3X660 MW NORTH KARANPURA TPS (NTPC)

TECHNICAL SPECIFICATION

FOR

LUBE OIL TRANSFER PUMPS

SPECIFICATION NO. : PE-TS-405-567-A001

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA (INDIA)

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VOLUME – II B

VOLUME – II B

SECTION – A

INTENT OF SPECIFICATION

1.0 INTENT OF SPECIFICATION

1.1 The specification is intended to cover design, engineering, manufacture, inspection and testing at vendor's / sub vendor's works, Performance & Guarantee testing, painting, forwarding, proper packing, shipment & delivery at site including start up and commissioning spares, mandatory spares of **Lube Oil Transfer Pumps** as per details in different sections of this specification for **3 X 660 MW NORTH KARANPURA TPS**

The bidder's scope shall also include any other services, etc. if called for in the succeeding sections of the specification.

1.2 The contractor shall be responsible for providing all material, equipment & services, which are required to fulfil the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under this specification, irrespective of whether it has been specifically listed herein or not. Omission of specific reference to any component / accessory necessary for proper performance of the equipment shall not relieve them of the responsibility of providing such facilities to complete the supply **Lube oil pumps** within quoted price.

1.3 It is not the intent to specify herein all the details of design and manufacture. However, the equipment / system shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.

1.4 The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing.

1.5 Items though not specifically mentioned but needed to make the system complete as stipulated under these specifications are also to be furnished unless otherwise specifically excluded.

1.6 The general terms and conditions, instructions to tenderer and other attachment referred to elsewhere are hereby made part of the tender specifications. The equipment / material and works covered by this specification is subject to compliance to all the attachments referred in the specification. The tenderer shall be responsible for adherence to all requirements stipulated herein.

1.7 While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information , ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to seek any clarification on specification requirement in the format enclosed under Vol-III of the specification within 10 days of receipt of tender documents. In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as per interpretation of Purchaser/Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by Purchaser/ Customer as and when brought to their notice either by the bidder or by purchaser/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.

1.8 Deviations, if any, should be very clearly brought out clause by clause in the enclosed schedule otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification.

1.9 In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.

1.10 Unless specified otherwise, all through the specification, the word contractor shall have same meaning as successful bidder/vendor and Customer/Purchaser/Employer will mean BHEL and/or Customer (NTPC: National Thermal Power Corporation Limited) as interpreted by BHEL in the relevant context. Please refer GCC/SCC for better clarity.

1.11 The equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and dispatch release issued by BHEL/Customer.

1.12 BHEL's Customer's representative shall be given full access to the shop in which the equipment's are being manufactured or tested and all test records shall be made available to him.

1.13 Various codes and standards to be used shall be as indicated in various parts of the specification. In case bidder uses any standard other than those indicated in the specification, the onus of establishing equivalence of the same with the specified standards will rest with the bidder and acceptance of the same shall be sole prerogative of customer. The bidder will also arrange for BHEL a copy of the standards in ENGLISH language. The cost of such service will be deemed to have been included by the bidder in the total cost of the package. BHEL will not entertain any additional cost on account of the same.

1.14 All text/ numeric in the document / drawings to be generated by the successful bidder will be in English language only.

1.15 The bidder's offer shall not carry any sections like clarification, interpretations and /or assumptions.

VOLUME – II B

SECTION – B

PROJECT INFORMATION

1.00.00 **BACKGROUND**

North Karanpura Super Thermal Power Project (3x660 MW), a pit head coal based thermal power project, is located in Hazaribagh and Chatra districts of Jharkhand State. Basic inputs i.e. coal, water and land have already been tied up. The project is proposed for the States & Union Territories of Northern, Western and Eastern Regions and the State of Jharkhand.

The capacity of the project is 1980 MW comprising of three (3) units of 660 MW each.

1.01.00 **Location and Approach**

The power project is proposed to be located near Tandwa town in Chatra districts in the state of Jharkhand on Hazaribagh-Chatra State highway at a distance of about 50 kms from Hazaribagh city. The nearest commercial airport is Ranchi at a distance of 150 kms from project site. The nearest railhead Khalari Railway Station on Ranchi-Garhwa section of Eastern Railways is about 40 kms from project site.
Major rail/road distances from the project site are as under:

City		Distance Approx. (kms)
Ranchi	:	150
Khalari	:	40

The site is located near Tandwa town having latitude and longitude of about 23^0 50' N to 23º 52' N and 84^0 59' E to 85º 2' E respectively. The Vicinity Plan of the project is placed at **Annexure-I.**

Further to the information given in this sub-section, Bidders are also advised to visit the project site and collect data on local site conditions.

1.02.00 **Land**

About 2245 acres of land is being acquired for the project. About 1500 acres of land is under possession/legal possession and out of 1500 acres, about 890 acres of land is to be used for plant, ash dyke and initial enabling township. No additional land is envisaged to be acquired in plant area. About 15 acres of land is envisaged to be acquired in Hazaribagh city for Township.
Commissioner, Chatra vide dated 25.05.1999 and 14.06.2000 has given in-principle clearance for NKSTPP.

1.03.00 **Water**

Make up water available for this project would be about 22 cusec and will be arranged by constructing a dam/reservoir across river Garhi.

1.04.00 **Fuel (Coal)**

1.04.01 **Coal Requirement, Availability and Linkage**

Coal requirement for the project is estimated as 10.6 Million Tonne/Annum (MTPA), considering a GCV of 3800 kcal/kg. Ministry of Coal vide letter dated 21.10.99 accorded in-principle coal linkage of 10.00 MTPA subject to ratification by Standing Linkage Committee-Long Term (SLC (LT)), of MOC. SLC (LT) in its meeting held on 15.12.2000 firmed up the coal linkage of 10.24 MTPA for the project. Subsequently, the coal linkage was withdrawn by SLC (LT) in its meeting held on 22/23.10.08.

Cabinet Committee on Investment (GOI) in its meeting on 20.02.13 decided in-principle to restore the original coal linkage granted to NKSTPP (i.e. from Magadh Coal Block) with the stipulation that the coal supply will commence during the 13th Five Year Plan. MOC vide letter dated 09.05.2013 restored the coal linkage with the stipulation that the coal supply will commence during the 13th five year plan.

1.04.02 **Coal Transportation**

Coal from Magadh block of North Karanpura Coalfields is proposed to be transported to the project site through conveyor belt system. One external coal handling plant and one internal coal handling plant are envisaged.

1.05.00 **Meteorological Data**

Important meteorological data from nearest observatory at Hazaribag is placed at Annexure-II**.**

1.06.00 **Plant Water Scheme**

The Plant water scheme is described below.

1.06.01 **Condenser Cooling System**

It is proposed to adopt Air Cooled Condenser for the project.

1.06.02 **Equipment Cooling Water (ECW) System (Unit Auxiliaries)**

All plant auxiliaries shall be cooled by De-mineralized water (DM) in a closed circuit. The primary circuit DM water shall be cooled through heat exchangers by auxiliary cooling water system. The hot secondary circuit cooling water shall be cooled in the cooling towers and shall be returned back to the system.

1.06.03 **Ash Water System**

It is proposed to have HCSD (High concentration Slurry Disposal) system for combined fly ash and bottom ash. No recirculation of ash water from ash disposal area is envisaged.

1.06.04 **Other Miscellaneous Water Systems**

(a) Raw water shall be used for meeting the Fly ash and bottom ash system requirement etc.

(b) The service water shall be taken from clarified water tank of Pretreatment plant. Service water (wash water) collected from various areas shall be treated using oil water separators, tube settlers, coal settling pits etc. as per requirement and treated water from liquid effluent treatment plant shall be recycled back to the service water system for re-use.

(c) The drinking water requirement of the plant shall be provided from water treatment plant.

(d) Steam Cycle make-up water, makeup to the primary circuit of ECW (unit auxiliaries) system, boiler fill water and makeup to the hydrogen generation plant shall be provided from Demineralising plant.

(e) The quality of Raw water is enclosed with this sub-section as Annexure-III.

1.07.00 **Criteria for Earthquake Resistant Design of Structures and Equipment**

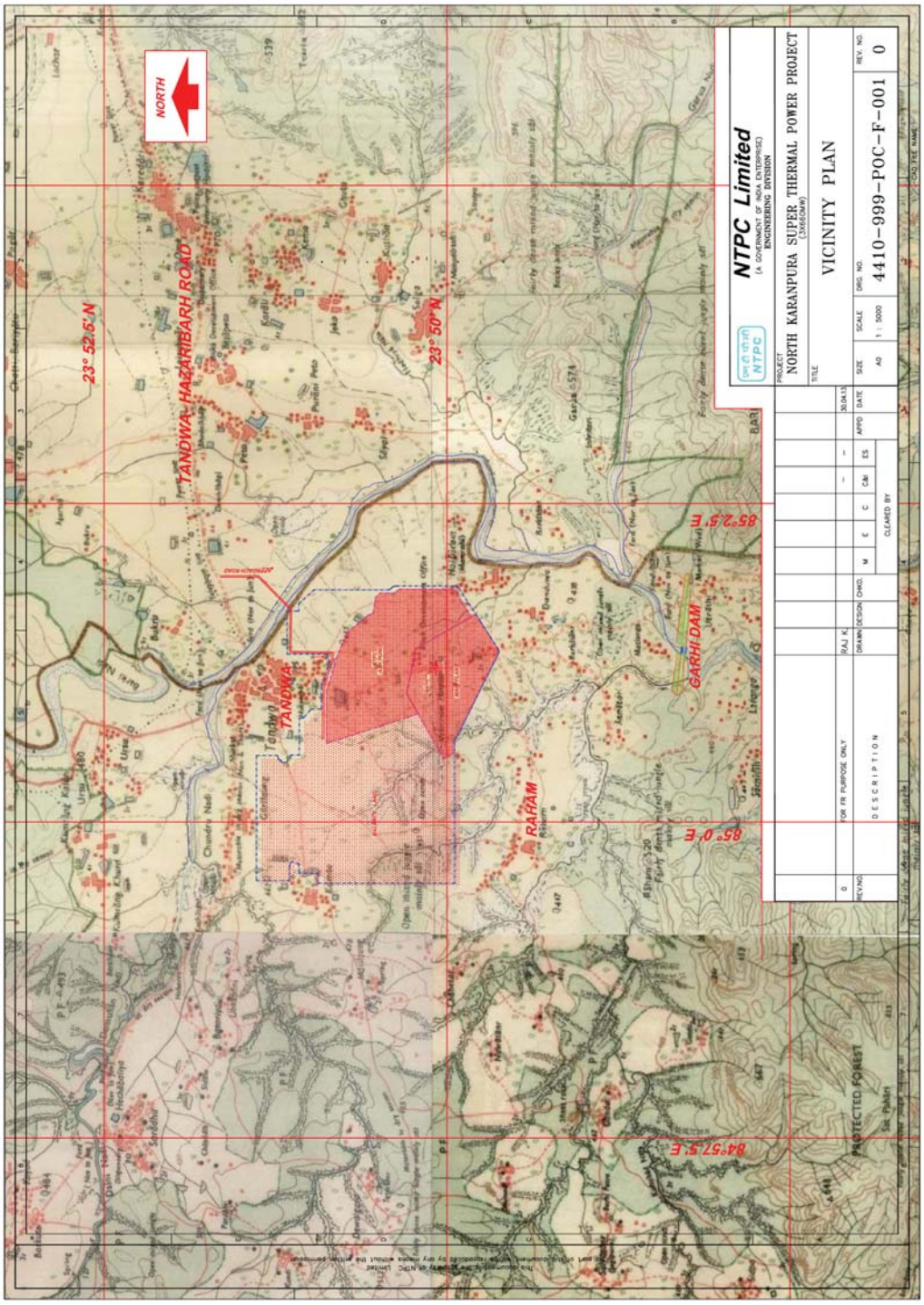
All power plant structures and equipment, including plant auxiliary structures and equipment shall be designed for seismic forces as given in the Part - B of this section.

1.08.00 **Criteria for Wind Resistant Design of Structures and Equipment**

All structures and equipment of the power plant, including plant auxiliary structures and equipment, shall be designed for wind forces as given as given in Part B of this section.

Annexure-I

VICINITY PLAN



Annexure-II

CLIMATOLOGICAL TABLE

CLIMATOLOGICAL TABLE

स्टेशन : हजारीबाग STATION : Hazaribagh — अक्षांश LAT 23°59′ N — देशांतर LONG 85°22′ E — समुद्री तल माध्य से ऊँचाई HEIGHT ABOVE M. S. L. मीटर 611 METRES

1951 से 1980 तक के प्रेक्षणों पर आधारित BASED ON OBSERVATIONS FROM 1951 TO 1980

MONTH माह		STATION LEVEL PRESSURE स्टेशन का सतह दाब (hPa)	DRY BULB शुष्क बल्ब (°C)	WET BULB नम बल्ब (°C)	DAILY MAX दैनिक अधिक तम (°C)	DAILY MIN दैनिक न्यून तम (°C)	HIGHEST IN THE MONTH माह में उच्चतम (°C)	LOWEST IN THE MONTH माह में निम्नतम (°C)	HIGHEST उच्चतम (°C)	DATE AND YEAR दिनांक और वर्ष	LOWEST निम्नतम (°C)	DATE AND YEAR दिनांक और वर्ष	RELATIVE HUMIDITY सापेक्ष आर्द्रता (%)	VAPOUR PRESSURE वाष्प दाब (hPa)	ALL CLOUDS समस्त मेघ (Oktas of sky)	LOW CLOUDS निम्न मेघ (Oktas of sky)	MONTHLY TOTAL मासिक योग (mm)	NO. OF RAINY DAYS वर्षा के दिनों की संख्या	TOTAL IN WETTEST MONTH WITH YEAR (mm)	TOTAL IN DRIEST MONTH WITH YEAR (mm)	HEAVIEST FALL IN 24 HOURS (mm)	DATE AND YEAR	MEAN WIND SPEED (Kmph)
		AIR TEMPERATURE वायु तापमान: MEAN माध्य							AIR TEMPERATURE: EXTREMES चरम				HUMIDITY आर्द्रता		CLOUD AMOUNT मेघ की मात्रा		RAINFALL वर्षा						
जनवरी JAN	I	947.6	14.7	10.9	22.6	9.3	26.7	4.6	30.6	31 1881	0.9	07 1980	62	10.4	1.4	0.5	23.5	1.7	113.0 1919	0.0	68.1	06 1945	6.2
	II	944.5	18.9	12.8									49	10.4	1.6	0.5							
फरवरी FEB	I	945.7	17.9	12.3	25.7	12.0	30.5	6.9	33.6	22 1967	1.7	08 1974	52	10.3	1.3	0.4	16.2	1.4	117.3 1907	0.0	63.5	23 1927	7.3
	II	942.6	22.6	14.4									39	10.4	1.4	0.6							
मार्च MAR	I	944.0	23.4	15.0	30.8	16.6	35.6	11.4	38.9	27 1892	6.7	04 1898	39	10.8	1.5	0.3	18.4	1.7	164.3 1905	0.0	44.2	20 1946	7.9
	II	940.6	27.6	16.3									29	10.2	1.9	0.5							
अप्रैल APR	I	941.0	28.6	18.2	35.7	21.3	39.3	16.4	41.7	22 1956	10.6	01 1968	36	13.3	1.8	0.3	17.0	1.4	81.6 1952	0.0	60.5	22 1925	8.6
	II	937.1	32.4	18.8									26	11.8	2.2	0.7							
मई MAY	I	937.0	30.7	21.1	37.8	24.0	41.5	19.3	43.9	18 1897	15.6	22 1977	43	18.1	2.5	0.3	43.4	2.9	187.2 1936	0.0	84.1	27 1887	9.1
	II	933.4	34.3	21.2									32	15.7	2.9	0.7							
जून JUN	I	933.4	28.4	23.3	34.1	24.1	40.1	21.0	46.6	14 1975	18.3	02 1975	67	25.0	5.3	1.8	177.1	9.2	774.5 1911	0.5 1905	249.2	24 1911	8.7
	II	930.4	30.4	23.5									60	23.8	5.8	2.5							
जुलाई JUL	I	933.1	25.6	23.8	29.5	23.0	33.2	21.4	39.6	08 1975	19.3	18 1975	86	28.2	6.5	3.8	310.0	16.2	693.2 1930	99.8 1911	221.7	06 1953	7.9
	II	930.5	26.8	24.1									80	26.1	6.4	3.7							
अगस्त AUG	I	934.5	25.2	23.7	29.1	22.7	31.5	21.3	34.2	03 1972	20.0	29 1967	88	28.3	6.4	3.8	320.1	16.2	706.1 1943	83.8 1928	180.1	17 1888	7.6
	II	931.6	26.4	24.3									84	28.7	6.4	3.5							
सितम्बर SEP	I	938.2	25.1	23.1	29.0	22.2	31.5	20.4	33.3	24 1960	17.8	29 1950	85	26.8	5.1	2.9	260.9	11.6	530.9 1893	40.7 1966	167.4	28 1963	7.3
	II	935.1	26.0	23.5									81	27.2	5.6	2.9							
अक्तूबर OCT	I	943.6	23.9	20.4	28.5	18.9	31.3	14.3	34.0	04 1966	9.7	12 1972	73	21.4	2.4	1.2	80.6	4.1	378.6 1963	0.0	149.4	24 1963	5.2
	II	940.6	24.9	20.7									68	21.3	2.9	1.3							
नवम्बर NOV	I	947.0	20.2	15.5	25.8	13.3	28.3	9.0	31.7	01 1896	4.4	25 1879	60	14.3	1.2	0.4	5.5	0.4	160.0 1924	0.0	95.0	08 1924	4.8
	II	943.9	21.4	16.0									56	14.2	1.6	0.5							
दिसम्बर DEC	I	948.2	15.7	11.8	23.1	9.3	26.2	5.1	29.4	20 1950	0.5	24 1961	62	11.1	1.1	0.2	5.2	0.4	81.3 1885	0.0	39.4	13 1885	5.3
	II	945.1	18.7	13.1									52	11.1	1.2	0.2							
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I	941.1	23.3	18.3	29.3	18.1	41.9	3.6	46.6		0.5		63	18.2	3.0	1.3	1277.9	67.2	2146.0 1893	739.6 1966	249.2		7.2
	II	938.0	25.9	19.1									55	17.7	3.3	1.5							
वर्षों की सं NUMBER OF YEARS	I	28	27	27	27	28	27	28	83		83		27	27	29	23	29	29	99	99	99		23
	II	28	28	28									28	27	30	22							

VOLUME – II B

SECTION – C

SPECIFIC TECHNICAL REQUIREMENTS

1.0 SCOPE OF WORK

1.1 Design, engineering, manufacturing, inspection and testing at manufacturer's works, painting, supply/delivery duly packed at project site for pump & motor set duly coupled and unitised on a common base frame with coupling guard, foundation bolts, flanges, companion flanges with nuts bolts and gaskets, drip pan with plugged draining arrangement, strainer with flanges, companion flanges, nuts, bolts & gaskets, foundation bolts etc. along with commissioning spares and all accessories as indicated in the pump data sheet.

The scope of equipment (Quantity, Capacity, Head and the type of strainer) to be supplied shall be as per Data sheet-A indicated in Section C.

1.2 Mandatory spares: Not Applicable

2.0 TERMINAL POINT

a) Strainer suction Counter flange
b) Pump discharge counter flange.

2.1 For electrical system, bidder's scope shall terminate at motor terminal box complete with cable glands/ lugs for power cabling. Also refer electrical scope between BHEL & Vendor enclosed under section- D of specification.

3.0 EXCLUSIONS

3.1 Power Cable
3.2 Motor starter in MCC
3.3 Local Push Button Station
3.4 Supply feeder
3.5 Earthing of Pumps. However, earthing conductor is to be provided by the bidder.
3.6 Foundation & associated civil works.

4.0 CORROSION PROTECTION/ PAINTING SCHEDULE

	External
Surface preparation	Surface shall be degreased and prepared by brush/mechanical tool/sand. Blasting shall be as per manufacturing guide lines.
Primer Coat	One coat of epoxy based zinc phosphate primer of 50-75 micron.
Intermediate coat	One coat of epoxy based TiO2 pigmented paint.
Finish	Two coat epoxy based finish coat. Thus a total DFT of 210-235 micron shall be achieved. Paint shade shall be grey RAL 9002.

Note:

1. Any change in painting specification at later date needs to be complied by bidder without any commercial implication.

2. Make of paints shall be as per approved BHEL vendor list.

5.0 QUALITY REQUIREMENTS

a) Bidder should maintain excellent quality of works; all supply items shall meet the relevant quality standards.

b) The successful bidder shall furnish Quality Plans/ Inspection Check Lists for various item for the package in line with minimum requirement indicated in specification during detail engineering for customer's approval.

c) For other items for which any specific inspection requirement is not indicated in the specification but the same included in scope of work , vendor specific QPs/ CLs shall be furnished by the successful bidder for Customer/Consultant's review and approval. All comments made by customer/ consultant shall be incorporated by the successful bidder without any commercial and delivery implication.

6.0 SUB-VENDOR ITEMS

Sub-vendor items makes are subjected to acceptance by customer without any additional commercial implication to BHEL.

7.0 DRAWINGS AND DOCUMENTS TO BE SUBMITTED WITH THE BID

The drawings and documents to be submitted with the bid shall be as mentioned in vol. III, document to be submitted by the bidder with the bid

8.0 DRAWINGS AND DOCUMENTS REQUIRED DURING DETAIL ENGINEERING

List of drawings / documents required during detail engineering along with submission Schedule is given in Volume III and data shall be as indicated in section –D under Clause No. 8.0

BHEL PEM	DATA SHEET "A" FOR LUBE OIL PUMPS	DOC. NO. PE-ID-405-100-Q012
		SHEET NO. 01 OF 01
	PROJECT TITLE : NTPC - 3x660MW NORTH KARANPURA STPP	

1.0	SERVICE IDENTIFICATION	**CLEAN OIL PUMP**	**DIRTY OIL PUMP**
2.0	DRAWING NO.	PE-DG-405-100-N108	PE-DG-405-100-N108
3.0	SYSTEM	CENTRAL LUBE OIL SYSTEM	CENTRAL LUBE OIL SYSTEM
4.0	TYPE	ROTARY POSITIVE DISPLACEMENT	ROTARY POSITIVE DISPLACEMENT
5.0	NUMBER REQUIRED	ONE (01) NO. (COMMON FOR STATION)	ONE (01) NO. (COMMON FOR STATION)
6.0	FLOW RATE (MAX.)	6600 LPH	6600 LPH
7.0	DISCHARGE PRESSURE	2.0 KG/CM^2 (g)	2.0 KG/CM^2 (g)
8.0	SUCTION CONDITION	FLOODED (MAX -4 MLC TO BE CONSIDERED)	FLOODED (MAX -4 MLC TO BE CONSIDERED)
9.0	LOCATION OF INSTALLATION	INDOOR	INDOOR
10.0	LIQUID PUMPED	TURBINE LUBE OIL (TURBINOL-46-HPC / SERVOPRIME 46-IOC)	TURBINE LUBE OIL (TURBINOL-46-HPC / SERVOPRIME 46-IOC)
11.0	PROPERTIES OF FLUID	DENSITY- 0.9 GM/CC AT 15^{o}C FLASH POINT - 210 ^{o}C VISCOSITY -28 CST AT 50 ^{o}C / 48 CST AT 37.8^{o}C / 140 CST AT 20^{o}C	DENSITY- 0.9 GM/CC AT 15^{o}C FLASH POINT - 210 ^{o}C VISCOSITY -28 CST AT 50 ^{o}C / 48 CST AT 37.8^{o}C / 140 CST AT 20^{o}C
12.0	TEMPERATURE NORMAL / MAX	AMBIENT / 70 ^{0} C	AMBIENT / 70 ^{0} C
13.0	SUCTION / DISCHARGE PIPING CONNECTION	OD 88.9 X 5.49 / OD 88.9 X 5.49	OD 88.9 X 5.49 / OD 88.9 X 5.49
14.0	RELIEF VALVE	BUILT-IN ON EACH PUMP	BUILT-IN ON EACH PUMP
15.0	SUCTION STRAINER	DUPLEX TYPE STRAINER WITH CHANGE-OVER VALVE, SS ELEMENT MESH SIZE 20 & BLOW DOWN VALVE	DUPLEX TYPE STRAINER WITH CHANGE-OVER VALVE, SS ELEMENT MESH SIZE 20 & BLOW DOWN VALVE
16.0	MATERIALS OF CONSTRUCTION CASING GEARS SHAFT	 ASTM A216 GR WCB EN-8/9 EN-8/9	 ASTM A216 GR WCB EN-8/9 EN-8/9
17.0	APPLICABLE CODES / STATUTORY REGULATIONS	AS APPLICABLE IS, BS, API STANDARDS	AS APPLICABLE IS, BS, API STANDARDS
18.0	DRIVE TYPE	INDUCTION MOTOR 415 V, 50 Hz	INDUCTION MOTOR 415 V, 50 Hz
19.0	INSTRUMENTS	NA	NA

NOTE : OTHER GENERAL TECHNICAL REQUIREMENTS / ACCESSORIES & SPARES AS PER OTHER PART OF SPECIFICATION

1.0 EQUIPMENT & SERVICES TO BE PROVIDED BY BIDDER:

a) Services and equipment as per "Electrical Scope between BHEL and Vendor".

b) Any item/work either supply of equipment or erection material which have not been specifically mentioned but are necessary to complete the work for trouble free and efficient operation of the plant shall be deemed to be included within the scope of this specification. The same shall be provided by the bidder without any extra charge.

c) Supply of mandatory spares as specified in the specifications of mechanical equipment's.

d) Electrical load requirement for **Lube oil pumps.**

e) All equipment shall be suitable for the power supply fault levels and other climatic conditions mentioned in the enclosed project information.

f) Bidder to furnish list of makes for each equipment at contract stage, which shall be subject to customer/BHEL approval without any commercial and delivery implications to BHEL

g) Various drawings, data sheets as per required format, Quality plans, calculations, test reports, test certificates, operation and maintenance manuals etc shall be furnished as specified at contract stage. All documents shall be subject to customer/BHEL approval without any commercial implication to BHEL.

h) Motor shall meet minimum requirement of motor specification.

2.0 **EQUIPMENT & SERVICES TO BE PROVIDED BY PURCHASER FOR ELECTRICAL & TERMINAL POINTS:**

Refer "Electrical Scope between BHEL and Vendor".

3.0 **DOCUMENTS TO BE SUBMITTED ALONG WITH BID**

3.1 Bidder shall confirm total compliance to the electrical specification without any deviation from the technical/quality assurance requirements stipulated.

3.2 No technical submittal such as copies of data sheets, drawings, write-up, quality plans, type test certificates, technical literature, etc. is required during tender stage. Any such submission even if made, shall not be considered as part of offer.

4.0 List of enclosures :

a) Electrical scope between BHEL & vendor (Annexure –I)
b) Technical specification for motors.
c) Datasheets & quality plan for motors.
d) Electrical Load data format (Annexure –II)
e) BHEL cable listing format (Annexure –III)

ANNEXURE – I TO SECTION – C : STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGE: LUBE OIL PUMPS

PROJECT: 3X660MW NORTH KARANPURA STPP

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	415V MCC	BHEL	BHEL	DOL starters for motors and 415V supply feeders for the requirements like control panel will be provided by BHEL.
2	Local push button station (for motors)	BHEL	BHEL	Located near the motor
3	Power cables, ordinary control cables and screened control cables between equipments supplied by vendor.	BHEL	Vendor	
4.	Power cables, ordinary control cables and screened control cables between equipments supplied by vendor & BHEL.	BHEL	BHEL	1) Laying of cables by BHEL. 2) Termination at BHEL equipment by BHEL. 3) Termination at vendor equipment by vendor.
5	Any special type of cable like compensating. Co-axial, prefab, MICC and fibre optical	Vendor	Vendor	Refer C &I portion of specification for scope of fibre optical cables if used between PLC/microprocessor & DCS.
6	Illumination	BHEL	BHEL	
7	Cabling material (cable trays, accessories and cable tray-supporting system, conduits) for cabling between equipments supplied by vendor and BHEL.	BHEL	BHEL	
8	Conduits and conduit accessories for cabling between equipments by vendor	Vendor	Vendor	Cabling shall be through conduits. However, vendor can use the trunk routes available for laying of cables. Conduits shall be supplied by vendor.
9	Junction box for control &instrumentation cable	Vendor	Vendor	
10	Equipment earthing.	BHEL	BHEL	
11	Motors with Base frame and fixing hardware for motors.	Vendor	Vendor	1. Makes shall be subject to customer/BHEL approval at contract stage.
12	a) Input cable schedules (Control & screened control cables) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable (excluding power cables) in enclosed excel format shall be submitted by vendor during detailed engineering stage.
13	Equipment layout drawings.	Vendor	-	Layout details between vendor supplied equipment and installation drawings by vendor
14	Cable glands , lugs and bimetallic strip for equipment supplied by vendor	Vendor	Vendor	1. Double compression Ni-Cr plated brass glands. 2. Solder less crimping type heavy-duty tinned copper lugs for power & control cables.

Note- 1. All QPs shall be subject to approval of BHEL/ Customer after award of contract.

2. In case the requirement of Junction Box arises on account of Power Cable size mis-match due to vendor engineering at later stage, vendor shall supply the Junction Box for suitable termination.

SUB–SECTION – B-07

MOTORS

MOTORS

1.00.00 GENERAL REQUIREMENTS

1.01.00 For the purpose of design of equipment/systems, an ambient temperature of 50 deg. Centigrade and relative humidity of 95% (at 40 deg C) shall be considered. The equipment shall operate in a highly polluted environment.

1.02.00 All equipments shall be suitable for rated frequency of 50 Hz with a variation of +3% & -5%, and 10% combined variation of voltage and frequency unless specifically brought out in the specification.

1.03.00 Contractor shall provide fully compatible electrical system, equipments, accessories and services.

1.04.00 All the equipment, material and systems shall, in general, conform to the latest edition of relevant National and international Codes & Standards, especially the Indian Statutory Regulations.

1.05.00 Paint shade shall be as per RAL 5012 (Blue) for indoor and outdoor equipment.

1.06.00 The responsibility of coordination with electrical agencies and obtaining all necessary clearances for contractors equipment and systems shall be under the contractor scope.

1.07.00 Degree of Protection

Degree of protection for various enclosures as per IS:4691, IEC60034-05 shall be as follows :-

i)	Indoor motors	-	IP 54
ii)	Outdoor motors	-	IP 55
iii)	Cable box-indoor area	-	IP 54
iv)	Cable box-Outdoor area	-	IP 55

2.00.00 CODES AND STANDARDS

1)	Three phase induction motors	:	IS:325, IEC:60034
2)	Single phase AC motors	:	IS:996, IEC:60034
3)	Crane duty motors	:	IS:3177, IEC:60034
4)	DC motors/generators	:	IS:4722
5)	Energy Efficient motors	:	IS 12615, IEC:60034-30

3.00.00 **TYPE**

3.01.00 **AC Motors:**

a) Squirrel cage induction motor suitable for direct-on-line starting.

b) Continuous duty LT motors upto 160 KW Output rating (at 50 deg.C ambient temperature), shall be **Premium Efficiency class-IE3**, conforming to IS 12615, or IEC:60034-30.

c) Crane duty motors shall be slip ring/ squirrel cage Induction motor as per the requirement.

3.02.00 DC Motors Shunt wound.

4.00.00 **RATING**

(a) Continuously rated (S1). However, crane motors shall be rated for S4 duty, 40% cyclic duration factor.

(b) Whenever the basis for motor or driven equipment ratings are not specified in the corresponding mechanical specification sub-sections, maximum continuous motor ratings shall be at least 10% above the maximum load demand of the driven equipment under entire operating range including voltage and frequency variations.

(c) For BFP motors starting MVA shall be restricted to 60 MVA.

5.00.00 **TEMPERATURE RISE**

Air cooled motors

70 deg. C by resistance method for both thermal class 130(B) & 155(F) insulation.

Water cooled

80 deg. C over inlet cooling water temperature mentioned elsewhere, by resistance method for both thermal class 130(B) & 155(F) insulation.

6.00.00 **OPERATIONAL REQUIREMENTS**

6.01.00 **Starting Time**

6.01.01 For motors with starting time upto 20 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 secs. more than starting time.

6.01.02	For motors with starting time more than 20 secs. and upto 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 secs. more than starting time.
6.01.03	For motors with starting time more than 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the starting time.
6.01.04	Speed switches mounted on the motor shaft shall be provided in cases where above requirements are not met.
6.02.00	**Torque Requirements**
6.02.01	Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor full load torque.
6.02.02	Pull out torque at rated voltage shall not be less than 205% of full load torque. It shall be 275% for crane duty motors.
6.03.00	**Starting voltage requirement** (a) 85% below 110 KW (b) 80% from 110 KW to 200 KW (c) 85% above 200 KW to 1000 KW (d) 80% from 1001 KW to 4000 KW (e) 75% above 4000KW Except AOP & JOP motors running on D.G emergency supply, starting voltage shall be 80%.
7.00.00	**DESIGN AND CONSTRUCTIONAL FEATURES**
7.01.00	Suitable single phase space heaters shall be provided on motors rated 30KW and above to maintain windings in dry condition when motor is standstill. Separate terminal box for space heaters & RTDs shall be provided. However for flame proof motors , space heater terminals inside the main terminal box may be acceptable.
7.02.00	All motors shall be either Totally enclosed fan cooled (TEFC) or totally enclosed tube ventilated (TETV) or Closed air circuit air cooled (CACA) type. However, motors rated 3000KW or above can be Closed air circuit water cooled (CACW). Motors and EPB located in hazardous areas shall have flame proof enclosures conforming to IS:2148 as detailed below (a) Fuel oil area : Group – IIB

	(b) Hydrogen generation		:Group - IIC or (Group-I, Div-II as per plant area NEC) or (Class-1, Group-B, Div-II as per NEMA /IEC60034)
7.03.00	Winding and Insulation		
	(a) Type	:	Non-hygroscopic, oil resistant, flame resistant
	(b) Starting duty	:	Two hot starts in succession, with motor initially at normal running temperature.
	(c) 11kV & 3.3 kV AC motors	:	Thermal class 155 (F) insulation. The winding insulation process shall be total Vacuum Presure Impregnated i.e resin poor method. The lightning Impulse & interturn insulation surge withstand level shall be as per IEC-60034 part-15
	(d) 240VAC, 415V AC & 220V DC motors	:	Thermal Class(B) or better
7.04.00	Motors rated above 1000KW shall have insulated bearings to prevent flow of shaft currents.		
7.05.00	Motors with heat exchangers shall have dial type thermometer with adjustable alarm contacts to indicate inlet and outlet primary air temperature.		
7.06.00	Noise level for all the motors shall be limited to 85dB(A) except for BFP motor for which the maximum limit shall be 90dB(A). Vibration shall be limited within the limits prescribed in IS:12075 / IEC 60034-14 . Motors shall withstand vibrations produced by driven equipment. HT motor bearing housings shall have flat surfaces, in both X and Y directions, suitable for mounting 80mmX80mm vibration pads.		
7.07.00	In HT motors, at least four numbers simplex / two numbers duplex platinum resistance type temperature detectors shall be provided in each phase stator winding. Each bearing of HT motor shall be provided with dial type thermometer with adjustable alarm contact and preferably 2 numbers duplex platinum resistance type temperature detectors.		
7.08.00	Motor body shall have two earthing points on opposite sides.		
7.09.00	11 KV motors shall be offered with Separate Insulated Connector (Elastimould or Equivalent make) as per IEEE 386. The offered Elastimould terminations shall be provided with protective cover and trifurcating sleeves. Elastimould termination kit shall be suitable for fault level of 25 KA for 0.17 seconds.		
7.10.00	3.3 KV motors shall be offered with dust tight phase separated double walled (metallic as well as insulated barrier) Terminal box. Suitable termination kit shall be provided for the offered Terminal box. The offered Terminal Box shall be suitable for fault level of 250		

	MVA for 0.12 sec. Removable gland plates of thickness 3 mm (hot/cold rolled sheet steel) or 4 mm (non magnetic material for single core cables) shall be provided.
7.11.00	The spacing between gland plate & centre of terminal stud shall be as per Table-I.
7.12.00	All motors shall be so designed that maximum inrush currents and locked rotor and pullout torque developed by them at extreme voltage and frequency variations do not endanger the motor and driven equipment.
7.13.00	The motors shall be suitable for bus transfer schemes provided on the 11kV, 3.3 kV /415V systems without any injurious effect on its life.
7.14.00	For motors rated 2000 KW & above, neutral current transformers of PS class shall be provided on each phase in a separate neutral terminal box.
7.15.00	The size and number of cables (for HT and LT motors) to be intimated to the successful bidder during detailed engineering and the contractor shall provide terminal box suitable for the same.
8.00.00	The ratio of locked rotor KVA at rated voltage to rated KW shall not exceed the following (without any further tolerance) except for BFP motor. (a) Below 110KW : 10.0 (b) From 110 KW & upto 200 KW : 9.0 (c) Above 200 KW & upto 1000KW : 10.0 (d) From 1001KW & upto 4000KW : 9.0 (e) Above 4000KW : 6 to 6.5
10.00.00	**TYPE TEST**
10.01.00	**HT MOTORS**
10.01.01	The contractor shall carry out the type tests as listed in this specification on the equipment to be supplied under this contract. The bidder shall indicate the charges for each of these type tests separately in the relevant schedule of Section - VII- (BPS) and the same shall be considered for the evaluation of the bids. The type tests charges shall be paid only for the test(s) actually conducted successfully under this contract and upon certification by the employer's engineer.
10.01.02	The type tests shall be carried out in presence of the employer's representative, for which minimum 15 days notice shall be given by the contractor. The contractor shall obtain the employer's approval for the type test procedure before conducting the type test. The type test procedure shall clearly specify the test set–up, instruments to be used, procedure,

acceptance norms, recording of different parameters, interval of recording, precautions to be taken etc. for the type test(s) to be carried out.

10.01.03 In case the contractor has conducted such specified type test(s) within last ten years as on the date of bid opening, he may submit during detailed engineering the type test reports to the Employer for waival of conductance of such test(s). These reports should be for the tests conducted on the equipment similar to those proposed to be supplied under this contract and test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. The Employer reserves the right to waive conducting of any or all the specified type test(s) under this contract. In case type tests are waived, the type test charges shall not be payable to the contractor.

10.01.04 Further the Contractor shall only submit the reports of the type tests as listed in "LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED"and carried out within last ten years from the date of bid opening. These reports

should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of client/Employers representative and submit the reports for approval.

10.01.05 **LIST OF TYPE TESTS TO BE CONDUCTED**

The following type tests shall be conducted on each type and rating of HT motor

(a) No load saturation and loss curves upto approximately 115% of rated voltage

(b) Measurement of noise at no load.

(c) Momentary excess torque test (subject to test bed constraint).

(d) Full load test(subject to test bed constraint)

(e) Temperature rise test at rated conditions. During heat run test, bearing temp., winding temp., coolant flow and its temp. shall also be measured. In case the temperature rise test is carried at load other than rated load, specific approval for the test method and procedure is required to be obtained. Wherever ETD's are provided, the temperature shall be measured by ETD's also for the record purpose.

10.01.06 **LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED**

The following type test reports shall be submitted for each type and rating of HT motor

(a) Degree of protection test for the enclosure followed by IR, HV and no load run test.

(b) Terminal box-fault level withstand test for each type of terminal box of HT motors only.

(c) Lightning Impulse withstand test on the sample coil shall be as per clause no. 4.3 IEC-60034, part-15

(d) Surge-withstand test on interturn insulation shall be as per clause no. 4.2 of IEC 60034, part-15

10.02.00 **LT Motors**

10.02.01 LT Motors supplied shall be of type tested design. During detailed engineering, the contractor shall submit for Employer's approval the reports of all the type tests as listed in this specification and carried out within last *ten* years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.

10.02.02 However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of client/Employers representative and submit the reports for approval.

10.02.03 **LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED**

The following type test reports shall be submitted for each type and rating of LT motor of above 50 KW only

1. Measurement of resistance of windings of stator and wound rotor.
2. No load test at rated voltage to determine input current power and speed
3. Open circuit voltage ratio of wound rotor motors (in case of Slip ring motors)
4. Full load test to determine efficiency power factor and slip .
5. Temperature rise test .
6. Momentary excess torque test.
7. High voltage test .

8. Test for vibration severity of motor.

9. Test for noise levels of motor(Shall be limited as per clause no 7.06.00 of this section)

10. Test for degree of protection and

11. Over speed test.

12. Type test reports for motors located in fuel oil area having flame proof enclosures as per IS 2148 / IEC 60079-1

10.03.00 All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.

10.04.00 The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and "No design Change". Minor changes if any shall be highlighted on the endorsement sheet.

TABLE - I

DIMENSIONS OF TERMINAL BOXES FOR LV MOTORS

Motor MCR in KW	**Minimum distance between centre of stud and gland plate in mm**
UP to 3 KW	**As per manufacturer's practice.**
Above 3 KW - upto 7 KW	85
Above 7 KW - upto 13 KW	115
Above 13 KW - upto 24 KW	167
Above 24 KW - upto 37 KW	196
Above 37 KW - upto 55 KW	249
Above 55 KW - upto 90 KW	277
Above 90 KW - upto 125 KW	331
Above 125 KW-upto 200 KW	203

For HT motors the distance between gland plate and the terminal studs shall not be less than 500 mm.

PHASE TO PHASE/ PHASE TO EARTH AIR CLEARANCE:

NOTE: Minimum inter-phase and phase-earth air clearances for LT motors with lugs installed shall be as follows:

Motor MCR in KW	**Clearance**
UP to 110 KW	10mm
Above 110 KW and upto 150 KW	12.5mm
Above 150 KW	19mm

Cable glands

Cable shall be terminated using double compression type cable glands. Testing requirements of Cable glands shall conform to BS:6121 and gland shall be of robust construction capable of clamping cable and cable armour (for armoured cables) firmly without injury to insulation. Cable glands shall be made of heavy duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 micron. All washers and hardware shall also be made of brass with nickel chrome plating Rubber components shall be of neoprene or better synthetic material and of tested quality. Cable glands shall be suitable for the sizes of cable supplied/erected.

Cable lugs

Cable lugs for power cables shall be tinned copper solderless crimping type suitable for aluminium compacted conductor cables. Cable lugs for control cables shall be tinned copper type. The cable lugs for control cables shall be provided with insulating sleeve and shall suit the type of terminals provided on the equipments. Cable lugs shall conform to relevant standard

1.	Design ambient temperature	:	50 ºC
2.	Maximum acceptable kW rating of LV motor	:	≤200KW
3.	Installation (Indoors/ Outdoors)	:	As required
4.	Degree Of Protection (Indoor/Outdoor)	:	IP54/IP55
5.	Type of Cooling	:	TEFC/CACA/TETV
6.	Details of supply system		
	a) Rated voltage (with variation)	:	415V ± 10%
	b) Rated frequency (with variation)	:	50 Hz (Variation: +3% to –5%)
	c) Combined voltage & freq. variation	:	10%
	d) System fault level at rated voltage	:	50 kA for 1 sec
	e) Short time rating for terminal boxes		
	110kW & Above (Breaker controlled)	:	50 kA for 1 sec
	Below 110kW (SFU+ Contactor controlled)	:	50 KA for 0.20 sec
	f) LV System grounding	:	Solidly
7.	CLASS OF INSULATION & TEMP RISE LIMITED TO	:	THERMAL CLASS F & TEMP RISE LIMITED TO CLASS B
8.	Minimum voltage for starting (As percentage of rated voltage)	:	85% below 110KW 80% from 110KW to 200 KW
9.	Power cables data	:	Shall be given during detailed engg.
10.	Earth Conductor Size & Material	:	Shall be given during detailed engg.
11.	Space heater supply	:	240 V, 1Φ, 50 Hz
12.	Rating up to which Single phase motor	:	Acceptable upto 0.20 kW
13.	Tests	:	As per Customer motor spec. (enclosed)
14.	Special requirement	:	Continuous duty LT motors upto 160 KW output rating (at 50 deg C) shall be Premium Efficiency class – IE3 conforming to IS 12615/IEC:60034-30.
15.	Maximum Ratio of locked rotor KVA at rated voltage to rated KW	:	Below 110 KW - 10.0 :From 110KW to upto 200KW - 9.0

- **Also detail Customer spec. for Motors to be referred as enclosed with spec.**

DRAWING DOCUMEMNT PROCEDURE GIVEN BELOW IS MINIMUM. FINAL DDP WILL BE GIVEN AFTER ORDERING AND SAME TO BE ADHERED TO WITHOUT ANY COMMERCIAL IMPLICATION.

S.No	Description of Drgs/Docs	No of Prints	No of CD ROMs/DVDs/Portable Hard Disk
1	Drawings, Data sheets, Design calculations, Purchase specifications and other documents		
	First submission and submission with major changes		
	▪ Layout (A0&A1 sizes)	4	-
	▪ Other Drawings/Documents (A0&A1 sizes)	2	-
	▪ P&ID (All sizes)	4	-
	a) Final drawings/documents (Directly to site)	6	2
	b) "As Built" Drawing/Documents (Directly to site)	6	2
	c) Analysis reports of Equipments / piping /structures components/system employing software packages as detailed in the specifications.	2	2
2	Erection Manual (Directly to site)	4 sets	2
3	Operation & Maintenance manual i) First Submission	1 set	--
	ii) Final Submission (Directly to site)	4 sets	2
4	Plant Hand Book i) First Submission	1	1
5	Commissioning and Performance Test Procedure manual i) First Submission	1 set	--
	ii) Final Submission (Directly to site)	4 sets	2

S.No	Description of Drgs/Docs	No of Prints	No of CD ROMs/DVDs/Portable Hard Disk
6	Performance and Functional Guarantee Test Report i) First Submission	2 sets	--
	ii) Approved Copies (Direct to Site)	4 sets	2
7	Project Completion Report (Directly to site)	6 sets	2
8	QA programme including Organisation for implementation and QA system manual(with revisions)	1	--
9	Vendor details in respect of proposed vendors including contractor's evaluation report.	2	--
10	Manufacturing QPs, Field QPs, Field welding schedules and their reference document like test procedures, WPS, POR etc i) For review/comment	1	--
	ii) Approved final copies of Field QPs, Field welding schedules and their reference document like test procedures, WPS, POR etc (Direct to Site)	4	2
11	Welding Manual, Heat Treatment Manuals, Storage & preservation manuals i) For review/comment	1 set	--
	ii) Approved copies (Direct to Site)	4 sets	2
12	QA Documentation Package for items / equipment manufactured and despatched to site	2 sets	2
13	QA Documentation Package for field activities on equipment/systems at site	2 sets	2

SUB-VENDOR LIST FOR LUBE OIL TRANSFER PUMPS

S.NO	CATEGORY OF INSPECTION	ITEM	SUB-VENDORS	PLACE
1	II	LUBE OIL TRANSFER PUMPS	UT PUMPS & SYSTEMS LTD.	FARIDABAD
	II		MATZ PUMPS PVT. LTD.	AHMEDABAD
	II		TUSHACO PUMPS PVT.LTD.	NEW DELHI
2	II	DUPLEX STRAINERS	JAYPEE INDUSTRIES PVT. LTD.	NEW DELHI
	II		MULTITEX FILTRATION ENGINEERS LIMITED,	NEW DELHI
	II		OTOKLIN GLOBAL BUSINESS LIMITED	MUMBAI
	II		TUSHACO PUMPS PVT LIMITED	NEW DELHI
	II		RELIABLE ENGINEERS	
	II		SUNGOV ENGINEERING PVT. LTD.	CHENNAI
3	III	MOTORS	CROMPTON GREAVES LIMITED	AHMEDNAGAR
	III		KIRLOSKAR ELECTRIC COMPANY	BANGALORE / HUBLI
	III		SIEMENS	MUMBAI
	III		ABB	BANGALORE / FARADABAD
	III		BHARAT BIJLEE	MUMBAI
	III		JYOTI	VADODARA
	III		MARATHON	KOLKATA
	III		NGEF	BANGALORE

NOTES

1. CAT I :INSPECTION BY OWNER, BHEL/BHEL NOMINATED TPIA & VENDOR .MDCC WILL BE ISSUED BASED ON INSPECTION REPORT IN LINE ITH APPROVED QAP.

2. CAT II: INSPECTION BY BHEL/BHEL NOMINATED TPIA & VENDOR. MDCC WILL BE ISSUED BASED ON INSPECTION REPORT IN LINE ITH APPROVED QAP.

3. CAT III: MDCC WILL BE ISSUSED BASED COC & MTC ISSUSD BY VENDOR AND VERIFICATION BY BHEL / OWNER IN LINE WITH APPROVED QAP/CHECK LIST

4. SUB-VENDOR LIST ABOVE IS SUBJECT TO CUSTOMER APPROVAL. BIDDER TO PREPARE SUB-VENDOR LIST WITH INSPECTION CATEGORIZATION AS THE ATTACHED LIST AND SUBMIT TO CUSTOMER. AS PER APPROVED LIST ONLY, MATERAIL TO BE SOURCED. NO COMMERCIAL IMPLICATION WILL BE ACCEPTED ON ACCOUNT OF DELETION OF ANY OF THE ABOVE VENDOR.

VOLUME – II B

SECTION – D

TECHNICAL SPECIFICATION OF EQUIPMENT

1.0 GENERAL

This specification covers the design material constructional features manufacture assembly inspection & testing at manufacturer's or his subcontractor's works, suitable painting & packing requirements of Lube Oil transfer pumps and drives along with all accessories as specified hereinafter.

2.0 CODES & STANDARDS

All equipment, systems and works covered under this specification shall comply with all currently applicable statutes regulations and safety codes in the locality where they will be installed. They shall comply with the latest editions of the codes and standards as given below.

a) American National Standards Institute (ANSI)
b) American Society of Testing & Materials (ASTM)
c) American society of Mechanical Engineers (ASME)
d) Hydraulic Institute Standards (HIS)
e) American Petroleum Institute (API)
f) American Gear Manufacturer's Association (AGMA)
g) National Electrical Manufacturer's Association (NEMA)
h) National Fire Protection Association (NFPA)
i) Indian Standards Institute (ISI)

Other International/National standards such as DIN, VDI, BS, IS etc. shall also be accepted subject to the owner's approval for which the bidder shall furnish along with the offer adequate information to justify that these standards are equivalent or superior to the standards mentioned above. In all such cases the Bidder shall furnish specifically the variations and deviations from the standards mentioned above together with the complete word to word translation of the standard that are normally not published in English In the event of any conflict between the Codes and Standards and their requirements of this specification, the requirement of this specification shall govern.

All equipment covered by this specification shall comply with all applicable laws and regulations of the Republic of India.

In case of any change in code, standards and regulations between the date of purchase order and the date when vendors proceeds with fabrication the purchaser shall have the option to incorporate changed requirements without additional commercial implication. It shall be the responsibility of vendor to advice purchaser of the resulting effect.

3.0 DESIGN REQUIREMENTS & CONSTRUCTIONAL FEATURES

3.1 Casting

The pump shall be horizontal, positive displacement type, designed for oil service and suitable for occasional dry running. The casing shall also have end plates/pump cover which close the ends of the body to form the pumping chamber. The casing shall house rotating assembly. Gear type with a drive shaft.

3.2 **Rotor**

The rotor shall constitute of a shaft on which either Gear are mounted. The rotating assembly shall be encased in the casing and shall be properly sealed. Mechanical Seal could be offered for sealing purpose. The seal material shall have low coefficient of friction and shall be suitable for the fluid handled.

3.3 **Bearing & Lubrication**

Bearings of adequate design shall be provided for taking the entire pump load arising from all probable conditions for continuous operation throughout its range of operation. The bearing shall be designed on the basis of 20,000 working hour's minimum for the load corresponding to the duty point. Proper Lubricating arrangement for the bearing shall be provided. Bearings shall be easily accessible without disturbing the pump assembly. The pump bearings shall be antifriction ball/ roller type of adequate size to carry both radial and axial loads. Any other type of bearing may be accepted subject to acceptance by customer.

3.4 **Coupling**

The pumps shall be directly coupled to their drives through a flexible coupling. Suitable coupling guards also shall be provided along with the coupling. The pump and its drive motor shall be mounted on machined base frame.

3.5 **Base Frame**

Common/individual base frame shall be provided for pump and motor. The base frame shall be fabricated/casted construction providing rigidity and stability and shall be capable of supporting the weight and reactions of the pump & motor. The base plate will have a drip pan with suitable draining arrangement and shall be suitably drilled for the anchor bolts. The material of construction shall be of tested quality structural steel as per IS-2062 or equivalent.

Anchor bolts, nuts, lock nuts, seating steel work as required shall be supplied with the equipment. Only hexagonal nuts shall be used for holding down the equipment.

3.6 **Lifting Arrangement**

Each pump shall incorporate suitable lifting attachments e.g. lifting lugs or eye bolts etc. to facilitate erection & maintenance.

3.7 **Rating Plates & Name Plate**

Each equipment shall have permanently attached to it in a conspicuous position, a rating plate of non-corrosive material upon which shall be engraved manufacturers name, equipment type or serial number.

4.0 **OTHER TECHNICAL / DESIGN & GENERAL REQUIREMENTS**

4.1 The data sheets for Pump and motors placed under Vol-III of specification forms part of specification. The "*" marked details are to be filled up by the bidder without altering the data already filled up.

4.2 The material of construction of Strainer body will be either ASTM A 106 Gr. B pipe or ASTM A216 WCB or fabricated from IS 2062 plates. However, the exact MOC is subject to acceptance by customer and there will be no additional commercial implication on account of above.

4.3 The driving motor power shall be selected based on highest viscosity of oil. The selection of pump motor rating shall be based on criterion given in the electrical portion of the specification.

4.4 The pump shall be designed for the normal operating temperature specified in the data sheet. However, the pump should be able to perform without any malfunctioning at the maximum temperature also as indicated in the data sheet.

4.5 Pumps shall be designed for smooth pulsation and noise free operation. Pump shall be designed to have maximum efficiency at the normal duty point.

4.6 The design of pump shall be so as to minimize the end thrust.

4.7 The pump shall have minimum vibration, noise and capacity reduction even when the viscosity of oil increases during winter season. The maximum permissible noise level of the pump set shall be 85 dB measured at a distance of 1 metre horizontal and 1.5 metre vertical from the edge of pump motor set.

4.8 Material of construction for the vital parts shall be as shown in data sheet or elsewhere in the specification. The material of construction of the other parts of the pump shall be subject to Customer's approval during detail engineering and any changes therein as required by the customer shall be provided by the successful bidder without any commercial implication. All materials used for manufacture of the pump and its components shall be of tested quality. Relevant test certificates shall be made available to the purchaser before taking up fabrication work. In the absence of such certificates the vendor shall arrange to carry out necessary tests required by the code at his cost.

4.9 The revision made by successful bidder in any drawings and documents shall be highlighted by indicating the no. of revisions in a triangle without fail so that the minimum time is required by customer to review the drawings and documents.

4.10 If required by the customer during detail engineering, the successful bidder will submit separate drawing of various assembly / sub - assembly in addition to GA drawing without any commercial implication to the customer.

4.11 The recommended civil foundation drawing to be furnished by the bidder during detail engineering shall include the followings:-

i) Scope of work by BHEL and vendor shall be indicated with different legend or in the form of note.
ii) Weight of moving parts, its frequency and its height from floor shall be furnished.
iii) Recommended location of cable trench for feeding cable to machine along with the details of cable entry.
iv) Civil loads per bolt / pocket (static and dynamic) in tabular form considering worst case.

4.12 The successful bidder will have to depute competent designer (s) at BHEL's office during detailed engineering stage to discuss drawings and other technical documents as and when required by BHEL. However, the vendor will be informed in advance by minimum 7 days.

4.13 All the drawings required to be furnished to customer during detailed engineering stage shall include technical parameters, details of paints and lubrication, hardness and BOQ / BOM in tabular form indicating all major components including bought out items and their quantity, material of construction indicating its applicable code / standard, weight, make etc.

4.14 All the drawings and documents including general arrangement drawing, data sheet, calculation etc. shall be furnished to the customer during detailed engineering stage and include / indicate the following details for clarity w.r.t. Inspection, construction, erection and maintenance and information etc.:-

a. All drawings and documents shall bear BHEL's title block and drawing / document number. However, BHEL's drawing / document-numbering scheme shall be furnished to the successful bidder after the placement of L.O.I.

b. All drawings and documents shall indicate the list of all reference drawings including general arrangement.

c. All drawings shall include / show plan, elevation, side view, cross - section, skin section, blow - up view of all major self-manufactured and bought out items shall be labelled and included in BOQ / BOM in tabular form.

d. Specification of painting shall be made as a part of general arrangement drawing of each equipment / items indicating at least 3 trade name.

e. Technical parameters of the equipment (capacity, pressure, fluid handled, vibration limit, noise level at a distance of 1.0 meter at a level of 1.5 meters above ground, details of coupling, details of motor, details of gears of pump, recommended capacity of hoist, weight of heaviest (single) part / component of the equipment and total weight etc.) in general arrangement drawing and these shall be indicated in the drawing with dimensions to the extent possible.

f. The supplier's drawings and data shall set forth overall and detailed dimensions; location and centre lines; pipe conduit and other connections schematic and wiring diagrams; clearance and load points; space required for withdrawal or removal of equipment or parts and such information as will be needed by Owner in order to provide adequate space for and connection to the equipment.

g. Details of cable entry for pump shall be shown in all the 3 views (plan, elevation and side view) indicating dimensions from a reference point.

4.15 All calculations which are required to be submitted shall be done manually and necessarily in SI units and the same shall be furnished along with the copy of authentic supporting literature e.g. Code, Hand book, National / international Standards etc.

5.0 TESTING & INSPECTION AT MANUFACTURE'S WORKS

5.1 The supplier shall provide inspection to establish and maintain quality of workmanship in his works and that of his subcontractors to ensure the mechanical accuracy of components, compliance with drawings, identity and acceptability of all materials, part and equipment. He shall conduct all tests required to ensure that the equipment and material furnished shall conform to the requirements of the applicable codes. All tests and test procedure proposed by the manufacturer shall be submitted to the purchaser for his prior approval. The purchaser shall be notified well in advance of the fabrication and major shop test of the equipment for the purpose of making general inspections and for the progress report. The purchaser's representative shall be given full access to the shop in which the equipment is being manufactured or tested and all test records shall be made available to him. A final inspection will be made by the purchaser's representative before the dispatch of the equipment. Final performance tests for the complete units shall be carried out in the presence of purchaser's representative.

All material used for manufacture of the equipment covered under this specification shall be of tested quality. Relevant test certificate shall be made available to the purchaser before the final shop inspection. In case the relevant correlating test certificates are not available, the supplier shall arrange to carry out the necessary tests required by code at his cost.

5.2 Steel forging used in pumps shall be tested for both physical properties and chemical composition.

5.3 The castings shall be sound, clean and free from porosity blowholes, hard duration and other harmful defect.

Areas, which in the opinion of the purchaser will create doubts about soundness to the castings, shall be subjected to dye-penetration test as per ASTM Specification A-165-95.

No welding or repairs shall be carried out without prior permission of the purchaser. The entire surface of the castings shall be subjected to Dye penetrant test as per ASTM A-165-95. Evaluation of indication shall be as per relevant standard.

5.4 Welding procedure, equipment, welders and operators shall be qualified, prior to taking up any welding. Liquid penetrant examination shall be carried out on the weldments in accordance with the requirement of ASME Code.

The welding procedures shall clearly state the type of material thickness joint details, preheat temperature maintained, post weld heat treatment given, welding current & voltage used during qualification of welding procedure. For all pressure parts and high-pressure weld joints, the latest applicable requirement of the code must be complied with. All records in line with the above shall be maintained and made available to the purchaser. The welding test shall be carried out on the following:

i) Root pass of single groove welded but joint.
ii) Finish surfaces of all fillet weld.
iii) Before weld repair after defect has been rouged out and grounded to ensure removal of defect.
iv) On impellers after any heat treatment.
v) Radiography of butt weld joints shall be carried out in accordance with the relevant code.

5.5 Heat treatment operations including stress relieving shall be performed in accordance with the applicable codes. Recording of temperature with thermocouples placed in direct contact with the job for recording the metal temperature during heat treatment shall be done.

5.6 Ultrasonic examination of pump shaft above 50 mm diameter as per the governing specifications. In absence of these, ultrasonic testing should conform to ASTM A 388 and evaluation of indications as per relevant standard.

5.7 All the impellers shall be statically and dynamically balanced at the operating speed as per the requirement of ISO 1940 G 6.3.

5.8 **Performance Tests**

Performance tests shall be conducted for each of the pump with unit motor at the manufacturer's works in the presence of the purchaser or his authorized agent in accordance with relevant Indian/ equivalent standards. At least 5 points, approximately equally spaced on the characteristic curve including relief valve set pressure, rated flow & pressure shall be tested and acceptance will be determined as per the relevant standard. These tests shall be conducted with actual drive motor being furnished. In general, performance tests shall include the following tests.

i) Establish flow and pressure characteristic
ii) Establish flow and power characteristic
iii) Establish flow and efficiency characteristic

Purchaser or their authorized representative shall have access to all the tests. Prior intimation shall be given allowing adequate time for preparation of the witness of the test. After the performance testing, the observations noted and the computation of results for rated performance shall be submitted to purchaser for approval. On approval the pump shall be undertaken for strip testing and its components shall be examined for visual and other tests before being taken for dispatch in the presence of purchaser or their authorized inspection agencies.

Test on each pump for vibration level in the transverse, horizontal and vertical directions shall be carried out. Noise level shall be measured at the rated speed. Measurement of oil leakage at seal/stuffing box shall be recorded if any.

5.9 **Tests at Site**

The pumps will be tested at site to verify its mechanical performance and checking the vibration and noise level. If the pumps fail to operate smoothly then such deficiencies shall be rectified by the supplier by making suitable alterations in the pump set and additional tests required to show the effect of such alterations shall be performed by him. The change made in the pump shall be certified with technical back up information to the satisfaction of the purchaser.

5.10 **Performance Guarantee**

The vendor shall *guarantee* the material and workmanship of all equipment as well as the operation of the pump as per requirement of this specification.

The vendor shall also *guarantee* for each pump the discharge pressure at the specified rated capacity and also corresponding efficiency, brake horsepower and relief valve set pressure.

6.0 **CLEANING PROTECTION & PAINTING**

Before shipment of the equipment to be supplied under this specification, internal surfaces of all parts shall be cleaned to remove loose dirt, weld rod stubs and other foreign objects prior to final assembly of the equipment.

Liquid used for hydro testing or cleaning shall be drained from the parts. Excess oil and grease shall be removed by wiping. All openings shall be covered to guard against damage and entrance of foreign objects during shipment. Hydraulic tested parts shall not be packed till the inside surface becomes dry.

Particular care shall be taken to ensure that all foundry sand and loose material is properly removed by fretting.

Ends shall be protected from external damage and sealed against the ingress of dirt.

A thin short steel circular blanking plate of a diameter 1/4" less than the bolt holes inner PCD shall be firmly fixed to the flange faces by the application of adhesive after first ensuring that the flange faces have been thoroughly degreased. A wooden blank should then be bolted to the flange using a minimum of four bolts.

All piping shall be closed after shop assembly by shot blasting or other means approved by owner. Lube oil piping or carbon steel piping shall be pickled.

The metal surface shall be painted with two (2) coats of approved anti-corrosive primer paint as per paint supplier's instruction. All machined surface shall have two (2) coats of water repellent grease after thorough cleaning. All exposed surfaces shall have two (2) coats of approved finish paint in addition to primer as per paint supplier's instruction.

All parts shall be properly boxed, crated or otherwise protected for transportation. All openings should be properly covered before crating/boxing to prevent ingress of dirt/dust/moisture and other undesirables. Spare parts shall be packed for long storage without injury.

For export jobs, seaworthy packing shall be used. Details of Seaworthy packing will be either project specific. In case there is no specification for seaworthy packing, the same shall be furnished by the bidder for BHEL’s approval. However, there will not be any additional cost implication on account of the same.

7.0 DRAWINGS/DOCUMENTS TO BE SUBMITTED WITH THE BID:

As per details given under Vol. III.

8.0 **DRAWINGS/DOCUMENTS AND DATA TO BE FURNISHED BY VENDOR AFTER AWARD OF THE CONTRACT.**

After award of Contract, the vendor will give following drawings for all the configurations for Pump- Motor Set and Strainers leaving project specific details as blank which can be filled up depending upon project requirement.

i) Fully dimensional outline General Arrangement drawings along with foundation details of the pump with motor assembly unit.
ii) Fully dimensional outline General Arrangement and foundation arrangement drawings of the strainer unit.
iii) Cross sectional drawing of the equipment showing the details of assembly of components and their material of construction with standard applicable codes.

Characteristic curves of pump at minimum, maximum and rated viscosity of oil showing the following:

i) Flow Vs. Pressure
ii) Flow Vs. Power
iii) Flow Vs. Efficiency
iv) Duly filled up data sheet of Pump, Motor
v) Calculation for selection of Motor Rating
vi) Pressure drop calculation across strainer
vii) Operation maintenance manual.
viii) Quality plans duly corrected in line with customer’s comments, if any.

9.0 **MANUFACTURERS NAME AND TAG PLATES:**

Each pump shall have a permanently attached brass metal tag on the body indicating the following information both in Hindi and English:

i) Manufacturer's name and trade mark.
ii) Capacity and Pressure.
iii) Design Pressure.
iv) Equipment tag no as furnished during the contract.

The equipment tag no will be indicated by the engineer on the drawing submitted for approval by the vendor.

	MANUFACTURER'S NAME & ADDRESS BHEL APPROVED VENDOR	STANDARD QUALITY PLAN		PROJECT - 3X660 MW NORTH KARANPURA TPS
		ITEM : LUBE OIL PUMPS SUB-SYSTEM: CLEAN/ DIRTY/ RETURN OIL PUMPS	QP NO. PE:QP: STD:567:A001 DATE 07/07/07 REV. 00 PAGE 1 of 5	PACKAGE LUBE OIL PUMPS CONTRACT NO PO NO. CONTRACTOR BHARAT HEAVY ELECTRICALS LTD.

SR. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY** 10			REMARKS
1	2	3	4	5	6	7	8	9	D*	M	C	N	11
1.0	RAW MATERIALS & BOUGHT OUT CONTROL												
1.1	PUMP CASING (Pump Body)	Physical Properties	Major	Physical Test	1/Cast	Appd Drg. /Data-sheet	Appd Drg. /Data-sheet	Lab Reports	D*	P	V	V	
		Chemical Properties	Major	Chemical Test	1/**Cast**	-do-	-do-	Lab Report	D*	P	V	V	
1.2	END COVERS	Physical Properties	Major	Physical Test	1/Cast	- do -	- do -	Lab Reports	D*	P	V	V	
		Chemical Properties	Major	Chemical Test	1/Cast	- do -	- do -	Lab Reports	D*	P	V	V	
1.3	SHAFTS	Physical Properties	Major	Physical Test	1/ Bar	- do -	- do -	Lab Reports	D*	P	V	V	
		Chemical Properties	Major	Chemical Test	1/Bar	- do -	- do -	Lab Reports	D*	P	V	V	
		Sub surface defects	Major	UT	100%	ASTM A 388 100% back wall echo	Fall in back wall echo 20% Max. Defect Echo 20% Max of B.W.E.	Inspection Report	D*	P	V	V	
		Hardness	Major	Hardness	100%	Appd Drg/ Datasheet	Appd Drg/ Datasheet	Lab Rprt.	D*	P	V	V	
1.4	GEARS (DRIVING AND DRIVEN)	Physical Properties	Major	Physical Test	1/ Bar	Appd Drg./ Datasheet	Appd Drg./ Datasheet	Lab Report	D*	P	V	V	
		Chemical Properties	Major	Chemical test	1/ Bar	Appd Drg./ Datasheet	Appd Drg./ Datasheet	Lab Report	D*	P	V	V	
				Heat Treatment	100%	-do-	-do-	HT Chart	D*	P	V	V	
		Sub surface defects	Major	UT	100%	ASTM A 388 100% back	Fall in back wall echo 20%	Inspection Report	D*	P	V	V	

		LEGEND :	FOR CUST/CONSUL USE	DOC.NO.:	
MANUFACTURER / SUBCONTRACTOR	CONTRACTOR	* RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION ** M: MANUFACTURER/SUB CONTRACTOR ,C: CONTRACTOR /NOMINATED INSPECTION AGENCY ,N: CUSTOMER/ CONSULTANT INDICATE 'P'-PERFORM, 'W'-WITNESS AND ,'V'-VERIFICATION AS APPROPRIATE, 'CHP' SHALL BE IDENTIFIED IN COLUMN "REMARKS" BY CUSTOMER/ CONSULTANT			
SIGNATURE			REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY	

	MANUFACTURER'S NAME & ADDRESS BHEL APPROVED VENDOR	STANDARD QUALITY PLAN	PROJECT - 3X660 MW NORTH KARANPURA TPS
		ITEM : LUBE OIL PUMPS SUB-SYSTEM: CLEAN/ DIRTY/ RETURN OIL PUMPS QP NO. PE:QP: STD:567:A001 DATE 07/07/07 REV. 00 PAGE 2 of 5	PACKAGE LUBE OIL PUMPS CONTRACT NO PO NO. CONTRACTOR BHARAT HEAVY ELECTRICALS LTD.

SR. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY** 10			REMARKS
1	2	3	4	5	6	7	8	9	D*	M	C	N	11
						wall echo	Max. Defect Echoe 20% Max of B.W.E.						
		Hardness Test	Major	Hardness	100%	Appd Dwg/ Data sheet	Appd Dwg/ Data sheet	Lab Rprt.	D*	P	V	V	
1.5	Relief Valve Body	Physical Properties	Major	Physical Test	1/Bar	Appd Drg/Data sheet	Appd Drg/Data sheet	Lab Reports	D*	P	V	V	
		Chemical Properties	Major	Chemical Test	1/Bar	-do-	-do-	Lab Reports	D*	P	V	V	
1.6	Flanges (Companion)	Physical Properties	Major	Physical Test	1/ Heat	-do-	-do-	Lab Reports	D*	P	V	V	
		Chemical Properties	Major	Chemical Test	1/Heat	-do-	-do-	Lab Reports	D*	P	V	V	
1.7	Bearings, Oil Seals, Mechanical Seals	Make, size, Bearing number, finish, fitment	Major	Visual, Fitment	100%	Manufacturing Drawing	Manufacturing drawing	Log book		P	V	-	
1.8	Electric Motors	Review of Routine test certificate	Major	Review	100%	IS 325/IEC –34 for export job	Appd Drg/Data sheet	Approved	D*	P	V	V	
		Review of Type test reports duly approved	Critical	Review	100%	IS 325/IEC-34 for export job	Appd Drg/Data sheet	Approved	D*	P	V	V	Any previous report for similar frame size not older than 2 yrs as on PO date
2.0	IN PROCESS CONTROL												
2.1	All components	1. Workmanship & Finish	Major	Visual Measurement	100%	Mfg. Drawing	Mfg. Drawing	Log book		P	W	-	

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	MANUFACTURER'S NAME & ADDRESS BHEL APPROVED VENDOR	STANDARD QUALITY PLAN	PROJECT - 3X660 MW NORTH KARANPURA TPS
		ITEM : LUBE OIL PUMPS SUB-SYSTEM: CLEAN/ DIRTY/ RETURN OIL PUMPS QP NO. PE:QP: STD:567:A001 DATE 07/07/07 REV. 00 PAGE 3 of 5	PACKAGE LUBE OIL PUMPS CONTRACT NO PO NO. CONTRACTOR BHARAT HEAVY ELECTRICALS LTD.

SR. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY** 10			REMARKS
1	2	3	4	5	6	7	8	9	D*	M	C	N	11
		2. Dimensions											
2.2	Pump Casing, Covers, Relief Valve Housing & Curing of Pump Casing Gaskets	Leak tightness	Critical	Hydro test at 2 x maximum allowable working pressure for 30 mins.	100%	Data Sheets / Technical Specifications	No leakages, No defor-mation	Inspection Report.	D*	P	W	V	
2.3	Gears/ Screws & Shaft	Surface Defects	CR	PT	100%	ASME E 165	No surface defects	Inspection Report	D*	P	V	V	
2.4	Gears/ Screws – Induc-tion Hardnening	Hardness	Major	Hardness Meas-urement	100%	Appd Dwg/ Data sheet	Appd Dwg/ Data sheet	Inspection Report	D*	P	V	V	
3.0	SUB ASSEMBLY / ASSEMBLY CONTROL FINAL INSPECTION AND TESTING												
3.1	Rotor Assembly	Static, residual dy-namic balancing	CR	Static, dynamic Bal-ancing	100%	ISO-1940	IS)-1940 G 6.3	Inspection Report	D*	P	V	V	
3.2	Pump Assembly	Completeness	Major	Visual, Measure-ment	100%	Manufactur-ing Drawing	Manufactur-ing Drawing	Check List/ Card	D*	P	V	V	
3.3	Complete Pump with Unit Motor	1. Performance for H v/s Q, H v/s P, H v/s Pump eff. 2. Vibration / Noise 3. Relief Valve set pressure 4. Leakage 5. Temp rise.	CR	Performance Test Measurement	100%	Hydraulic In-stitute Stand-ards of USA. Tech Specn, Appd. Data sheets	Hydraulic In-stitute Stand-ards of USA. Tech Specn, Appd. Data sheets Vibration Lev-el = 50 Mi-	Test Report	D*	P	W	V	Pump to be tested with oil of viscosity closest to lube oil @ rated viscosity for Pressure, @ lowest viscosity for capacity , @ highest viscosity for power

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	MANUFACTURER'S NAME & ADDRESS BHEL APPROVED VENDOR	STANDARD QUALITY PLAN		PROJECT - 3X660 MW NORTH KARANPURA TPS
		ITEM : LUBE OIL PUMPS SUB-SYSTEM: CLEAN/ DIRTY/ RETURN OIL PUMPS	QP NO. PE:QP: STD:567:A001 DATE 07/07/07 REV. 00 PAGE 4 of 5	PACKAGE LUBE OIL PUMPS CONTRACT NO PO NO. CONTRACTOR BHARAT HEAVY ELECTRICALS LTD.

SR. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY** 10			REMARKS
1	2	3	4	5	6	7	8	9	D*	M	C	N	11
		6. Over all dimen-sions	Major	Visual		Approved GA Drgs.	crons ,max. Noise Level = 85 dB max.						
		7. Orientation	Major				Approved GA Drgs.						
		8. Strip Test	Critical	Visual	100%	No visible damage	No visible damage						
3.4	Cleaning, protection, painting & packing	Activity compliance	MI	Visual	100%	Tech / Mfg. Specn for packing; Appd dwg for clean-ing, protection & painting including shade	Tech / Mfg. Specn for packing; Appd dwg for clean-ing, protection & painting including shade	Inspection Report	D*	P	V	V	

LEGEND

MI: Minor Characteristics affecting appearance.
MA: Major characteristics affecting performance , redution in life , large down time etc.
CR: Critical Characteristics affecting safety of equipment & personnel.
P: Agency which performs the test inspection
W: Agency which witness the test inspection.

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		ITEM : LUBE OIL PUMPS SUB-SYSTEM: CLEAN/ DIRTY/ RETURN OIL PUMPS	QP NO. PE:QP: STD:567:A001 DATE 07/07/07 REV. 00 PAGE 5 of 5	PACKAGE LUBE OIL PUMPS CONTRACT NO PO NO. CONTRACTOR BHARAT HEAVY ELECTRICALS LTD.

SR. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY** 10			REMARKS
								D*	M	C	N	
1	2	3	4	5	6	7	8	9				11

V: Agency which verifies test certificates, inspection reports and carries out audit check of component/operation.
M: Manufacturer/ Sub-Contractor.
C: Contractor nominated inspection agency / BHEL.
N: Customer/ Consultant
CHP: Customer/ consultant

		LEGEND :	FOR CUST/CONSUL USE	DOC.NO.:	
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SIGNATURE			REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY	

	MANUFACTURER'S NAME & ADDRESS BHEL APPROVED VENDOR	STANDARD QUALITY PLAN		PROJECT PACKAGE LUBE OIL PUMPS CONTRACT NO LOI No. CONTRACTOR BHARAT HEAVY ELECTRICALS LTD.
		ITEM : BASKET (SIMPLEX/DUPLEX) OIL STRAINER SUB-SYSTEM: LUBE OIL	QP NO. PE:QP:STD:567:A0 012 DATE 07/07/07 REV. 00 PAGE 1 of 3	

SR. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY** 10			REMARKS
1	2	3	4	5	6	7	8	9	D*	M	C	N	11
1.0	RAW MATERIALS & BOUGHT OUT CONTROL												
1.1	STRAINER BODY , FLANGE, BOTTOM PLATE, TOP COVER	Physical Properties	Major	Physical Test	1sample /Heat	Appd Drg. /Data-sheet	Appd Drg. /Data-sheet	Lab Reports	D*	P	V	-	
		Chemical Properties	Major	Chemical Test	1sample /Heat	-do-	-do-	Lab Report	D*	P	V	-	
1.2	3 WAY VALVE HOUSING CASTING, BACKING PLATE	Physical Properties	Major	Physical Test	1/Cast	- do -	- do -	Lab Reports	D*	P	V	-	FOR DUPLEX STRAINER ONLY
		Chemical Properties	Major	Chemical Test	1/Cast	- do -	- do -	Lab Reports	D*	P	V		
1.3	SCREEN	Chemical composition	Major	Chemical Test	1/Sample	- do -	- do -	Lab Reports	D*	P	V		
2.0	IN PROCESS CONTROL												
2.1	Welding Procedure	Correctness/ Welding parameters	Major	Review	100%	ASME, SEC-IX	ASME, SEC-IX	QW 482	D*	P	V	-	
2.2	PQR & Welders Qualification	Weld Soundness	Major	Physical test/ RT	100%	ASME, SEC-IX	ASME, SEC-IX	QW 483 & QW 484	D*	P	V	-	
2.3	Weld Fit ups	Dimension & Alignment	Major	Measurement/ Visual	100%	Appd WPS/ Appd dwg	Appd WPS	QW 482	D*	P	V	-	

		LEGEND :	FOR DVB/NTPC USE	DOC.NO.:	
MANUFACTURER / SUBCONTRACTOR	CONTRACTOR	* RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION ** M: MANUFACTURER/SUB CONTRACTOR ,C: CONTRACTOR /NOMINATED INSPECTION AGENCY ,N: DVB/NTPC INDICATE 'P'-PERFORM, 'W'-WITNESS AND ,'V'-VERIFICATION AS APPROPRIATE, 'CHP' SHALL BE IDENTIFIED IN COLUMN "REMARKS" BY DVB/NTPC			
SIGNATURE			REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY	

	MANUFACTURER'S NAME & ADDRESS BHEL APPROVED VENDOR	STANDARD QUALITY PLAN ITEM : BASKET (SIMPLEX/DUPLEX) OIL STRAINER SUB-SYSTEM: LUBE OIL	QP NO. PE:QP:STD:567:A0 012 DATE 07/07/07 REV. 00 PAGE 2 of 3	PROJECT PACKAGE LUBE OIL PUMPS CONTRACT NO LOI No. CONTRACTOR BHARAT HEAVY ELECTRICALS LTD.

SR. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY** 10			REMARKS
1	2	3	4	5	6	7	8	9	D*	M	C	N	11
		Orientation											
2.4	Weldments- Root & Final Run (As applicable)	Weld defects	Major	Penetrant test	100%	ASME- E 165	No defect	Mfr test reports	D*	P	V	-	
2.5	Assembly of internal basket	Orientation & fittings of internal	Major	Visual & Proper Fitment	100%	Appd Drawing/ Data Sheet	Appd dwgs & manufacturing standards	Inspection Report	D*	P	V	-	
3.0	FINAL INSPECTION AND TESTING												
3.1		Completeness Cleanliness Dimension of screen & other parts	Major	Visual Measurement	100%	Appd Dwg	Appd Dwg/ Data Sheet/ Mfr standard	Inspection Report	D*	P	V	V	
3.2		Leaktightness	Major	Hydrotest at 1.5 times the design pressure ; holding time 30 minutes	100%	Appd Drg & Data Sheet	Appd Dwg/ Data Sheet/ Mfr standard	Inspection Report	D*	P	V	V	
3.3		Flow v/s pressure drop test	Major	Measurement of pressure drop across strainer	One/type/ size	Appd Drg & Data Sheet	Appd Dwg/ Data Sheet/ Mfr standard	Inspection Report	D*	P	V	V	
3.4	Cleaning, protection, painting & packing	Activity compliance	MI	Visual	100%	Tech / Mfg. Specn for packing; Appd dwg	Tech / Mfg. Specn for packing; Appd dwg	Inspection Report	D*	P	V	V	

		LEGEND :	FOR DVB/NTPC USE	DOC.NO.:	
MANUFACTURER / SUBCONTRACTOR	CONTRACTOR	* RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION ** M: MANUFACTURER/SUB CONTRACTOR ,C: CONTRACTOR /NOMINATED INSPECTION AGENCY ,N: DVB/NTPC INDICATE 'P'-PERFORM, 'W'-WITNESS AND ,'V'-VERIFICATION AS APPROPRIATE, 'CHP' SHALL BE IDENTIFIED IN COLUMN "REMARKS" BY DVB/NTPC			
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1	2	3	4	5	6	7	8	9	D*	M	C	N	11
						for cleaning, protection & painting including shade	for cleaning, protection & painting including shade						

LEGEND

MI: Minor Characteristics affecting appearance.
MA: Major characteristics affecting performance , redution in life , large down time etc.
CR: Critical Characteristics affecting safety of equipment & personnel.
P: Agency which performs the test inspection
W: Agency which witness the test inspection.
V: Agency which verifies test certificates, inspection reports and carries out audit check of component/operation.
M: Manufacturer/ Sub-Contractor.
C: Contractor nominated inspection agency / BHEL.
N: DVB/NTPC
CHP: DVB/NTPC

		LEGEND :	FOR DVB/NTPC USE	DOC.NO.:	
MANUFACTURER / SUBCONTRACTOR	CONTRACTOR	* RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION ** M: MANUFACTURER/SUB CONTRACTOR ,C: CONTRACTOR /NOMINATED INSPECTION AGENCY ,N: DVB/NTPC INDICATE 'P'-PERFORM, 'W'-WITNESS AND ,'V'-VERIFICATION AS APPROPRIATE, 'CHP' SHALL BE IDENTIFIED IN COLUMN "REMARKS" BY DVB/NTPC			
SIGNATURE			REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY	

MOTOR

TESTS/CHECKS / TEMS/COMPONENTS	Visual	Dimensional	Make/Type/Rating /General Physical Inspection	Mech/Chem. Properties	NDT /DP/MPI/UT	Metallography	Electrical Characteristics	Welding/Brazing(WPS/PQR)	Heat Treatment
Plates for stator frame, end shield, spider etc.	Y	Y	Y	Y	Y				Y
Shaft	Y	Y	Y	Y	Y	Y			Y
Magnetic Material	Y	Y	Y	Y			Y		
Rotor Copper/Aluminium	Y	Y	Y	Y			Y		Y
Stator copper	Y	Y	Y	Y			Y		Y
SC Ring	Y	Y	Y	Y	Y		Y	Y	Y
Insulating Material	Y		Y	Y			Y		
Tubes, for Cooler	Y	Y	Y	Y	Y				Y
Sleeve Bearing	Y	Y	Y	Y	Y				Y
Stator/Rotor, Exciter Coils	Y	Y	Y				Y	Y	
Castings, stator frame, terminal box and bearing housing etc.	Y	Y	Y	Y	Y			Y	
Fabrication & machining of stator, rotor, terminal box	Y	Y			Y			Y	Y
Wound stator	Y	Y					Y	Y	
Wound Exciter	Y	Y					Y	Y	
Rotor complete	Y	Y					Y		
Exciter, Stator, Rotor, Terminal Box assembly	Y	Y					Y		
Accessories, RTD, BTD,CT, Space heater, antifriction bearing, gaskets etc.	Y	Y	Y						
Complete Motor	Y	Y	Y						

Note: 1. This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. However, No QP for LT motor upto 50KW.

2. Additional routine tests for Flame proof motors shall be applicable as per relevant standard

3. Makes of major bought out items for HT motors will be subject to NTPC approval.

Y1 = for HT Motor / Machines only.

MOTOR

TESTS/CHECKS / ITEMS/COMPONENTS	Magnetic Characteristics	Hydraulic/Leak/Pressure Test	Thermal Characteristics	Run out	Dynamic Balancing	Routine & Acceptance tests as per IS-325/IS-4722 /IS- 9283/IS 2148/IEC60034\IEC 60079-I	vibration	Over speed	Tan delta, shaft voltage & polarization index test	Paint shade, thickness & adhesion
Plates for stator frame, end shield, spider etc.										
Shaft										
Magnetic Material	Y		Y							
Rotor Copper/Aluminium										
Stator copper			Y							
SC Ring										
Insulating Material			Y							
Tubes for Cooler		Y								
Sleeve Bearing		Y								
Stator/Rotor, Exciter Coils										
Castings, stator frame, terminal box and bearing housing etc.										
Fabrication & machining of stator, rotor, terminal box										
Wound stator										
Wound Exciter										
Rotor complete				Y	Y					
Exciter, Stator, Rotor, Terminal Box assembly										
Accessories, RTD, BTD,CT, , Space heater, antifriction bearing, gaskets etc.										
Complete Motor						Y	Y	Y	Y1	Y

Note: 1. This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. However, No QP for LT motor upto 50KW.

2. Additional routine tests for Flame proof motors shall be applicable as per relevant standard

3. Makes of major bought out items for HT motors will be subject to NTPC approval.

Y1 = for HT Motor / Machines only.

VOLUME – III

SECTION - D

TECHNICAL SCHEDULES / DATA SHEETS

DOCUMENT TO BE SUBMITTED BY THE BIDDER WITH THE BID

S. No.	ITEM DESCRIPTION	YES/NO
01	Compliance cum Confirmation Certificate	
02	Signed and Stamped copy of Pre-bid clarification (if any released before bid submission else write - NIL and submit)	
03	Signed and Stamped copy of Deviation schedule writing **"NO DEVIATION TO SPECIFICATION"**	
04	Signed and Stamped copy of Electrical Load Data as a token of acceptance.	
05	Un-priced bid clearly indicating "Quoted" or "Not Quoted" against each row & column.	

Note: The bidder must submit the above mentioned documents along with their bid so as to enable BHEL to evaluate their offer. In the absence of any documents mentioned above, bidder's offer is liable to be rejected.

Further any documents submitted by bidder other than above shall not be taken cognizance of and these shall not form part of contract.

The bidder hereby certifies that above mentioned document are enclosed with the bid.

SIGNATURE : _____

NAME : _____

DESIGNATION : _____

COMPANY : _____

DATE : _____

COMPANY SEAL

DRAWINGS DOCUMENTS REQUIRED DURING DETAIL ENGINEERING

S. NO	DOCUMENT NO.	DOCUMENT TITLE	SCH. DATE OF SUB. FROM LOI (IN DAYS)	PURPOSE
1	PE-V0-405-567-A001	GAD of Duplex Strainer of Central Oil Purification System	10	APPROVAL
2	PE-V0-405-567-A002	DS and GAD of Dirty / Clean Oil Pump of Central Oil Purification System	10	APPROVAL
3	PE-V0-405-567-A003	DS and GAD of Electric Motor for Dirty / Clean Oil Pump of Central Oil Purification System	10	APPROVAL
4	PE-V0-405-567-A004	QAP Of Lube Oil Transfer Pump And Strainer	10	APPROVAL
5	PE-V0-405-567-A005	O&M Manual for Lube Oil Transfer Pumps	28	APPROVAL

NOTE:

1. Non-submission of the document as per attached schedule will attract LD.

2. Drawing / Document shall be uploaded by the successful bidder on WRENCH /DMS. Procedure for the same will be informed after award of contract.

3. On approval of above documents, bidder will be entitled for 5% payment against basic engineering completion.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

COMPANY _____

DATE: _____

COMPANY SEAL

COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing/ stamping this compliance certificates (every sheet) and furnishes same with the offer.

a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions other than those mentioned under "exclusion" in section C and those resolved as per 'Schedule of Deviations', if applicable, with regard to same.

b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'.

c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL/ CUSTOMER approval & customer hold points for inspection/ testing shall be marked in the QP at the contract stage. Inspection/ testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This shall be within the contracted price with no extra implications to BHEL after award of the contract.

d) All drawings/ data-sheets/ calculations etc. submitted along with the offer shall be considered for reference only, same shall be subject to BHEL/ CUSTOMER approval in the event of order.

e) The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified/ intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre - bid discussions, otherwise BHEL/ Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.

f) For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

g) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.

h) All sub vendors shall be subject to BHEL/ CUSTOMER approval in the event of order.

i) In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities. This clause will apply in case during site commissioning additional requirements emerges due to customer and/ or consultant's comments. No extra claims shall be put on this account.

j) The vendor shall guarantee the material and workmanship of all equipment as well as the operation of the pump as per requirement of the specification. The vendor shall also guarantee for each pump the discharge pressure at the specified rated capacity and also corresponding efficiency, brake horsepower and relief valve set pressure.

k) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's/ Customer's/ Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.

l) As built drawings shall be submitted as and when required during the project execution.

m) Drawing / Document shall be uploaded by the successful bidder on WRENCH / DMS. Procedure for the same will be informed after award of contract.

n) The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.

SIGNATURE : _____

NAME : _____

DESIGNATION : _____

COMPANY : _____

DATE : _____

COMPANY SEAL

Other points to be considered while preparing drawings:

a) Data sheets of various items shall be prepared by the bidder and shall be submitted to BHEL / customer / consultant for approval after placement of order and any changes required by BHEL / customer / consultant for the same shall be incorporated and adhered by the bidder without any commercial implications.

b) GA drawing covering all details shown in data sheets like design data, dimensions, material of construction, lists of specifications, details of paints, standards & codes, general notes including details of test to be conducted to be covered.

c) Quality assurance plan / check list shall be prepared by the bidder for Pumps, strainer, motor shall be submitted to BHEL / customer / consultant for approval after placement of order and any changes required by BHEL / customer / consultant for the same shall be incorporated and adhered by the bidder without any commercial implications.

d) All possible efforts shall be made by the bidder to get the approval of drawings and documents from BHEL / customer / consultant at the earliest and the documents prepared / generated by them or their sub-vendors shall be checked by their competent authority before submission to BHEL.

e) Revision made by the bidder in any drawings and documents shall be highlighted by indicating the no. of revisions in a triangle without fail so that the minimum time is required by BHEL to review the drawings and documents.

f) Any other drawings and documents in addition to the list of drawings and documents indicated in the NIT specification as required by BHEL for the execution of the project shall be furnished by them during detailed engineering stage and no commercial implication shall be entertained by BHEL for the same.

g) Civil works will be done by BHEL based on civil inputs furnished by the bidder during detail engineering. In case of any changes in the civil input drawing after civil work is completed. Necessary prices on account of modification of the civil work shall be deducted from bidder's account.

h) Bidder to furnish the civil foundation drawing of pumps, motor and strainer along with the loading data for approval during detailed engineering stage showing / indicating the followings:-
   - Scope of work by BHEL and bidder shall be indicated with different legend or in the form of note.
   - Recommended locations of earthing pads.
   - Details of pockets as required for anchor / foundation bolts.

i) All drawings and documents including general arrangement drawing, data sheet, calculation etc. shall be furnished to BHEL during detailed engineering stage and shall include / indicate the following details for clarity w.r.t. inspection, construction, erection and maintenance etc.:-

   - All drawings and documents shall bear BHEL's title block and drawing / document number. However, BHEL's drawing / document numbering scheme shall be furnished to the successful bidder after the placement of L.O.I.
   - All drawings and documents shall indicate the list of all reference drawings including general arrangement.
   - All drawings shall include / show plan, elevation, side view, cross - section, skin section, blow - up view etc. All major self-manufactured and bought out items shall be labelled and included in BOQ / BOM in tabular form indicating all components including bought out items and their quantity, material of construction indicating its applicable code / standard, weight, make etc.
   - Specification / schedule of painting shall be made as a part of general arrangement drawing of each item indicating at least 3 make.

j) All text/ numeric in the document / drawings to be generated by the successful bidder will be in English language only.

LOAD TITLE	RATING (KW / A)		UNIT (U)/STN (S)	Nos.		VOLTAGE CODE*	FEEDER CODE**	EMER. LOAD (Y)	CONT.(C)/ INTT.(I)	STARTING TIME >5 SEC (Y)	LOCATION	BOARD NO.	CABLE		BLOCK CABLE DRG. No.	CONTROL CODE	REMARKS	LOAD No.
	NAME PLATE	MAX. CONT. DEMAND (MCR)		RUNNING	STANDBY								SIZE CODE	NOs				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
																		ANNEXURE-II
CLEAN OIL TRANSFER PUMP	3.7 KW		-	1	-	D	U	-	-	-	TG hall							
DIRTY OIL TRANSFER PUMP	3.7 KW		-	1	-	D	U	-	-	-	TG hall							

Note:

1. **Bidder to confirm that the system provided by them would be catered by the above loads considered by BHEL. In case there is any variation; the same should be clearly stated in the technical offer. No changes would be admissible during detailed engineering stage.**

2. **Bidder to note that for the system being supplied by them, only the above loads will be provided. In case any other load is required the same would be derived /multiplied by bidder on their own from these feeders only.**

NOTES: 1. COLUMN 1 TO 12 & 18 SHALL BE FILLED BY THE REQUISITIONER (ORIGINATING AGENCY); REMAINING COLUMNS ARE TO BE FILLED UP BY PEM (ELECTRICAL)

2. ABBREVIATIONS : * VOLTAGE CODE (7):- (ac) A=11 KV, B=6.6 KV, C=3.3 KV, D=415 V, E=240 V (1 PH), F=110 V (cc): G=220 V, H=110 V, J=48 V, K=+24V, L=-24 V

: ** FEEDER CODE (8):- U=UNIDIRECTIONAL STARTER, B=BI-DIRECTIONAL STARTER, S=SUPPLY FEEDER, D=SUPPLY FEEDER (CONTACTER CONTROLLED)

भेल BHEL	**LOAD DATA (ELECTRICAL)**	JOB NO.		ORIGINATING AGENCY		PEM (ELECTRICAL)
		PROJECT TITLE	3 x 660 MW NORTH KARANPURA TPS	NAME		DATA FILLED UP ON
		SYSTEM	LUBE OIL PUMPS	SIGN.		DATA ENTERED ON
		DEPTT. / SECTION	ELECTRICAL	SHEET 1 OF 1	REV. 00	DE'S SIGN. & DATE

"*" marked details will be furnished by the bidder for review and approval by customer

1.00	**Project Information**	
1.01	Enquiry No.	*
1.02	Project	*
2.00	**Service Condition**	
2.01	Service	Clean Oil/ Dirty Oil/Drain Oil (*) bidder to tick mark the applicable service)
2.02	No. of units	*
2.03	Location	Indoor
2.04	Duty	Intermittent
3.00	**Operating Condition**	
3.01	Liquid to be pumped	Turbine Lube Oil
3.02	Pumping Temperature	Ambient/70°C
3.03	Viscosity	
	a) Highest	140cSt @20°C
	b) Lowest	28cSt @50°C
	c) Normal	48cSt @37.8°C
3.04	Design Viscosity of oil (cSt)	28cSt for capacity , 140cSt for power consumption
3.05	Specific Gravity	0.9 gm/cc
3.06	Suction Conditions available	Flooded
3.07 i)	Rated capacity (LPM)	*
ii)	Pump Maximum flow (LPM) & corresponding head (kg/cm^2 (g))	*
3.08	Rated head – kg/cm^2 (g)	*
3.09	R.V. Press. Setting	*
4.00	**Pump**	
4.01	Manufacturer	*
4.02	Type	External gear with herringbone gears
4.03	Model No.	*
4.04 (i)	Design & Manufacturing Standard	API 676
4.04 (ii)	Testing Standard	HIS (ANSI/HI-3.6-2000 / VDMA 24284 , Accuracy Class-2, Group-II (* Bidder to tick the standard adopted)
4.05	Rotation (Viewed from pump shaft end)	*
4.06	Shut off head, if applicable	Not applicable
4.07	Suction flange	Size 80 NB for pump capacity 5000 LPM and above, 50 NB for pump capacity 2880 and 2640 LPM
		Standard: ANSI B 16.5
		Rating : 150 lb
		Facing: RF
		Location : Top / End / Side

		(as viewed from drive end) -*(Bidder to tick the applicable)
4.08	Discharge flange	Size 80 NB for pump capacity 5000 LPM and above, 50 NB for pump capacity 2880 and 2640 LPM
		Standard ANSI B 16.5
		Rating 150 lb
		Facing RF
		Location (as viewed from drive end) -*(Bidder to tick the applicable)
		Top End Side
4.09	Timing Gear	Not applicable for gear pumps
4.10	Relief Valve	Built-in
	a) Manufacturer	Pump manufacturer (OEM)
	b) Type	*
	c) Size (NB)	*
	d) Capacity, litre/min	110% of the pump max. flow
	e) Valve, setting pressure adjustable & range of adjustability, in case adjustable (*)	Yes/No (* bidder to indicate the applicable)
	f) **Material**	
	g) Spring, Material	Spring Steel
	h) Relief valve cover-Material	Same as MOC of pump body
	) Bonnet-Material	Same as MOC of pump body
4.11	Shaft Sealing	Mechanical seal
4.12	Bearing	
	a) Type	*
	b) Nos. Provided	*
	c) Method of lubrication	*
	d) Temperature rise over	*
4.13	Type of Coupling	*
4.14	Type of Impeller	External gear- Herringbone profile
4.15	BHP consumed at Rated viscosity (at pump shaft)	*
4.16	BHP consumed at Max. viscosity (at pump shaft)	*
4.17	BHP consumed at Min. viscosity (at pump shaft)	*
4.18	BHP consumed at the R.V. Set Pressure (at pump shaft) @ 48 cSt	*
4.19	Pump Efficiency at rated condition @ 48 cSt	
	a) Mechanical	*
	b) Volumetric	*
	c) Overall	*
4.20	Recommended motor rating at 50 º C ambient (kw)	*
4.21	Motor RPM	*
4.22	Design pressure of the pump body and end covers - kg/cm^2 (g) (Should be at least 6 kg/cm^2 (g))	*
5.00	Material of Construction	

5.01	Casing and End covers	ASTM A 216 WCB
5.02	Rotor/Gear	EN-8 BS 970 Part-I, Hardness- *
5.03	Shaft/Shaft Sleeve	SS 316
5.04	Seal	*
5.05	Gasket	GRAFOIL/ Any other asbestos free material subject to customer acceptance (* bidder to indicate)
5.06	Bearing	*
5.07	Relief Valve Components	*
5.08	Base Plate	MS to IS 2062
6.00	**Spares**	
6.01	Commissioning Spares	1 set of gaskets/1 no. gasket compound tube
		1 No. mechanical seal
6.02	Essential Spares for Pump, if applicable	* (Project specific)
6.03	Essential Spares for Motor, if applicable	* (Project specific)
6.04	Recommended Spares for Pump for 3 Years	*
7.00	**Weight of**	
7.01	Pump	*
7.01	Motor	*
7.01	Base plate	*
7.01	Other Accessories (Please specify)	*
8.00	**Strainer/Filter**	
8.01	**Manufacturer**	*
8.02	Type & Size	* (Type -Project specific; size –to match pump suction)
8.03	Nos. provided	* (Project specific)
8.04	Size of Screen mesh & wire dia (min)	40 mesh & 34 SWG
8.05	Design Pressure (kg/cm^2) (Should be at least 4 kg/cm^2)	*
8.06	Capacity (LPM)	To match pump flow
8.07	Design Viscosity	140cSt @ 20 °C
8.08	End Connection	Flanged ANSI B 16.5, Class –150 lb
8.09	Maximum Pressure drop at design viscosity (kg/cm2)	
	a) Clean	*
	b) Dirty (50% clogged)	*
8.10	Material of construction	
	a) Strainer body	*
	b) Screen	SS316
	c) Gaskets	GRAFOIL/ Any other asbestos free material subject to customer acceptance (* bidder to

		indicate)
8.11	a) Inlet pipe Area	*
	b) Free straining area	*
	c) Ration of Free straining area to inlet pipe area (should be ≥ 6:1)	*
9.00	Accessories to be provided	
9.01	Common base plate	Yes- MS fabricated from IS 2062 plate common for pump & motor
9.02	Coupling & Coupling Guard	Yes
9.03	Foundation bolts & nuts	Yes
9.04	Flanges & Companion flanges	Yes, Class 150 lb, RF to ANSI B 16.5
9.05	Nuts, bolts & gaskets	Yes
9.06	Lifting lugs, Eye bolts etc	Yes
9.07	Name plate for all the equipment	Yes

	TITLE	SPECIFICATION NO.
	MOTOR	VOLUME
		SECTION
	DATA SHEET - C	REV NO. 00 DATE
		SHEET 1 OF 2

S. No.	Description	Data to be filled by successful bidder
A.	**General**	
1	Manufacturer & country of origin	
2	Motor type	
3	Type of starting	
4	Name of the equipment driven by motor & Quantity	
5	Maximum Power requirement of driven equipment	
6	Rated speed of Driven Equipment	
7	Design ambient temperature	
B.	**Design and Performance Data**	
1	Frame size & type designation	
2	Type of duty	
3	Rated Voltage	
4	Permissible variation for	
5	a Voltage	
6	b Frequency	
7	c) Combined voltage & frequency	
8	Rated output at design ambient temp (by resistance method)	
9	Synchronous speed & Rated slip	
10	Minimum permissible starting voltage	
11	Starting time in sec with mechanism coupled	
12	a) At rated voltage	
13	b) At min starting voltage	
14	Locked rotor current as percentage of FLC (including IS tolerance)	
15	Torque	
	a) Starting	
	b) Maximum	
16	Permissible temp rise at rated output over ambient temp & method	
17	Noise level at 1.0 m (dB	
18	Amplitude of vibration	
19	Efficiency & P.F. at rated voltage & frequency	
	a) At 100% load	
	c) At 75% load	

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

S. No.	Description	Data to be filled by successful bidder
	c) At starting	
C.	**Constructional Features**	
1	Method of connection of motor driven equipment	
2	Applicable Standard	
3	DOP of Enclosure	
4	Method of cooling	
5	Class of insulation	
6	Main terminal box	
	a) Type	
	b) Power Cable details (Conductor, size, armour/unarmour)	
	c) Cable Gland & lugs details (Size, type & material)	
	d) Permissible Fault level (kArms & duration in sec)	
7	Space heater details (Voltage & watts)	
8	Flame proof motor details (if applicable)	
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	
10	Winding connection	
11	Kind of rotor winding	
12	Kind of bearings	
13	Direction of rotation when viewed from NDE	
14	Paint Shade & type	
15	Net weight of motor	
16	Outline mounting drawing No (To be enclosed as annexure)	
D.	**Characteristic curves/ drawings** (To be enclosed for motors of rating ≥ 55KW)	
	a) Torque speed characteristic	
	b) Thermal withstand characteristic	
	c) Current vs time	
	d) Speed vs time	

PRE-BID CLARIFICATION SCHEDULE

S.NO.	SECTION/CLAUSE/ PAGE NO.	STATEMENT OF THE REFERRED CLAUSE	CLARIFICATION REQUIRED

The bidder hereby certifies that above mentioned are the only clarifications required on the technical specification for the subject package.

SIGNATURE : _____

NAME : _____

DESIGNATION : _____

COMPANY : _____

DATE : _____

COMPANY SEAL

DEVIATION SCHEDULE

PACKAGE:- MISCELLANEOUS TANKS

TENDER ENQUIRY REFERENCE:-

NAME OF VENDOR:-

SL NO	VOULME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION / TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWL OF DEVIATION (POSITIVE/ NEGATIVE)	REASON FOR QUOTING DEVIATION
TECHNICAL DEVIATIONS									
COMMERCIAL DEVIATIONS									

PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE			
NAME	**DESIGNATIONS**	**SIGN & DATE**	

NOTES:

1. For self-manufactured items of bidder, cost of withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.
2. For directly dispatch able items, cost of withdrawal of deviation will be applicable on the basic price including taxes, duties & freight.
3. All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.
4. Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of.
5. Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawal of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable.
6. Bidder shall furnish price copy of above format along with price bid.
7. The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.
8. Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered.
9. For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawal of deviation shall be taken as NIL.
10. Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be accepted.
11. All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format.
12. Cost of withdrawal is to be given separately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL.
13. In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive.
14. In case of discrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.

SCHEDULE OF WEIGHTS & DIMENSIONS

( ) From general terms and conditions of contract and special condition of contract (Vol. I)
( ) From technical specifications (Vol. II B)
( ) From general terms and conditions of contract for erection (vol. I)
( ) From general technical conditions (Vol. IIC)

Particulars of Bidders / Authorized Representative
(NAME/ DESIGNATION/ SIGN/ DATE)

COMPANY SEAL

SCHEDULE OF MANUFACTURE & DISPATCH TO SITE

Sl. No.	Equipment / Major Bought out Items	Time for manufacture / procurement from date of issue of letter of intent (weeks)	Time for test, dismantling, packing & ready for dispatch (weeks)	Time required for shipment to site (weeks)	Total time from date of issue of letter of intent to shipment to site (weeks)

Particulars of Bidders / Authorized Representative
(NAME/ DESIGNATION/ SIGN/ DATE)

COMPANY SEAL