



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/4066/2019/0977V/2
Item-Oil Purification Unit along
with spares
Project: Udangudi unit-1 & 2

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											REV	TYPE OF CHECK	QUANTUM OF CHECK	7	8	9	D	10	11	
			SPEC.		AS PER PO																				
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	7	8	9	D	10	11														
1	2	3	4	5	6	7	8	9	D	10	11														

[illegible]

			FOR CUSTOMER USE	
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	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 दुर्व्यय को बिना कम्पनी के लिखित में हस्तिकाार हो न किया जाय।

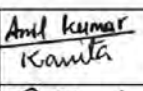
दिनांक एवं हस्ताक्षर
SIGN & DATE

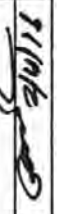
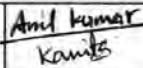
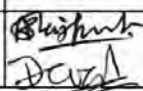
मासकी सूची संख्या
INVENTORY NO.

29/03/16
P.5538

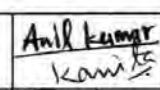
Bid Specification
For
Turbine Oil Purification System
(Centrifuge type)

			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	
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दिनांक एवं हस्ताक्षर SIGN & DATE 	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	 18.03.16
सामग्री सूची संख्या INVENTORY NO P-5538		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	 18.03.16

SIGN & DATE SUPERSEDES INVENTORY NO. सावधानी सूची संख्या को अपडेट करना है		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited it must not be used directly or indirectly in any way detrimental to the interest of the company	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.				
	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.				
SIGN & DATE 	स्वत्वधिकार एवं गोपनीय इस दस्तावेज में की गई प्रस्ताव यात्रा हरिद्वार भारती लिमिटेड की सम्पत्ति है इसका प्रयोग एवं प्रकाशन के बिना की जाये वरना जो कि कानूनी के विरुद्ध होगा।	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	 18.03.16
सावधानी सूची संख्या INVENTORY NO. P-53398			जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	 18.03.16

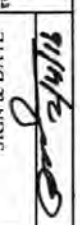
18.03.16

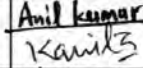
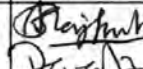
BHEL भारतीय भारती SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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SUPERSEDES INVENTORY NO भारतीय भारती का अधिकारिण करता है	3.9 The OPS shall be equipped with sight glasses both for the purified 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.			
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	स्वत्वाधिकार एवं गोपनीयता इस दस्तावेज में दी गई सूचना भारत भारती लिमिटेड की संपत्ति है इसका प्रयोग एवं प्रसारण अन्य किसी भी उद्देश्य के लिए या किसी भी प्रकार के उद्देश्य के लिए नहीं किया जाये।			
BHEL भारतीय भारती SIGN & DATE				
भारतीय भारती INVENTORY NO 25538	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	 18.03.16
		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	 18.03.16

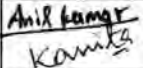
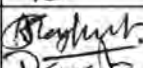
SIGN & DATE 	उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013
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SUPPLIES INVENTORY NO. भारतीय नौरी संस्था को प्रविष्टिगत करना है	TABLE- A																																																			
	<table border="1"> <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
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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 प्रलेख में दी गई सूचना भारत भारती लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल उसी उद्देश्य के लिए किया जा सकता है जो कि प्रलेख के तहत किया गया 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 

भारतीय नौरी संस्था INVENTORY NO. P-508	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita	Anil kumar 	18.03.16
		जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh		18.03.16

विनाक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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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.			
सामग्री सूची संख्या की अधिकतम संख्या है	(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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स्वत्वधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती उपकरणों लिमिटेड की संपत्ति है। इसका उपयोग केवल इस दस्तावेज के अंतर्गत ही किया जा सकता है। अन्यथा इसका उपयोग कानून के विरुद्ध होगा।	(h) Local instruments for pressure temp. & flow indication shall be provided in accordance with clause 8.0 of Annexure-I.			
विनाक 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.			
सामग्री सूची संख्या INVENTORY NO	(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.			
Rev. no. 08	(k) Remote operating facility for all electrically operated components should be provided on control panel.			
निर्माणकर्ता WORKED BY:	Anil / Kavita		18.03.16	
जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh		18.03.16	

दिनांक एवं हस्ताक्षर SIGN & DATE सावरी सूची संख्या INVENTORY NO.		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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SUPERSEDES INVENTORY NO. सावरी सूची संख्या को अधिलिखित करना 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 एवं प्रसारण अन्य के बिना की तरह अवैध है जो कि कंपनी के हित में है। (इतिहासक हो या न हो)			
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	18.03.16

SIGNATURE SIGN & DATE SUPERSEDES INVENTORY NO. मालकी सूची संख्या को अधिलिखित करना है।		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013	
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	(bb) The local control panel shall have main switch fuse unit, power contactors, control transformer, space heater, alarm lamps, terminals, switchgear, OLR for separator motors and heaters and other contactors. (cc) Interconnection diagram shall be provided along with offer. (dd) Anti vibration pads shall be provided. Control panel should also be designed in such a way that it is able to withstand the site vibrations. (ee) Instruments/ equipments used in parallel system of 2x4500LPH system shall be of same make & type for both the purifiers in a single project. 4.2 For DCS control panel, additional requirements The purification system shall be operated from control room as well as local panel having the logic built in BHEL control system instead of relay based control system. It shall also have Local/remote switch, separator start/stop selector Switch, heater on/off sel. Switch Test/Accept/Reset push buttons and 24 V DC interfacing relays with DCS. Control Philosophy (a) The purification system shall be operated from control room, as well as local control panel "DCS/Local" selector switch shall be provided on the LCP. (b) All field instruments shall be wired to a JB, which shall be in vendor scope. From JB these shall be wired to DCS by BHEL. (c) Operating sequence and interlocks for various drives shall be programmed in BHEL's DCS. Vendor shall furnish Logic diagram and write-up for operation of the system. All interlocks shall be clearly brought out in the logic diagram and write-up. (d) 24V Interfacing relay are to be supplied by vendor mounted in the LCP for operation of drives. 24V commands shall be given from DCS to these relays for operation of various drives. (e) Alarms shall be generated in DCS and output shall be given for driving the alarm windows in LCP. (f) Control of individual heaters stages shall be from DCS for maintaining required oil temp using 2 nos. duplex RTDs.				
	स्वत्वधिकार एवं गोपनीय यह दस्तावेज भारत भारती लिमिटेड की संपत्ति है। इसका प्रयोग केवल उद्देश्य के लिए है। इसका उपयोग अन्य किसी भी उद्देश्य के लिए नहीं किया जा सकता।				
SIGNATURE SIGN & DATE 	18/03/16				
INVENTORY INVENTORY NO. P-55528	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)

SIGNATURE AND DATE

SUPERSEDES
INVENTORY NO

आमपी मूखी मलया को
अधिकतम मलया को

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स्वत्वाधिकार एवं गोपनीय

SIGN & DATE

सामग्री सूची संग्रहा

Rev. no.
08

निर्माणकर्ता
WORKED BY:

Anil / Kavita

Anil Kumar
Karnataka

18.03.16

जाँचकर्ता
CHECKED BY

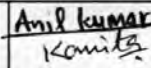
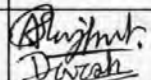
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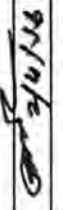
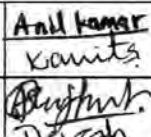
दिनांक एवं हस्ताक्षर SIGN & DATE सामग्री सूची संख्या INVENTORY NO 10-03-16	स्टैंडर्ड ST39013	उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	पृष्ठ 40 का 11 Page 11 of 40
दिनांक एवं हस्ताक्षर SIGN & DATE 10/3/16	सामग्री सूची संख्या INVENTORY NO 10-03-16	6.2 The purification 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) TESTING OF MATERIALS: 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 10/3/16	सामग्री सूची संख्या INVENTORY NO 10-03-16	निर्माणकर्ता WORKED BY: Anil / Kavita	18.03.16
	Rev. no. 08	जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	18.03.16

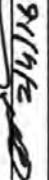
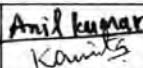
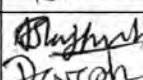
निष्पन्न एवं हस्ताक्षर SIGN & DATE नमूने की सूची संख्या INVENTORY NO 1-55-98		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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(a) Check for dimensions of all the component parts including surface finish, 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 संख्या 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	
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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

चित्रक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013		
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सामग्री सूची संख्या INVENTORY NO	i. Cross-sectional drawings of all equipments including horizontal and vertical section of separator indicating the recommended and mandatory spare parts. Also, list of recommended and mandatory spares with their part no. / model no. and quantity required. j. Details of standards /codes used for designing of the various equipments and selecting the material of various components. k. Name of the manufacturer and illustrative literature all components which have been out-sourced for purchaser's review. l. All other relevant data and drawings which supplier considers necessary for better understanding of the system. m. Type test Reports for capacity, moisture content, particle size of impurities and motor efficiency conducted within last 5 years. n. Interconnecting diagram of DCS control panel (if required). o. Acceptance norms for (i) in process NDT of bowl, shaft, butt welds of piping. (ii) Static & dynamic balancing of shaft. (iii) Performance test on pumps & motors. (iv)Vibration norms for pumps, motor and unit. p. Also, Bidder to shall furnish the filled up check list of BHEL format as per annexure –VII.				
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

चिह्नक एवं हस्ताक्षर SIGN & DATE सामग्री सूची संख्या INVENTORY NO 12538	स्टॉक एवं हस्ताक्षर SIGN & DATE 11/11/16	स्वामित्व अधिकार एवं गोपनीयता इस संकेत में की गई प्रतियां भारत देशी मालिकता के अधिकार के अंतर्गत हैं। इसमें प्रत्येक एवं अवलोक्य रूप में किसी भी तरह के प्रतिलिपि, जो कि कंपनी के हित में हितधारक की व किताबें हैं।	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	SUPERSEDES INVENTORY NO सामग्री सूची संख्या को अधिकृतित करता है	चिह्नक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013 पृष्ठ 40 का 15 Page 15 of 40																
					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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 उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013	
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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.	
स्वामित्व अधिकार एवं गोपनीयता इस दस्तावेज में दी गई जानकारी भारत भारती परमाणुविक्रय निगम की संपत्ति है इसका उपयोग केवल उचित उद्देश्य के लिए ही किया जा सकता है अन्यथा इसे कानूनन दंडनीय माना जाएगा।	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.	
	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,	
दिनांक एवं हस्ताक्षर SIGN & DATE 	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh 
सामग्री सूची संख्या INVENTORY NO. P-5538		18.03.16 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							
ग्राहकी सूची संख्या INVENTORY NO		Rev. no.		निर्माणकर्ता WORKED BY:		Anil / Kavita	
12558		08		जाँचकर्ता CHECKED BY:		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 18 Page 18 of 40																																																																								
सामग्री सूची संख्या INVENTORY NO.	14 ANNEXURE-I (PROPERTIES OF TURBINE OIL)																																																																										
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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	(c) At 24°C after testing at 93.5°C				
	Nil				
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	13.	De-aeration capacity at 50°C	6 Minute Max.	DIN 51381	
	14.	Ash (by weight)	Max. 0.01	IS : 1448- P4	
	15.	Water content by weight	% gm below the limit of quantitative detectability.	DIN 51592	
	16.	Mechanical solid impurities.	Below the limit of quantitative detectability.	DIN 51592	
	17.	Water separation capacity After steam treatment.	Max. 300 seconds	DIN 51589	
निष्कर्ष एवं हस्ताक्षर SIGN & DATE	स्वसाक्षिकार एवं गोपनीय यह दस्तावेज में दी गई सूचना भारत भारती लिमिटेड का संपत्ति है। इसका उपयोग केवल सूचित उद्देश्य के लिए ही किया जा सकता है। इस दस्तावेज में दी गई सूचना को बिना लिखित अनुमति के किसी भी व्यक्ति को प्रसारित नहीं किया जा सकता है।				
सामग्री सूची संख्या INVENTORY NO	Rev. no. 08	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil kumar Kamita	18.03.16
सामग्री सूची संख्या INVENTORY NO		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	Rajput Devesh	18.03.16

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SUPERSEDES INVENTORY NO	15 ANNEXURE-II (DATA SHEET OF TURBINE OIL PURIFICATION SYSTEM)																																																																												
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दिनांक एवं हस्ताक्षर SIGN & DATE	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita	जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh	Anil Kumar 18.03.16
				Devesh 18.03.16

SIGNATURE SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013
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SUPERSEDES INVENTORY NO आवृत्ति पूर्ण अथवा को अधिकतम करना है	3.5	Speed	RPM
	3.6	Particle size distribution of impurities in purified oil at outlet of centrifuge in single pass as per ISO 4406	
	3.7	Particle size distribution of impurities in purified oil at outlet of oil purification system (i.e. polishing filter) in single pass as per ISO 4406	
	3.8	Moisture/Water content in purified oil at outlet of oil purification system / polishing filter	ppm

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	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	

आवृत्ति संख्या INVENTORY NO P-5531	Rev. no. 08	निर्माणकर्ता WORKED BY: Anil / Kavita <i>Anil kumar Kamra</i>	18.03.16
		जाँचकर्ता CHECKED BY: A. S. Rajput / Devesh <i>Ashish Rajput Devesh</i>	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																																																																																		
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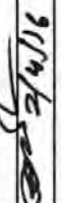
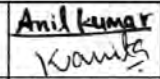
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 इस दस्तावेज में दी गई सूचना भारत हेवी एलेक्ट्रिकल्स लिमिटेड की संपत्ति है इसका प्रयोग एवं प्रसारण केवल केवल के निर्देशों के बिना ही नहीं किया जाये।

चित्रक एवं हस्ताक्षर
SIGN & DATE

दिनांक एवं हस्ताक्षर SIGN & DATE सामग्री सूची संख्या INVENTORY NO 15588		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013 पृष्ठ 40 का 24 Page 24 of 40																																																																								
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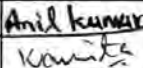
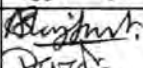
14.1.4.	Quantity	
14.2	DESIGN AND PERFORMANCE DATA	
14.2.1.	Frame size	
14.2.2.	Type of duty	
14.2.3.	Type of enclosure /Method of cooling/ Degree of protection	
14.2.4.	Applicable standard to which motor generally conforms	
14.2.5.	Efficiency class as per IS 12615	
14.2.6.	(a)Whether motor is flame 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)	

दिनांक एवं हस्ताक्षर SIGN & DATE 		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		ST39013																																																																																																				
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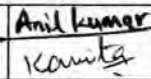
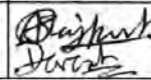
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SUPERSEDES INVENTORY NO सामग्री सूची संख्या को प्रतिस्थापित करना है	16 ANNEXURE-III (SPECIFICATION OF MOTOR)				
	1.0 A suitable motor conforming to the purification unit requirement shall be supplied. The motor shall also meet the following requirement broadly. The motor shall confirm to IS : 4722, IS : 325, IS : 2253, IS : 2254, IS : 4029, IS : 3202, IS12615:2011 & IS : 2148 or equipment BS : Specification. The motor shall meet all Indian statutory requirements.				
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electricals Limited and must not be used directly or indirectly in any way detrimental to the interest of the company	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)		
	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					
SIGN & DATE SIGNATURE	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.		
सामग्री सूची संख्या INVENTORY NO P-5538	Rev. no. 00		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

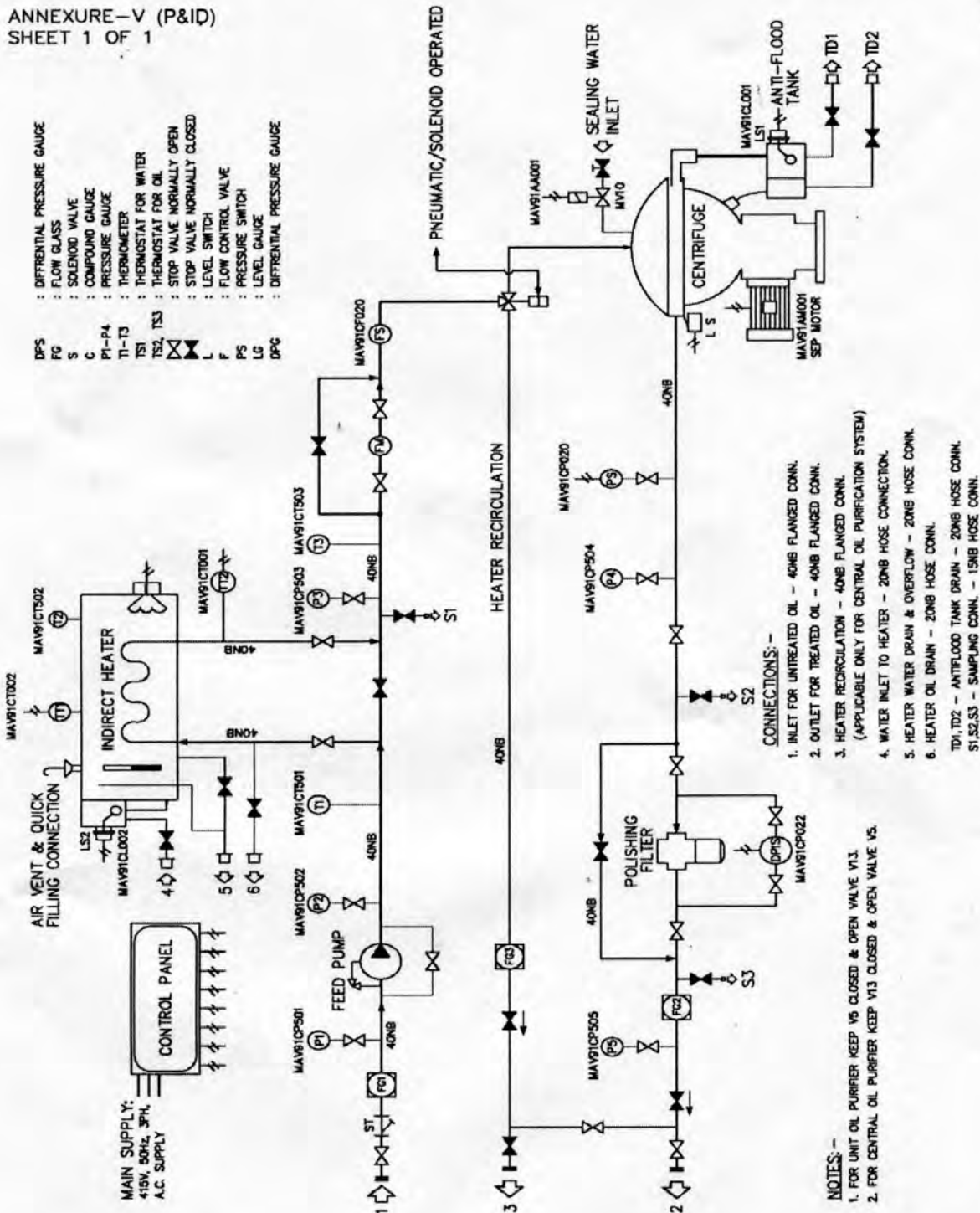
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निष्कापक हस्ताक्षर SIGN & DATE	सुपरसेड्स INVENTORY NO	2.4 Overload (% of full load) that can be Carried by motor without impairing Overall performance and period for Which this overload is applicable. Motor shall be capable for running at full load 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			
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	सुपरसेड्स INVENTORY NO	2.5	Location	Turbine oil room indoor	
	2.6	Class of Insulation	Class-F, fungus resistant as per IS:3202 with temp rise limited to that of class B.		
	2.7	Shaft disposition mountings	As per Unit's supplier requirement.		
	2.8	Method of connections driven equipment	As per Unit's supplier requirement.		
	2.9	Direction of rotation and corresponding terminal designation	To suit pumps & centrifuge		
	2.10	Enclosure and ventilation	Totally enclosed fan cooled and flame proof IP55.		
	2.11	Bearing	As per supplier's design, min life 30,000 hrs		
	2.12	Grounding Device	Suitable arrangement shall be provided for earthing the motor at two separate and distinct connection points. Design of earthing conductor shall be as per IS: 4722-1992.		
	2.13	Terminal box	Flame proof terminal box to be provided with double compression Cable gland for AI cable Fault level : 45 KA for 0.01 Sec		
	3.0 SPECIAL REQUIREMENTS:				
	3.1 The motor shall be 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	Rev. no.	निर्माणकर्ता WORKED BY:	Anil / Kavita 	10.03.16
सुपरसेड्स INVENTORY NO	08	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh 	10.03.16	

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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		
स्वत्वाधिकार एवं गोपनीयता इस दस्तावेज में दी गई जानकारी का प्रसारण, प्रकाशन, प्रतिलिपि तैयार करना, या किसी भी प्रकार से इसकी प्रतिलिपि तैयार करना बिना लिखित अनुमति के ग्राहक को अनुमति नहीं 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.		
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SUPERSEDES INVENTORY NO सामग्री सूची संख्या को प्रतिस्थापित करता है	17 ANEXURE-IV (SPECIFICATION OF INSTRUMENTS)																	
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	1) 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" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">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.
Type	Bimetallic rigid system type. No use of mercury or any other hazardous/toxic material																	
Case	Die cast aluminium alloy moisture proof case, heavily enamelled black																	
Dial Size	100 mm																	
Range	As per design																	
Accuracy	1% of total range																	
Bulb Material	½" bulb diameter made of SS. 316																	
Thermo-well	SS-AISI316 (with thread size G1/2")																	
Ambient Temp	60° C max.																	
3) MAGNETIC LEVEL SWITCH																		
Process Connection: - Nb25																		
Material: All parts coming in contact with the liquid made of stainless steel SS316																		
Electrical characteristics																		
Switch: Single pole double throw change over switch silver contact for handling the following currents																		
AC 250V – 5.0A																		
DC 250V – 0.25A																		
Operating characteristics																		
Differential – 6 MM I. e. 3 MM on either side of centre line working pr & Temp. : As per design																		
Ambient Temp. : 60°C max.																		
SIGNATURE SIGN & DATE सामग्री सूची संख्या INVENTORY NO P-5538	Rev. no. 08																	
निर्माणकर्ता WORKED BY:		Anil / Kavita 																
जाँचकर्ता CHECKED BY:		A. S. Rajput / Devesh 																
		18.03.16																

निर्माण एवं हस्ताक्षर SIGN & DATE 24/4/16		निर्माण एवं हस्ताक्षर SIGN & DATE		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		सुपरसेड्स INVENTORY NO.			
सामग्री सूची संख्या INVENTORY NO 25338		Rev. no. 08		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											
MAIN SUPPLY: 415V, 50Hz, 3PH, A.C. SUPPLY CONTROL PANEL AIR VENT & QUICK FILLING CONNECTION INDIRECT HEATER MAV91CTD02 MAV91CTD01											

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.		3		4	
1		2		5	
		6		7	
		8		9	
		10		11	

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 Komit	18.03.16
P-5528	08	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	Devesh	18.03.16

Devesh 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			
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			
SIGN & DATE 18/03/16	Rev. no.	निर्माणकर्ता WORKED BY:	Anil / Kavita	Anil Kumar Kumar 18.03.16
SIGN & DATE 18/03/16		जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	A. S. Rajput Devesh 18.03.16

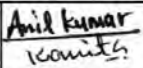
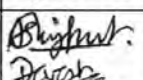
विनाम एवं तारीख SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013
			पृष्ठ 40 का 37 Page 37 of 40

सामग्री सूची संख्या INVENTORY NO 4558	SUPERSEDES INVENTORY NO	moisture content on one oil purification system provided as per BHEL specifications/enquiry?		
		15. Is the painting scheme as per BHEL specifications/enquiry?		
		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

स्वामित्व अधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल भारत सरकार के अधिकारियों के लिए ही किया जाय।	विनाम एवं तारीख SIGN & DATE 	सामग्री सूची संख्या INVENTORY NO 4558	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)

SIGN & DATE

SUPERSEDES
INVENTORY NO.

आजपी मूषी मरणा को
अधिकमित्र मानता है।

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स्वत्वाधिकार एवं गोपनीय

SIGN & DATE

सामग्र्यी 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

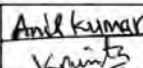
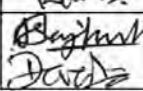
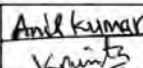
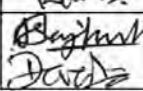
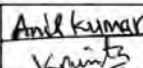
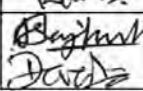
जाँचकर्ता
CHECKED BY:

A. S. Rajput /
Devesh

Original
Per 1715

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	सुपरसेड्स 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 अन्यथा इसका प्रयोग कानून के विरुद्ध होगा।				
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

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश (हीप : हरिद्वार) PRODUCT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	ST39013 पृष्ठ 40 का 40 Page 40 of 40						
SUPERSEDES INVENTORY NO	सामग्री सूची संख्या को अपडेटिंग करना है	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. Date: &Place: Signature Seal of manufacturer							
सामग्री सूची संख्या INVENTORY NO.	Rev. no. 08	निर्माणकर्ता WORKED BY:	<table border="1"> <tr> <td>Anil / Kavita</td> <td></td> <td>18.03.16</td> </tr> <tr> <td>जाँचकर्ता CHECKED BY:</td> <td>A. S. Rajput / Devesh</td> <td></td> </tr> </table>	Anil / Kavita		18.03.16	जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh	
Anil / Kavita		18.03.16							
जाँचकर्ता CHECKED BY:	A. S. Rajput / Devesh								

ADDENDUM- 411928W6100

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 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 UDANGUDI 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- 411928W6100

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- 411928W6100

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 - RAL 7035.
41. Motor Efficiency: - LT Motors, It shall be IE3 class as per IS 12615.
42. Above requirements supersede the corresponding requirements/clause of spec ST39013.

Kavita/Engr.

(CIE)

Anil Kumar/Sr.Engr.

(TL)

APPLICABLE MANDATORY SPARE LIST FOR LUB OIL PURIFICATION UNIT**DRAWING NO-41810F51001 REV 00****Mat code-W90318103567****PROJECT- 2X660MW UDANGUDI**

Item no.	DESCRIPTION	SPARE QTY	UNIT	Work Order
1	Relays type 1	2	no	10848U11502
2	Relays type 2	2	no	10848U11502
3	Control supply transformer	2	no	10848U11502
4	Power fuses/MCB type1	2	no	10848U11502
5	Power fuses //MCB type 2	2	no	10848U11502
6	Ammeter of each type and size & range	5	no	10848U11502
7	Aux relays of each type & timer	5	no	10848U11502
8	Power contactor of each type & rating	5	no	10848U11502
9	Limit Switch of each type & rating	5	no	10848U11502
10	Contactor complete set-power & aux. contactor	5	No	10848U11502
11	Fixed contact set of each type & rating	10	No	10848U11502
12	Moving contact set of each type & rating	1	no	10848U11502

13	Current transformer of each type & ratio	5	No	10848U11502
14	Control supply transformer of each type & rating	5	No	10848U11502
15	Control and selector switches of each type & rating	5	No	10848U11502
16	Indicating lamps(equally divided for all types and ratings)	5	no	10848U11502

NOTE-DRAWING SHOULD BE READ ALONGIWITH THE SPECIAL INSTRUCTIONS MENTIONED IN THE INDENT.