Min) of rated torque</td> </tr> <tr> <td>1.10</td> <td>Break down torque</td> <td>2.05 times (min) of rated valve.</td> </tr> <tr> <td>1.11</td> <td>Efficiency at full load</td> <td>IE2 AS PER IS 12615:2011</td> </tr> <tr> <td>1.12</td> <td>Power factor at full load</td> <td>0.85 (Min)</td> </tr> </table> 1.13 Motor shall be designed to with stand the voltage and torque stresses developed due to difference between the motor residual voltage and incoming supply voltage equal to 150% of the rated motor voltage during fast changeover of buses. 2.0 STARTING DATA <table border="1"> <tr> <td>2.1</td> <td>Starting</td> <td>Suitable for DOL</td> </tr> <tr> <td>2.2</td> <td>Acceleration time with full load connected.</td> <td>To be furnished by supplier.</td> </tr> <tr> <td>2.3</td> <td>Permissible starting duty cycle, No. of Starts.</td> <td>3-Starts equally spread over an hour. 2-consecutive starts from hot condition without any injurious heating to the winding.</td> </tr> </table>	1.1	Application	To drive feed pump (suction & discharge) and centrifuge	1.2	Type of Motor	Squirrel cage, induction motor	1.3	KW Rating at 500 ambient temp	It shall have at least 10-15% reserve capacity than required for drive the unit when it is discharging max. quantity at max. viscosity	1.4	KW actually required by driven equipment under specified operation/ start-up conditions.	Unit capacity	1.5	Min. Voltage required under starting conditions to bring driven equipment up to rated speed.	80% rated	1.6	Full load speed	It shall be commensurate with pump & centrifuge speed as per design	1.7	Full load current	As per design	1.8	Starting current	Not to exceed 600% of the rated exclusive of IS tolerance	1.9	Starting Torque	1.3 (Min) of rated torque	1.10	Break down torque	2.05 times (min) of rated valve.	1.11	Efficiency at full load	IE2 AS PER IS 12615:2011	1.12	Power factor at full load	0.85 (Min)	2.1	Starting	Suitable for DOL	2.2	Acceleration time with full load connected.	To be furnished by supplier.	2.3	Permissible starting duty cycle, No. of Starts.
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1.8	Starting current	Not to exceed 600% of the rated exclusive of IS tolerance																																											
1.9	Starting Torque	1.3 (Min) of rated torque																																											
1.10	Break down torque	2.05 times (min) of rated valve.																																											
1.11	Efficiency at full load	IE2 AS PER IS 12615:2011																																											
1.12	Power factor at full load	0.85 (Min)																																											
2.1	Starting	Suitable for DOL																																											
2.2	Acceleration time with full load connected.	To be furnished by supplier.																																											
2.3	Permissible starting duty cycle, No. of Starts.	3-Starts equally spread over an hour. 2-consecutive starts from hot condition without any injurious heating to the winding.																																											
दिनांक एवं हस्ताक्षर SIGN & DATE सामग्री सूची संख्या INVENTORY NO	Rev. no. 00	निर्माणकर्ता WORKED BY: Anil / Kavita	जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	दिनांक 18.03.16																																									

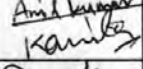
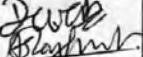
निष्कापक हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
			पृष्ठ 40 का 31 Page 31 of 40	
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	2.4 Overload (% of full load) that can be Carried by motor without impairing Overall performance 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		
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	2.5 Location Turbine oil room indoor		
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	2.6 Class of Insulation Class-F, fungus resistant as per IS:3202 with temp rise limited to that of class B.		
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	2.7 Shaft disposition mountings As per Unit's supplier requirement.		
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	2.8 Method of connections driven equipment As per Unit's supplier requirement.		
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	2.9 Direction of rotation and corresponding terminal designation To suit pumps & centrifuge		
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	2.10 Enclosure and ventilation Totally enclosed fan cooled and flame proof IP55.		
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	2.11 Bearing As per supplier's design, min life 30,000 hrs		
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	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.		
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	2.13 Terminal box Flame proof terminal box to be provided with double compression Cable gland for AI cable Fault level : 45 KA for 0.01 Sec		
3.0 SPECIAL REQUIREMENTS:				
3.1 The motor shall be rewindable				
3.2 The motor shall have on line greasing facility.				
3.3 Motor shall be suitable for working in an environment of oil fumes without any hazard.				
3.4 Separate terminal box for space heater (if applicable) to be provided.				
3.5 Motor bearings (DE & NDE) shall be sealed type to avoid frequent Re-greasing.				
3.6 The motor construction shall be suitable for easy disassembly and reassembly.				
3.7 The terminal box shall be suitable for top and bottom entry of cable and shall be suitable for PVC insulated PVC sheathed armoured aluminium cables and shall be capable of being rotated by 180° in steps of 90°.				
3.8 Motor vibrations shall be acceptable as per IS: 12075; motor efficiency as per IS 12615:2011 & noise level as per IS: 12065. Also mechanical vibrations shall be under limits as per IS: 10816-2.				
4.0 DOCUMENTS TO BE SUPPLIED WITH DELIVERY WITH EACH UNIT. THESE SHALL BE SUPPLIED IN TWO COPIES & WORKABLE SOFT COPY.				
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	निर्माणकर्ता WORKED BY:	Anil / Kavita	10.03.16
निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	10.03.16

दिनांक एवं हस्ताक्षर SIGN & DATE सामग्री सूची संख्या INVENTORY NO.	उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
		पृष्ठ 40 का 32 Page 32 of 40	
SUPERSEDES INVENTORY NO. भारती सूची संख्या को प्रतिस्थापित करता 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		
स्वत्व अधिकार एवं गोपनीयता इस दस्तावेज में दी गई जानकारी का प्रसार इसी संस्थान के अधिकारियों की अनुमति के बिना नहीं किया जा सकता। प्रसारण एवं उपयोग के बिना इस दस्तावेज को किसी भी रूप में प्रसारित करने से निषेध 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		
दिनांक एवं हस्ताक्षर SIGN & DATE 	दिनांक एवं हस्ताक्षर SIGN & DATE 		
सामग्री सूची संख्या INVENTORY NO. P.5531	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

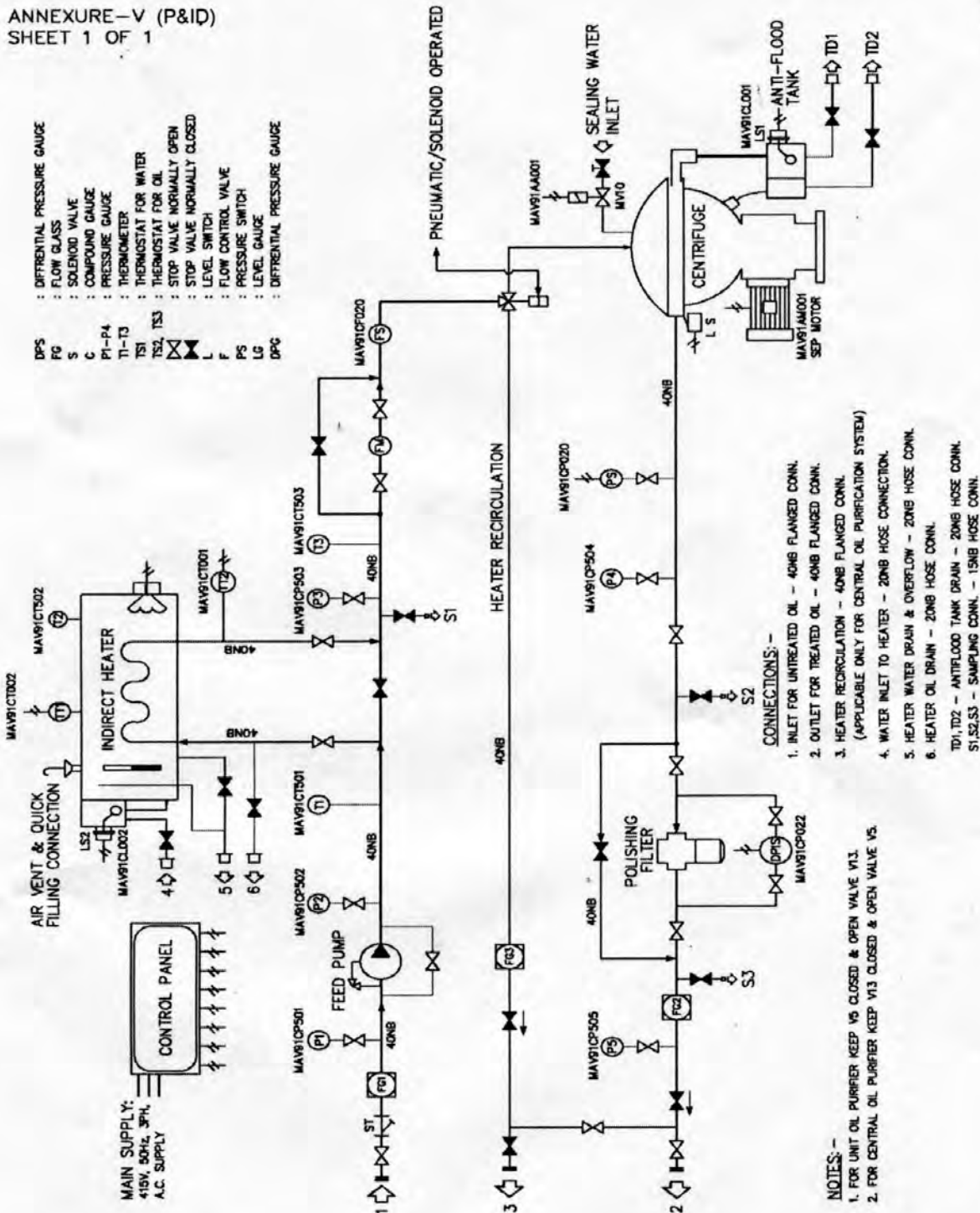
SIGNATURE SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013
			पृष्ठ 40 का 33 Page 33 of 40

SUPERSEDES INVENTORY NO सामग्री सूची संख्या को प्रतिस्थापित करता है	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 bourden 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.																	
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.	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
Type	Bimetallic rigid system type. No use of mercury or any other hazardous/toxic material																	
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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.																	
स्वामित्व अधिकार पूर्व गोपनीय इस दस्तावेज़ में दी गई जानकारी भारत भारती लिमिटेड की संपत्ति है। इसका उपयोग केवल उद्देश्य के लिए किया जाना चाहिए। इसका उपयोग अन्य किसी भी उद्देश्य के लिए नहीं किया जाना चाहिए।	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																	

सामग्री सूची संख्या INVENTORY NO. P-5538	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kavita	18.03.16
		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput Devesh	18.03.16

सामग्री सूची संख्या INVENTORY NO 25338	Rev. no. 08	निर्माणकर्ता WORKED BY: जाँचकर्ता CHECKED BY: Anil / Kavita A. S. Rajput / Devesh  18.03.16  18.03.16
दिनांक एवं हस्ताक्षर SIGN & DATE 24/4/16	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.	COPYRIGHT AND CONFIDENTIAL
दिनांक एवं हस्ताक्षर SIGN & DATE	SUPERSEDES INVENTORY NO.	SIGNATURE AND DATE
दिनांक एवं हस्ताक्षर SIGN & DATE	दिनांक एवं हस्ताक्षर SIGN & DATE	उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR) ST39013 पृष्ठ 40 का 34 Page 34 of 40

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



निर्माण एवं हस्ताक्षर SIGN & DATE			उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013
सामग्री सूची संख्या को INVENTORY NO.				पृष्ठ 40 का 35
सामग्री सूची संख्या को SUPERSEDES INVENTORY NO.				Page 35 of 40

19 ANNEXURE-VI (QUALITY PLAN)

MANUFACTURER'S NAME AND ADDRESS		TO BE FILLED BY BHEL		TO BE FILLED BY BHEL	
VENDOR'S NAME		ITEM		Q.P. NO. DATED	
BHEL		DRG. NO.		REV.	
SPEC.		REV.		REV.	
CHARACTERISTICS		CLASS		TYPE OF CHECK	
COMPONENT & OPERATIONS		QUANTUM OF CHECK		REFERENCE DOCUMENT	
NO.		6		7	
1		5		8	
2		4		9	
3		3		10	
4		2		11	
5		1		12	
6		1		13	
7		1		14	
8		1		15	
9		1		16	
10		1		17	
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88		1		95	
89		1		96	
90		1		97	
91		1		98	
92		1		99	
93		1		100	

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

सामग्री सूची संख्या INVENTORY NO.	Rev. no.	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kumar	18.03.16
P-5528	08	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput / Devesh	18.03.16

18.03.16

SIGN & DATE 18/03/16		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013	
				पृष्ठ 40 का 36 Page 36 of 40	
SUPERSEDES INVENTORY NO 2-5538	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 ($\beta_3 = 1000$ 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			
Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Komit	18.03.16	
	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	Anil Kumar Komit	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	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;"></td> <td style="width: 70%;">moisture content on one oil purification system provided as per BHEL specifications/enquiry?</td> <td style="width: 15%;"></td> <td style="width: 10%;"></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): a) b) c) 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)		
	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)																		
Notes: Vendors shall fill relevant columns with Yes/ No/ Value offered.																			
Date: Place:		Signature & Seal of manufacturer																	
दिनांक एवं हस्ताक्षर SIGN & DATE	सामग्री सूची संख्या INVENTORY NO																		
दिनांक एवं हस्ताक्षर SIGN & DATE	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita	18.03.16																
दिनांक एवं हस्ताक्षर SIGN & DATE	जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	18.03.16	18.03.16																



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

SIGN & DATE

SUPERSEDES
INVENTORY NO.

आजपी मूची मारया की
अधिकांश जनता है

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स्वत्वाधिकार एवं गोपनीय

SIGN & DATE

नामर्था सूची संख्या

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.

REV. no. 00

निर्माणकर्ता
WORKED BY:

Anil / Kavita

Anil Kumar
Kamath

18.03.16

जाँचकर्ता
CHECKED BY:

A. S. Rajput /
Devesh

Original

18.03.16

विनाक 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	सुपरसेडस INVENTORY 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:		
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स्वत्वधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती भारतीभारत लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल से किया जा सकता है जो कि कंपनी के हित में हो। इसका प्रयोग अन्य किसी भी तरह के उद्देश्य के लिए नहीं किया जा सकता है।				
विनाक एवं हस्ताक्षर SIGN & DATE 	निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh			
सामग्री सूची संख्या INVENTORY NO. 25538	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	Anil kumar Kavita 18.03.16	18.03.16

विनिर्देशक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013		
			पृष्ठ 40 का 40 Page 40 of 40		
सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO.	Check list for OPU (Relay Based) - Oil Purification Unit is relay based: yes/no - On/Off control, indication and alarms is provided in local panel: yes/no - Control panel is designed for 3 phase (415 v Ac) 3 wire incomer power supply system: yes/no - Motor efficiency meeting as per special instruction/project requirement : yes /no - Air requirement of pneumatic valves is mentioned: yes/no. - 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 - Cable glands for 415 V AC incomer is provided : yes/no - Adequately sized copper ground bus is provided for each panel: yes/no - Painting treatment as per addendum or special instruction mentioned in indent: yes/no - Paint shade of control panel as per addendum/special requirement: yes/no - Construction of panel as per specification/addendum: yes/no - Control panel is provided with anti-vibration pads to withstand vibrations: yes/no. - Plug and socket type connection for all instruments : yes/no - Arrangement for Liquid seal breakage alarm is provided: yes/no - Price break of spare item/spare of LS switchgear given along with offer: yes/no - Motor data sheet shall be subject to customer/ BHEL approval: yes/no 20% spare terminals have been provided at panel: yes/no - All instruments shall be of reputed make.			
विनिर्देशक एवं हस्ताक्षर SIGN & DATE 	सामग्री 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	Date: &Place:		
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.			Signature Seal of manufacturer		

ADDENDUM-411928B1200(Rev. no.-01)
MANUAL CLEANING TYPE OIL PURIFIER (DCS BASED)

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

1. Capacity of oil purifier shall be **6000 LPH**.
2. Refer var. no.7,8,10&11 of Table A of clause no 3.17 at sheet no. 06 of 40 of specification ST 39013 -This var.no. may be ignored.
3. Since unit oil purifier and central oil purifier are same, the drawings/documents to be furnished to BHEL for approval shall be common for both.
4. If paint requirement is mentioned in special instructions of indent, then the requirement mentioned in indent will supersede the requirement mentioned in this addendum and BHEL specification ST39013.
5. The sizes of inlet and outlet pipe connections of oil purification system shall be NB 50mm in place of NB 40mm mentioned in P&ID of Spec-ST39013. Also, the sizes of inlet and outlet pipe connections of vented sight overflow fitting shall be NB 50mm.
6. Supervision by vendor during erection & commissioning at site shall be required.
7. List of recommended spares and commissioning spares along with price breakup of individual spares are required.
8. 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.
9. 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**)?
10. 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**.
11. Clause 5(b) at page no.: 10 and Clause 20 A (9) at page no.: 36 of Spec-ST39013 read as $\beta \geq 1000$ in place of $\beta = 1000$ or better.
12. 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.
13. 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.
14. Clause 8.1(f) at page no.: 13 of Spec-ST39013 read as:- Characteristic curve of all pumps preferably required.
15. 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.

Anil Kumar
 22/1/2020

ADDENDUM-411928B1200(Rev. no.-01)

MANUAL CLEANING TYPE OIL PURIFIER (DCS BASED)

16. 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.
17. 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.
18. 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
19. For supply of VAF meter 3 phase 3 wire supply is preferred.
20. 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.
21. 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.
22. Refer sheet no 09 of 40 of specification ST 39013 ,clause no 4.2 – Alternatively switching of control unit shall be possible from DCS.
23. Refer sheet no 12 of 40 of specification ST 39013 ,clause no 7.h- Alternatively manufacturers test certificate shall be provided for BHEL review.
24. Refer sheet no 12 of 40 of specification ST 39013 ,clause no k.i – may be ignored.
25. 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.
26. 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.
27. 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.
28. Refer sheet no 30 of 40 of specification ST 39013 ,clause no 17.1.i -This clause may be ignored.
29. 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.
30. 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.
31. 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.
32. Motor starting current shall be for Direct Online(DOL) shall be as per IS:12615-2011/IEC 60034.

Anil Kumar
22/01/2020

ADDENDUM-411928B1200(Rev. no.-01)**MANUAL CLEANING TYPE OIL PURIFIER (DCS BASED)**

33. 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.
34. Clause 4.1.e at page no.: 7 of Spec-ST39013 Requirement of flame proof motor as per IS2148 is not essential.
35. Above requirements supersede the corresponding requirements of ST39013.

Anil Kumar
22/01/2020