Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
PROJECT ENGINEERING MANAGEMENT

Enq No.: PE/PG/RTC/E-5250/2016 **Date.30.05.2016**

OPEN e- TENDER ENQUIRY

DUE DATE
June,20, 2016
02.00 P.M.

Subject: Tender Enquiry for Rate Contract for lube oil transfer pumps for two years

Dear Sir,

We are pleased to invite your tender offers for subject package. Please upload your best quotation/ offer in two (2) parts on **https://bheleps.buyjunction.in** for the requirement before above mentioned due date & time. The details of the tender enquiry is as mentioned below:

Sl. No	Description for which Rate Contract is desired	Tentative Quantity	Delivery required
1	**Lube oil transfer Pumps** - Refer Technical specification no. PE-TS-STD-567-A001 for detailed description.	**48 No's** (break up) & cumulative for the Prospective Projects as per Annexure-III. Quantity can vary in line with cl no.6 of GCC Rev 06	The delivery period for all the items of lube oil transfer pump shall be Four (04) months from the PO date for respective project/requirement under the RC. Other schedules like submission of drawings, approval of drawings, inspection etc. shall be as per the Technical Specification no. PE-TS-STD-567-A001. Delays due to non-fulfilment of the requirements as specified in the specification shall be to the vendor's account. . Vendors to note that delivery period mentioned above is for contractual LD calculation purpose, however in case of exigencies BHEL may asked for early delivery.

Rate contract is proposed for 2 year from placement of RC with a provision for further extension after review on mutual consent. Rate contract shall be decided on the basis of weighted FOR site prices L1 basis of each type (Rated Capacity) of lube oil transfer pumps including same rated capacity Duplex Strainer & Mandatory Spares as per price format (Annexure-I), vendor to quote quote Ex-work price, ED, CST (not VAT) & Freight as % of Ex-work price strictly as per schedule of price format, considering delivery anywhere in India. However tentative list of projects considered for the tender shall be as per Annexure-III.

The units rate for each type (Rated Capacity) of lube oil transfer pumps including same rated capacity Duplex Strainer & Mandatory Spares item should be quoted ex-works including packing & forwarding, excise duty, CST against C-form (not VAT), Freight (% of Ex. Works) to derive FOR site price for tendered specifications/ rated capacity/type as per price schedule format (Annex-I). List of prospective projects for Rate Contract for lube oil transfer pump is indicated in Annexure-III.

Mandatory Spare are proposed to be considered for evaluation, however, bidder to note that ordering of the same is subject to ordering for the same from the end customer i.e in case end customer asks for mandatory spares then only order for mandatory spares shall be placed otherwise only main supply shall be taken. Bidder to specify mandatory spares prices __% of main supply (pump supply) & & same has to be maintained in price bid(in break-up of prices).

Rate Contract (RC) is proposed to be done with 2 vendors for each type (Rated Capacity) of lube oil transfer pumps including same rated capacity Duplex Strainer & Mandatory Spares in the ratio of 60:40 value wise at overall L1

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price. BHEL will try to maintain proposed order splitting among the bidders during RC period but Proposed splitting of RC between vendors may change during ordering stage against specific project due to non-approval of vendor by customer etc. & order for a project shall not be split.L1 rates shall be counter offered to vendors (L2, L3, L4 & so on) in succession, in case none of accepts L1 rates, RC shall be done with L1 bidder for 100 % value. Since the rate contract is being proposed on two bidders, vendors to quote prices with CST against form-C.

For uniformity in evaluation, bid evaluation shall be done on CST basis i.e. same state ordering is not envisaged under proposed RC. However after RC during ordering for specific project falling in the same State where manufacturing factory of the vendor is also located & it gets established that ordering on VAT is economical then BHEL can do suitable amendment in PO on case to case basis.

Pre-Qualifying Requirements (PQR): All the bidders (registered/ non-registered) to submit documents fulfilling PQR requirements (as per enclosed Annex-V) with the bid & their further evaluation shall be done based on qualification in PQR.

Non-Registered Vendors "vendors who are not registered with PEM needs to apply & get registered for subject package with PEM before P-2 (price bid opening) & hence they need to apply online for registration on PEM web portal & have to enclose acknowledgement with this effect with the bid documents else their bid will not be considered for evaluation"

The bidders (who are not registered with BHEL-PEM) -Online Registration Portal is operational in BHEL. Non-registered Vendors, who wish to apply for registration with BHEL-PEM, have to apply through Online Registration Portal available at www.bhelpem.com →vendor section → Online Supplier Registration. All credentials and/or documents duly signed and stamped related to registration has to be uploaded on the website and submit the application for registration. One set of hard copy of the filled-up SRF downloaded from Online Registration Portal duly signed and stamped has to be submitted.

The schedule of submission of drawings/ documents, equipment manufacture inspection & dispatch will be as per given in Technical Specification no. PE-TS-STD-567-A001. You have to make sincere efforts to meet projects schedule.

Bidder shall confirm total compliance to the technical specification without any deviations from the technical requirements and commercial terms & conditions stipulated.

TERMS AND CONDITIONS: -

Please refer GCC Rev. 06 which is available on http://www.bhelpem.com/Documents/GCC/GCC-Rev-06.pdf. You are requested to kindly download the same.

1. Enquiry No., due date etc. must be as per clause no. 2.0 of "Instructions to Bidders".
2. Offers should be submitted in two parts online at **https://bheleps.buyjunction.in** as follows:

   Part-I: TECHNO-COMMERCIAL BID

   Part-II: PRICE BID.
3. Deviations (Commercial as well as Technical) from NIT are generally not acceptable. In case of deviations from NIT, the tenderer shall give cost of withdrawal of such deviation in Sealed Cover as per Annexure-II Deviation Sheet (Cost of Withdrawal) as per GCC Rev-06.
4. Bidders to note that Deviations (technical/commercial) not mentioned in 'Annexure II: Deviation Sheet' and shown separately or found hidden in offer, will not be taken cognizance of.
5. Un-Priced price schedule (format) duly filled in 'Quoted" or 'Q' in each column/row.
6. Standard pre-printed terms & conditions of the tenderers shall not be considered valid.
7. Unsolicited fresh/ revised price bids shall not be entertained.

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7. Unsolicited fresh/ revised price bids shall not be entertained.

8. Purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any/ all tender(s) in part or full without assigning any reason whatsoever.

9. Bidder is requested to quote their best competitive prices. "BHEL reserves the right to go for **Reverse Auction (RA)** instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

   In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit online sealed bid in the Reverse Auction. Non-submission of online sealed bid by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

   Terms and Conditions of Reverse Auction shall be as per attached Annexure-4.

10. **Tenders should be submitted ONLINE via e-Procurement System only,** however, all correspondence thereof, shall be addressed to the undersigned by name & designation and sent at the following address :

Mr. N.C Sharma,Sr.ENGR/MM M/s Bharat Heavy Electricals Ltd., Project Engineering Management, Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 e-mail : ncsharma@bhelpem.co.in Ph. No. 0120-4213591	Mr. I P Singh, Sr. Mgr./ CMM M/s. Bharat Heavy Electricals Ltd., Project Engineering Management, Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16A,Noida-201301,U.P.,INDIA e-mail: INDRA@bhelpem.co.in Ph. No. 0120-4368749

However, for **Technical clarifications**, following persons may be contacted:

Mr. SHALENDRA KUMAR YADAV Sr.ENGR/MAUX M/s Bharat Heavy Electricals Ltd., Project Engineering Management, Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 e-mail : skyadav@bhelpem.co.in Ph. No. 0120-4368916	Mr HARISH KUMAR Sr.MGR/MAUX M/s Bharat Heavy Electricals Ltd., Project Engineering Management, Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 e-mail : harish_kumar@bhelpem.co.in Ph. No.0120-4368912

11. Any taxes and duties applicable on the date of bid but not quoted by the bidders shall be to the bidder account.

12. **Late tenders will be rejected.**

13. Delivery terms for dispatches shall be FOR Dispatch Station.

14. CIF is not available for this package.

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15. Bidders to submit their offers strictly in line with the enclosed Price Format (Annexure-I).

16. This enquiry is subject to Conditions/ limits if any imposed in PMD / Vendor registration.

17. Procurement of the subject package shall be done through e-procurement.

18. Bidder to note that all other terms and condition shall be strictly as per NIT, GCC Rev. 06 & SCC. In the event of any contradiction in the terms and conditions mentioned, the order of preference shall be NIT (this letter) / SCC / GCC Rev. 06.

NOTE: In case you are not making an offer against this enquiry, you are requested to send a regret letter so as to reach us on or before the due date.

Thanking you,
Yours faithfully,
For and on behalf of BHEL

30/05/2016

N.C Sharma
Sr.ENGR/ MM

Enclosures:

a) Technical Specification No. PE-TS-STD-567-A001.
b) Annexure-I: Price Format.
c) Annexure-II: Special Conditions of Rate Contract (SCC).
d) Annexure-III: List of prospective projects.
e) Annexure-4: Terms and Conditions of Reverse Auction.
f) Annexure-V: PQR (Pre-qualifying Requirement)

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Annex-II:Special Condition of Rate Contract for lube oil transfer pumps

1. BHEL/PEM intends to enter into Rate Contract for the tendered various rated capacity of lube oil transfer Pumps initially for a period of two year. The Rate Contract shall come into force from the date of issue of Rate Contract/ Purchase order. Validity for ordering shall be two years from the purchase order of Rate Contract.

2. The item will be required against respective projects. Exact quantities, mode of dispatch, consignee etc. and Project name shall be intimated while placing order for a specific project based on the Rate Contract.

3. The unit rate for each item should be quoted ex-works including packing & forwarding for tendered specifications/sizes as per price schedule format. Other elements of prices such as Excise Duty, Sales Tax, and freight charges (Including service tax) % of Ex-works are also to be indicated. Destination may be anywhere in India as per project requirement.

4. The freight charges shall be paid on percentage on ex-works prices or actual freight charges paid to transporter whichever is lower against production of documentary evidence. Vendor to quote freight charges as percentage (%) of ex-works price for destination anywhere in India.

5. Vendor to note that Excise Duty is payable on self manufacturing item only as per clause no 4.1.2 of GCC Rev 06 & hence for their BOI may quote Excise Duty is inclusive or Nil.

6. The prices shall remain firm during the contract period of two year.

7. Inspection of materials shall be carried out by BHEL / CQA and or by Customer or by an authorized agency at manufacture's works before dispatch, if required & for dispatch material BHEL/Customer MDCC shall be issued & based on that only material shall be dispatched. It is responsibility of vendor to for obtain Material Dispatch Clearance Certificate (MDCC) from BHEL or CUSTOMER as required before dispatch of material.

8. Items have to be manufactured as per specification and supplied strictly in accordance with the approved BHEL / Customer's Drawings & Quality Plan. The items/ test certificate of items, which for any reason are not acceptable to BHEL / Customer, shall be required to be retested. No extra charge shall be payable on those account by BHEL.

9. Vendor shall take full responsibility for obtaining Material Dispatch Clearance Certificate (MDCC) from BHEL or CUSTOMER as required.
10. Mode dispatch shall be by road through BHEL (PEM) approved transporters.
11. BHEL reserves the right to enter into a parallel rate contract with L1 or L2 _ _ _ and so on vendor only as per NIT.
12. Other terms and conditions shall be as per Standard Technical specification no. PE-RC-STD-567-A001 & GCC Rev 06 & this NIT & Price schedule.
13. Offer shall be evaluated with unit rate + ED + CST (not VAT) + Freight for calculating Total FOR Site price placed with CST against C-form for respective projects keeping FOR site price same, vendors to quote accordingly.

14. Bidder to submit offer on techno-commercial compliance basis for rate contract of said item and to submit complete tender in all respects duly signed & stamped on each and every page by the authorized signatory of the bidder as a token of acceptance of all the term and conditions of tender

15. The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendor/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL web site http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud as soon as it comes to their notice.

ANNEXURE-I

PRICE FORMAT-LUBE OIL PUMPS-RATE CONTRACT

S.No	Details of Works or Equipment/System	ITEM CODE	QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED)	ED @ %____ (Including cess) (Rs.)	CST @ %____ (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (	TOTAL F.O.R. SITE PRICE (Rs.)
1	2	3	4	5	6	7	8	9	10
2	**Main Supply+Maindatory spares (Type-A Rated capacity)**								
2.1	Total lumpsum firm price inclusive of all taxes duties and other levies as applicable for design, engineering, manufacturing, inspection and testing at manuffacturer's works,painting, supply/delivery duly packed at project site for **[A]** one (1) no. each of following 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 with one set of commissioning spares comprising of one no. mechanical seal and one no. gasket compound tube/one set gasket for pump and strainer.**[B]** Each of following strainers complete with flanges,companion flanges with nuts bolts and gaskets, foundation bolts (if applicable) with nuts and washers , 15 NB vent and drain connections provided with CS ball valves, 15 NB vent & drain pipe each 5 ft longas per specification no. PE-TS-STD-567-A001.**[C]** one (1) set each comprising of 100% requirement for 1 pump motor set of following items against pump capacities and head indicated below. The MOCs of the items shali be as indicated in the specification no. PE-TS-STD-567-A00								
a)	Rated Capacity 6600 LPH and rated discharge pressure as 2 kg/cm2 (g) to 3 kg/cm2 (g) , inlet/outlet size as 80 NB/80NB	**LOP/6600/2-3**	1						
b)	**Duplex Strainer** - Rated Capacity 6600 LPH , inlet/outlet size as 80 NB/80NB	**DS/6600**	1						
c)	**Mandatory Spares**-Pump Rated Capacity 6600 LPH /Rated Discharge Pressure 2 kg/cm2 (g) to 3 kg/cm2 (g) (Pump-Motor Code- LOP/6600/2-3) as below								
i)	Driving & Driven Gear	**LOP/6600/2-3/SPa**	1 SET						
ii)	Mechanical seal	**LOP/6600/2-3/SPb**	1 SET						
iii)	Pump-Motor coupling	**LOP/6600/2-3/SPc**	1 SET						
iv)	Pump Bearing	**LOP/6600/2-3/SPd**	1 SET						
v)	Motor bearing- driving end	**LOP/6600/2-3/SPe**	1 SET						
vi)	Motor bearing -non driving end	**LOP/6600/2-3/SPf**	1 SET						
vii)	Drive Motor (Energy effcient)	**LOP/6600/2-3/SPg**	1 SET						
3	**GRAND TOTAL[2.1a+ 2.1b+ 2.1c(i) to 2.1 c (vii)]**								

S.No	Details of Works or Equipment/System	ITEM CODE	QUANTITY	UNIT PRICE EX-WORKS (DULY PACKED) (Rs)	TOTAL PRICE EX-WORKS (DULY PACKED)	ED @ %_____ (Including cess) (Rs.)	CST @ %____ (Rs) against from C and form E	FREIGHT CHARGES @ % of Ex-work (Including Service Tax) (	TOTAL F.O.R. SITE PRICE (Rs.)
4.0	**Main Supply+Maindatory spares (Type-B Rated capacity)**								
a)	Rated Capacity 8250 LPH and rated discharge pressure as 2 kg/cm2 (g) to 3 kg/cm2 (g) , inlet/outlet size as 80 NB/80NB	**LOP/8250/2-3**	1						
b)	**Duplex Strainer** - Rated Capacity 8250 LPH , inlet/outlet size as 80 NB/80NB	**DS/8250**	1						
c)	**Mandatory Spares**-Pump Rated Capacity 8250 LPH /Rated Discharge Pressure 2 kg/cm2 (g) to 3 kg/cm2 (g) (Pump-Motor Code- LOP/8250/2-3) as below								
i)	Driving & Driven Gear	**LOP/8250/2-3/SPa**	1 SET						
ii)	Mechanical seal	**LOP/8250/2-3/SPb**	1 SET						
iii)	Pump-Motor coupling	**LOP/8250/2-3/SPc**	1 SET						
iv)	Pump Bearing	**LOP/8250/2-3/SPd**	1 SET						
v)	Motor bearing- driving end	**LOP/8250/2-3/SPe**	1 SET						
vi)	Motor bearing -non driving end	**LOP/8250/2-3/SPf**	1 SET						
vii)	Drive Motor (Energy effcient)	**LOP/8250/2-3/SPg**	1 SET						
5	**GRAND TOTAL[4.0a+ 4.0b+ 4c(i) to 4c(vii)]**								

Note

1.Mandatory Spare are proposed to be considered for evaluation, however, bidder to note that ordering of the same is subject to ordering for the same from the end customer i.e in case end customer asks for mandatory spares then only order for mandatory spares shall be placed otherwise only main supply shall be taken.

2.Bidder to specify mandatory spares prices __% of main supply(Pumps supply) & same has to be maintained in price bid(in break-up of prices).

3.Evaluation:-Rate contract shall be decided on the basis of weighted FOR site prices L1 basis of each type (Rated Capacity) of lube oil transfer pump including same rated capacity Duplex Strainer & Mandatory Spares.

Annex-III

DATE: 20.02.2016

PROJECTED QUANTITIES FOR RATE CONTRACT OF LUBE OIL TRANSFER

With reference to proposed execution of rate contract of Lube Oil Transfer Pump package, the indicative list of required quantities as on date are listed below:

S.No	Tentative Project List	Quantity	Capacity (LPH)
1	1X800 MW North chennai (BTG)	2	8250
2	1X800 MW Krishnapattam (BTG)	2	8250
3	1X800 MW Vijaywada (BTG)	2	8250
4	5X800 MW Yadadri STPP	4	8250
5	4X660 MW Barethi (BTG) STPP	2	8250
6	2X660 MW BIFPCL Maitree Bangladesh	2	6600
7	1X370 MW Yelhanka TPP	2	6600
8	4X1000MW Pudimadaka STPP (STG)	2	8250
9	1X520MW Tuticorin TPP	2	6600
10	1x250 Rourkela TPP	2	8250
11	1x660 Bhusaval TPP	2	8250
12	1x600 Adilabad Extn	Not required	
13	3x660 Ghatampur TG Pkg	2	6600
14	2x660 Udangudi TPP	2	8250
15	1x660 Panki TPP	2	8250
16	2x800 Uppur TPP	2	8250
17	2x800 Dhuvaran TPP	2	8250
18	2x660 Obra TPP	2	8250
19	2x660 Jawaharpur TPP	2	6600
20	1x800 Yeramarus Extn	2	8250
21	2x660 Katwa TG Pkg	2	8250
22	2x660 Bilhaur TG Pkg	2	6600
23	2x660 Khurja TPP	2	6600
24	2x660 Buxar TPP	2	6600
	TOTAL	**48**	

It may be noted that actual ordering will be based on order to be executed by BHEL & technical requirement of Lube Oil Transfer Pump as per the order. The quantity can vary from given tentative quantity to as needed during the rate contract period.

Terms & Conditions of Reverse Auction

Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

2. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit 'online sealed bid' in the Reverse Auction. Non-submission of 'online sealed bid' by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

3. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

4. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.

5. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.

6. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.

7. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.

8. Reverse auction will be conducted on scheduled date & time.

9. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.

10. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure VII) as provided on case-to-case basis to Service provider within two working days of Auction without fail.

11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL's standard practice.

12. Bidders shall be required to read the "Terms and Conditions" section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the 'Business Rules of Reverse Auction', which will be communicated before the Reverse Auction.

13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines*, shall be initiated by BHEL and the results of the RA scrapped/ aborted.

14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

15. In case BHEL decides to go for reverse auction, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

TECHNICAL SPECIFICATION

FOR

RATE CONTRACT

OF

LUBE OIL TRANSFER PUMPS

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

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA

VOLUME – IIB

VOLUME-III

SECTION-A

INTENT OF SPECIFICATION

1.0 INTENT OF SPECIFICATION

1.1 The specification covers 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 required on FOR site basis, of **Lube Oil Transfer Pumps** as per details in different sections / volumes of this specification and various pre award agreements for **RATE CONTRACT PURPOSE.**

1.2 The Vendor 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 the contractor 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 shall conform in all respects to highest 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. Similarly, the extent of supply also includes all items required for completion of the system and not withstanding that they may have been omitted in drawings / specifications or schedules.

1.5 The general term and conditions, instructions to tenderers and other attachment referred to elsewhere are made part of the tender specification. The equipment materials and works covered by this specification is subject to compliance to all attachments referred to in the specification. The bidder shall be responsible for and governed by all requirements stipulated herein.

1.6 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.

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

1.8 Deviations, if any, should be very clearly brought out clause by clause along with cost of withdrawal in the enclosed schedule (in Vol – III); otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification. If no cost of withdrawal is given against the deviation, it will be presumed that deviation can be withdrawn without any cost to BHEL/its customer.

1.9 In the event of any conflict between the requirements of two clauses of this specification documents or requirements of different codes and standards specified, Section - C shall prevail over section – D, however more stringent requirement as per the interpretation of the owner shall apply.

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

1.11 For definition of word like Contractor, bidder, supplier, vendor, Customer/ Purchaser / Employer, consultant, please refer relevant clause(s) of GCC.

VOLUME-IIB

SECTION – B

(PROJECT INFORMATION)

VOID

TECHNICAL SPECIFICATION

FOR

RATE CONTRACT

OF

LUBE OIL TRANSFER PUMPS

VOLUME-IIB

SECTION C

(TECHNICAL SPECIFICATIONS)

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA

TECHNICAL SPECIFICATIONS

FOR

LUBE OIL TRANSFER PUMPS

SECTION C1
(Specific Technical Requirements)

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA

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 project specific and shall be intimated accordingly. However, broad classification of items intended to be covered under this specification shall be as follows:

	ITEM DESRIPTION	**ITEM CODE**
1.00	Lube Oil 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 with at least 1 set of commissioning spares comprising of one no. mechanical seal and one no. gasket compound tube/one set gasket for pump and strainer.	
a)	Rated Capacity 6600 LPM and rated discharge pressure as 2 kg/cm2 (g) or 3 kg/cm2 (g) , inlet/outlet size as 80 NB/80NB	LOP/6600/2-3
b)	Rated Capacity 8250 LPM and rated discharge pressure as 2 kg/cm2 (g) or 3 kg/cm2 (g) , inlet/outlet size as 80 NB/80NB	LOP/8250/2-3
2.00	Strainers complete with flanges, companion flanges with nuts bolts and gaskets, foundation bolts (if applicable) with nuts and washers, 15 NB vent and drain connections provided with CS ball valves, 15 NB vent & drain pipe each 5 ft long	ITEM CODE
a)	Duplex Strainer - Rated Capacity 6600 LPM , inlet/outlet size as 80 NB/80NB	DS/6600
b)	Duplex Strainer - Rated Capacity 8250 LPM , inlet/outlet size as 80 NB/80NB	DS/8250
3.00	Spares comprising of 100% requirement for 1 pump motor set of following items against pump capacities and head indicated below. The MOCs of the items shall be as indicated in the specification no. PE-TS-STD-567-A001	
3.01	Pump Rated Capacity 6600 LPM /Rated Discharge Pressure 2 kg/cm2 (g) or 3 kg/cm2 (g) (Pump- Motor Code- LOP/6600/2-3)	
a)	Driving & Driven Gear	LOP/6600/ 2-3/SPa
b)	Mechanical seal	LOP/6600/ 2-3/SPb
c)	Pump-Motor coupling	LOP/6600/ 2-3/SPc
d)	Pump Bearing	LOP/6600/2-3/SPd

e)	Motor bearing- driving end	LOP/6600/ 2-3/SPe
f)	Motor bearing -non driving end	LOP/6600/2-3/SPf
g)	Drive Motor	LOP/6600/2-3/SPg
h)	Oil Seals, if applicable	LOP/6600/ 2-3/SPh
3.02	Pump Rated Capacity 8250 LPM /Rated Discharge Pressure 2 kg/cm2 (g) or 3 kg/cm2 (g) (Pump- Motor Code- LOP/8250/2-3)	
a)	Driving & Driven Gear	LOP/8250/2-3/SPa
b)	Mechanical seal	LOP/8250/ 2-3/SPb
c)	Pump-Motor coupling	LOP/8250/2-3/SPc
d)	Pump Bearing	LOP/8250/2-3/SPd
e)	Motor bearing- driving end	LOP/8250/2-3/SPe
f)	Motor bearing -non driving end	LOP/8250/ 2-3/SPf
g)	Drive Motor.	LOP/8250/2-3/SPg
h)	Oil Seals, if applicable	LOP/8250/2-3/SPh

1.2 Mandatory spares:

Mandatory spares, if required, shall be project specific and will be intimated accordingly.

1.3 Recommended Spares:

List of recommended spares for 3 years of trouble free operation apart from those already covered in mandatory spares, if applicable, shall also be given by the bidder in his offer.

2.0 TERMINAL POINT

2.1 a) For Pump- Counter flange on both suction and discharge side.
b) For Strainer- Counter flange on both suction and discharge side.

2.2 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- C2 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 including grouting.

4.0 CORROSION PROTECTION/ PAINTING SCHEDULE

This shall be project specific. There will, however, be no additional commercial implication on account of the same. The shade of colour shall be 410- light brown as per IS 5 unless stated otherwise. However, successful bidder will have to get confirmation in writing from BHEL/ Customer regarding final colour shade before going ahead with finish coat.

5.0 QUALITY REQUIREMENTS

Unless noted otherwise, the pumps, motors & strainers shall meet the minimum requirements as indicated in the Minimum Quality Plan for these items and enclosed in the specification. The quality plans indicated in various section are minimum requirements. However, for project specific QP, in case customer has any comments on the minimum quality plans, these will be taken care by the bidder without any additional commercial implication to BHEL.

6.0 SUB-VENDOR ITEMS

The makes of sub-vendor items indicated under annexure-IV, section C1, Vol- IIB of specification are subject to acceptance by customer without any additional commercial implication to BHEL

7.0 OTHER PROJECT SPECIFIC DATA

Following details will also be project specific and intimated to the bidder accordingly.

- Project information
- Power Cable Data

TECHNICAL SPECIFICATIONS

FOR

LUBE OIL TRANSFER PUMPS

ANNEXURE-I

(DATASHEET-C FOR LUBE OIL PUMPS)

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA

"*" 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 (as viewed from drive end) -*(Bidder to tick the applicable) Top End Side
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
	i) 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 oil temperature	*

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 at maximum value of set pressure range	*
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	CAST IRON – IS210 FG260
5.02	VOID	
5.03	Rotor/Gear	EN-8 BS 970 Part-I Hardness- *
5.04	Shaft/Shaft Sleeve	SS 316
5.05	Seal	*
5.06	Gasket	GRAFOIL/ Any other asbestos free material subject to customer acceptance (* bidder to indicate)
5.07	Bearing	*
5.08	Relief Valve Components	*
5.09	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	*
6.05	Recommended Spare for Motor for 3 Years	*
7.00	**Weight of**	
7.01	Pump	*
7.02	Motor	*
7.03	Base plate	*
7.04	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)
8.10	a) Inlet pipe Area	*
	b) Free straining area	*
	c) Ratio of Free straining area to inlet pipe area (should be $\geq$ 6:1)	*

9.00 Accessories to be provided

Common base plate plate	Yes- MS fabricated from IS 2062 Common for pump & motor
Coupling & Coupling Guard	Yes
Foundation bolts & nuts	Yes
Flanges & Companion flanges	Yes, Class 150 lb, RF to ANSI B 16.5
Nuts, bolts & gaskets	Yes
Lifting lugs, Eye bolts etc	Yes
Name plate for all the equipment	Yes

TECHNICAL SPECIFICATIONS

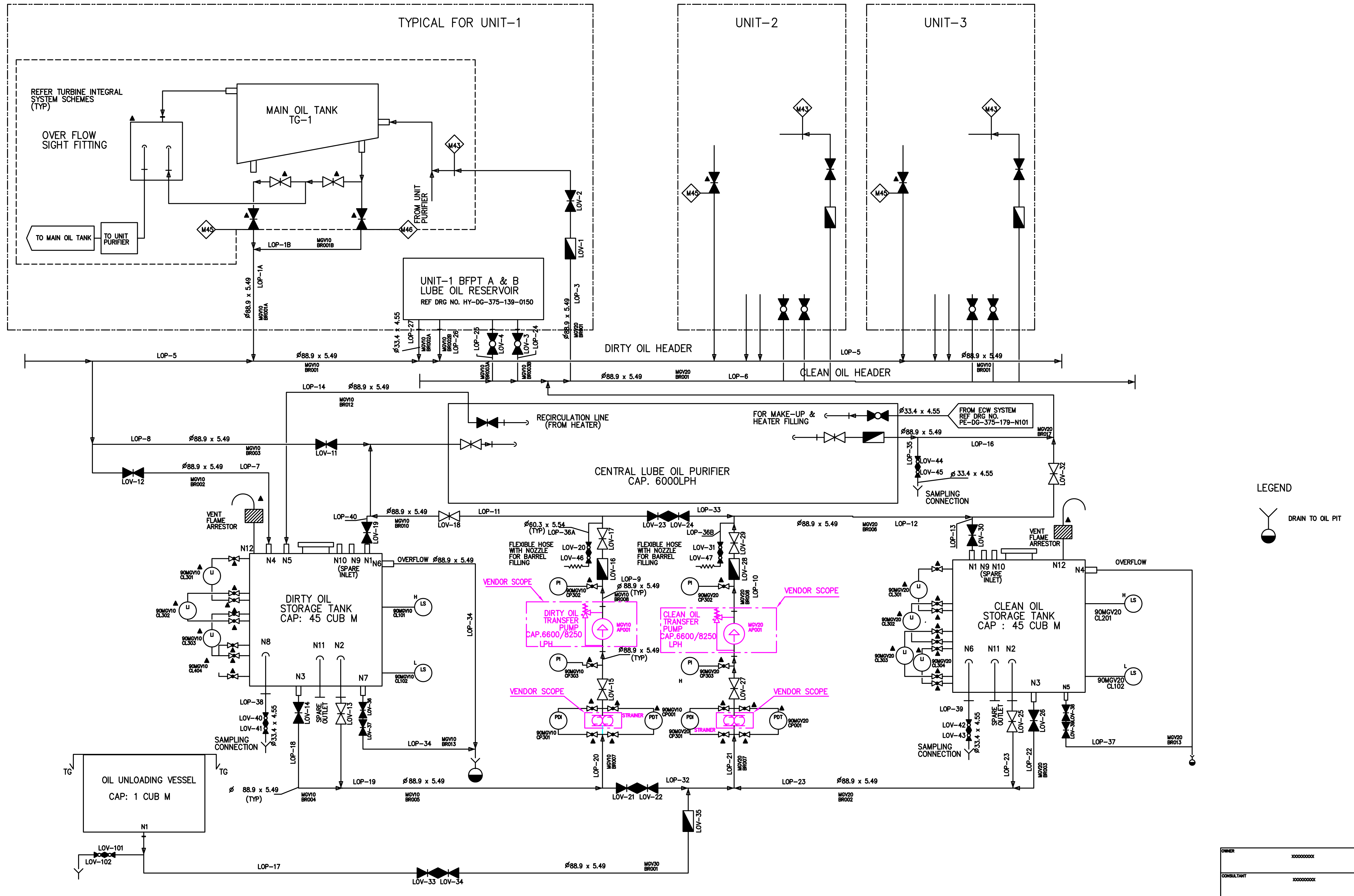
FOR

LUBE OIL TRANSFER PUMPS

ANNEXURE-IA

(P & ID FOR LUBE OIL PUMPS)

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA


TYPICAL FOR UNIT-1
UNIT-2
UNIT-3
REFER TURBINE INTEGRAL SYSTEM SCHEMES (TYP)
MAIN OIL TANK TG-1
OVER FLOW SIGHT FITTING
TO MAIN OIL TANK
TO UNIT PURIFIER
FROM UNIT PURIFIER
UNIT-1 BFPT A & B LUBE OIL RESERVOIR
REF DRG NO. HY-DG-375-139-0150
DIRTY OIL HEADER
CLEAN OIL HEADER
RECIRCULATION LINE (FROM HEATER)
FOR MAKE-UP & HEATER FILLING
FROM ECW SYSTEM REF DRG NO. PE-DG-375-179-N101
CENTRAL LUBE OIL PURIFIER CAP. 6000LPH
SAMPLING CONNECTION
VENT FLAME ARRESTOR
DIRTY OIL STORAGE TANK CAP: 45 CUB M
CLEAN OIL STORAGE TANK CAP : 45 CUB M
OVERFLOW
FLEXIBLE HOSE WITH NOZZLE FOR BARREL FILLING
VENDOR SCOPE
DIRTY OIL TRANSFER PUMP CAP.6600/8250 LPH
CLEAN OIL TRANSFER PUMP CAP.6600/8250 LPH
STRAINER
SPARE OUTLET
OIL UNLOADING VESSEL CAP: 1 CUB M
LEGEND
DRAIN TO OIL PIT

OWNER	XXXXXXXXX
CONSULTANT	XXXXXXXXX
PROJECT	XXXXXXXXX

BHARAT HEAVY ELECTRICALS LTD.
POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NEW DELHI

TITLE: P&ID CENTRAL LUBE OIL STORAGE & PURIFICATION SYSTEM

DRAWING NO. PE-DG-XXX-100-N108

REV. 00

TECHNICAL SPECIFICATION

FOR

RATE CONTRACT

OF

LUBE OIL TRANSFER PUMPS

ANNEXURE – II

(MINIMUM REQUIREMENTOF QAP FOR LUBE OIL TRANSFER PUMPS PACKAGE)

BHARAT HEAVY ELECTRICALS LTD

POWER SECTOR PROJECT ENGINEERING MANAGEMENT

PPEI, NOIDA-INDIA

	MANUFACTURER'S NAME & ADDRESS BHEL APPROVED VENDOR	MINIMUM REQMT. QUALITY ASSURANCE PLAN	PROJECT
		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 OUTS 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	

		LEGEND :	FOR CUST/CONSUL USE	DOC.NO.:	
MANUFACTURER / SUBCONTRACTOR	CONTRACTOR	* RECORDS IDENTIFIED WITH "D" 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	MINIMUM REQMT. QUALITY ASSURANCE PLAN		PROJECT
		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
		Sub surface defects	Major	UT	100%	ASTM A 388 100% back wall echo	Fall in back wall echo 20% Max. Defect Echoe 20% Max of B.W.E.	Inspection Report	D*	P	V	V	
		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	Routine test report	D*	P	V	V	
2.0	**IN PROCESS CONTROL**												
2.1	All components	1. Workmanship &	Major	Visual Measure-	100%	Mfg. Drawing	Mfg. Drawing	Log book		P	V	-	

		LEGEND :	FOR CUST/CONSUL USE	DOC.NO.:	
MANUFACTURER / SUBCONTRACTOR	CONTRACTOR	* RECORDS IDENTIFIED WITH "D" 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	MINIMUM REQMT. QUALITY ASSURANCE PLAN		PROJECT PACKAGE LUBE OIL PUMPS CONTRACT NO PO NO. CONTRACTOR BHARAT HEAVY ELECTRICALS LTD.
		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	

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
		Finish 2. Dimensions		ment									
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	CR	Performance Test	100%	Hydraulic In-stitute Stand-ards of USA. Tech Specn, Appd. Data	Hydraulic In-stitute Stand-ards of USA. Tech Specn, Appd. Data	Test Report	D*	P	W	W	Pump to be tested with oil of viscosity closest to lube oil @ rated viscosity for Pressure, @ lowest

		LEGEND :	FOR CUST/CONSUL USE	DOC.NO.:	
MANUFACTURER / SUBCONTRACTOR	CONTRACTOR	* RECORDS IDENTIFIED WITH "D" 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	MINIMUM REQMT. QUALITY ASSURANCE PLAN 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	PROJECT 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
		pressure 4. Leakage 5. Temp rise. 6. Over all dimensions 7. Orientation 8. Strip Test	 Major Major Critical	 Measurement Visual Visual	 100%	sheets Approved GA Drgs. No visible damage	sheets Vibration Level = 50 Microns ,max. Noise Level = 85 dB max. No visible damage						viscosity for capacity , @ highest viscosity for power Strip test in case of abnormal noise only.
3.4	Cleaning, protection, painting & packing	Activity compliance	MI	Visual	100%	Tech / Mfg. Specn for packing; Appd dwg for cleaning, protection & painting including shade	Tech / Mfg. Specn for packing; Appd dwg for cleaning, 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.

		LEGEND :	FOR CUST/CONSUL USE	DOC.NO.:	
MANUFACTURER / SUBCONTRACTOR	CONTRACTOR	* RECORDS IDENTIFIED WITH "D" 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	MINIMUM REQMT. QUALITY ASSURANCE PLAN		PROJECT PACKAGE LUBE OIL PUMPS CONTRACT NO PO NO. CONTRACTOR BHARAT HEAVY ELECTRICALS LTD.
		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	

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

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: Customer/ Consultant
CHP: Customer/ consultant hold point

		LEGEND :	FOR CUST/CONSUL USE	DOC.NO.:	
MANUFACTURER / SUBCONTRACTOR	CONTRACTOR	* RECORDS IDENTIFIED WITH "D" 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	MINIMUM REQMT. QUALITY ASSURANCE 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 Orientation	Major	Measurement/ Visual	100%	Appd WPS/ Appd dwg	Appd WPS	QW 482	D*	P	V	-	
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	-	

		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	MINIMUM REQMT. QUALITY ASSURANCE 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 2 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
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 for cleaning, protection & painting including	Tech / Mfg. Specn for packing; Appd dwg for cleaning, protection & painting including	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			
SIGNATURE			REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY	

	MANUFACTURER'S NAME & ADDRESS BHEL APPROVED VENDOR	MINIMUM REQMT. QUALITY ASSURANCE 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 3 of 3

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

		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	

TECHNICAL SPECIFICATION

FOR

RATE CONTRACT

OF

LUBE OIL TRANSFER PUMPS

ANNEXURE - III

(MDL WITH SUBMISSION SCHEDULE)

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA

DRAWINGS/ DOCUMENTS REQUIRED DURING DETAIL ENGINEERING

The successful bidder shall submit the following drawings / documents during detail engineering for approval / information / reference (as the case may be):-

Sl. No.	BHEL Drawing / Document No.	Title	Schedule Date	Resubmission after incorporating comments
1	PE-V0-STD-567-A101	Data sheet & GA of LOP	4 weeks from LOI	Within 1 week
2	PE-V0-STD-567-A102	Data sheet & GA of Strainer	4 weeks from LOI	Within 1 week
3	PE-V0-STD-567-A103	Data sheet & GA of lube oil pump motor	4 weeks from LOI	Within 1 week
4	PE-V0-STD-567-A104	QAP of Lube oil pump and strainer	4 weeks from LOI	Within 1 week
5	PE-V0-STD-567-A105	O & M Manual of lube oil pumps	8 weeks from LOI	Within 1 week

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

COMPANY SEAL

SIGNATURE :_____

NAME : _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

ANNEXURE-IV
LIST OF MAKES OF SUB-VENDOR ITEMS
LUBE OIL TRANSFER SYSTEM

SUB-VENDORS - LUBE OIL TRANSFER PUMPS

S. NO	CATEGORY OF INSPECTION	ITEM	SUB-VENDORS	PLACE	REMARKS
1	II	LUBE OIL TRANSFER PUMPS	UT PUMPS & SYSTEMS LTD.	FARIDABAD	
	II		MATZ PUMPS PVT. LTD.	AHMEDABAD	
	II		DELTA PD PUMPS PVT LTD	MUMBAI	
	II		TUSHACO PUMPS PVT.LTD.	NEW DELHI	
2	II	SIMPLEX STRAINERS	JAYPEE INDUSTRIES PVT. LTD.	NEW DELHI	
	II		MULTITEX FILTRATION ENGINEERS LIMITED,	NEW DELHI	
	II		OTOKLIN GLOBAL BUSINESS LIMITED	MUMBAI	
	II		BHATIA ENGINEERING CO.	NEW DELHI	
	II		FILTERATION ENGINEERS (I) PVT. LTD.	MUMBAI	
	II		SUNGOV ENGINEERING PVT. LTD.	CHENNAI	
	II		GRAND PRIX	FARIDABAD	
	II		SAROJINI ENTERPRISE	HOWRA	
	II		TUSHACO PUMPS PVT LIMITED	NEW DELHI	SELF MAKE- SUPPLIED IN DADRI
	II		RELIABLE ENGINEERS		SUBSIDIARY OF MATZ PUMP: SUPPLY STRAINER IN ALL PROJECT. ONLY FOR LOP
2	II	DUPLEX STRAINERS	JAYPEE INDUSTRIES PVT. LTD.	NEW DELHI	
	II		MULTITEX FILTRATION ENGINEERS LIMITED,	NEW DELHI	
	II		OTOKLIN GLOBAL BUSINESS LIMITED	MUMBAI	
	II		SUNGOV ENGINEERING PVT. LTD.	CHENNAI	
	II		GRAND PRIX	FARIDABAD	
	II		TUSHACO PUMPS PVT LIMITED	NEW DELHI	SELF MAKE- SUPPLIED IN DADRI
	II		RELIABLE ENGINEERS		SUBSIDIARY OF MATZ PUMP: SUPPLY STRAINER IN ALL PROJECT. ONLY FOR LOP
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		Bharat Heavy Electricals LTD. (BHEL)		

	III		NGEF	BANDALORE / HUBLI	
	III		LHP	SOLAPUR	
4	III	PAINT	ASIAN PAINT		
	III		BERGER		
	III		KANSAI NEROLAC		
	III		JOTUN		
	III		SHALIMAR		
	III		JENSON & NICHOLSON (I) LTD		
	III		CDC CARBOLINE (I) LTD.		
	III		ADDISON PAINTS LTD		
	III		GRAND POLYCOAT		
	III		BOMBAY PAINTS		
	III		HEMPLE PAINTS (SINGAPORE)		
	III		AKZONOBEL COATINGS		
	NOTES	INSPECTION CATEGORIZATION			
	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			

The make of Sub-vendor items shall be generally as indicated above which is subject to customer / BHEL approval during detail engineering.

Make of any unlisted items shall be subject to customer / BHEL approval during detail engineering. For such items, bidder to furnish list of sub-vendors during detail engineering stage for Customer / BHEL's review and approval. Bidder shall furnish following supporting documentation within 1 month of placement of LOI. Thereafter no request for additional sub-vendor shall be entertained.

a) Documentation to show that the equipment /system has been supplied for a plant of similar or higher capacity.

b) Documentation in the form of certificate that the equipment/system has been operating satisfactorily for two years as on the scheduled date of bid opening.

The successful bidder will get the makes of all items approved from Customer/ Consultant during detail engineering within two months of placement of LOI. The complete list will be necessarily be submitted within one month of placement of LOI to ensure timely placement of order for BOIs

Bidder to assess the capability of their proposed sub-vendors in terms of preparation of drawings, calculations, documents, quality assurance, supply of material etc. as per project schedule before placing the order on them.

Dealers are not acceptable for any item of the package. Bidder shall procure all items including plates, structural, flanges; counter flanges etc. from approved sub vendor only.

TECHNICAL SPECIFICATION

FOR

RATE CONTRACT

OF

LUBE OIL TRANSFER PUMPS

ANNEXURE - V

(FORMAT FOR O& M MANUAL)

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA

Check List for Operation & Maintenance Manual

Project name:

Project number:

Package Name:

Sl.no. & Sections	Description	Yes	No	Not Applicable	Remarks
1.	Cover page				
1.1	Project Name				
1.2	Customer Name				
1.3	Name of Package				
1.4	Supplier details with phone, FAX email address				
1.5	Name and sign of prepared by , checked by & approved by				
2.0	Index				
2.1	showing the sections & related page nos All the pages should be numbered section wise				
3.0	Description of Plant				
3.1	Description /write up of operating principle of system equipment/ associated sub-systems & accessories/controls system , operating conditions, performance parameters under normal , start up and special cases				
3.2	Equipment list and basic parameter with Tag numbers				
3.3	Data sheets approved by Customer/for information and catalogues provided by original manufacturer				
3.4	Associated other packages and Interface /terminal points				
3.5	P&ID & Process Diagrams				
3.6	GA Layout drawings, As-built drawings				
3.7	Single line/wiring diagrams				
3.8	Control philosophy /control write-ups				
4.0	Commissioning Activities (if not covered in separate document i.e. erection manual, commissioning manual)				
4.1	Pre-Commissioning Checks				
4.2	Transportation and handling at site				
4.3	Storage at site				
4.4	Unpacking & Installation procedure				
5.0	Operation Guidelines for plant personal/user/operator				
5. 1	Interlock & Protection logic along with the limiting values of protection settings for the				

	equipment along with brief philosophy behind the logic, drawings etc. to be provided.				
5. 2	Start up and shut down procedure for equipments along with the associated systems in step by step mode. Valve sequence chart, step list, interlocks etc with Equipment isolating procedures to be mentioned.				
5. 3	Do's & Don't of the equipments.				
5. 4	Safety precautions to be taken during normal operation. Safety symbols, Emergency instructions on total power failure condition/lubrication failure/any other condition				
5. 5	Parameters to be monitored with normal values and limiting values				
5. 6	Trouble shooting with causes and remedial measures				
5. 7	Routine operational checks, recommended logs & records				
5. 8	Changeover schedule if more than one auxiliary for the same purpose is given				
5. 9	Painting requirement and schedule				
5. 10	Inspection, repair , Testing and calibration procedures				
6.0	Maintenance guidelines for plant personal				
6.1	List of Special Tools and Tackles required for Overhaul/Trouble shooting including special testing equipment required for calibration etc.				
6.2	Stepwise dismantling and re-assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained, clearances etc. to be mentioned. Tolerances for fitment of various components to be given.				
6.3	Preventive Maintenance & Overhauling schedules linked with running hours/calendar period along with checks to be given				
6.4	Long term maintenance schedules especially for structural, foundations etc.				
6.5	Consumable list along with the estimated quantity required during commissioning, normal running and during maintenance like Preventive Maintenances and Overhaul.				
6.6	List of lubricants with their Indian equivalent, Lubrication Schedule, Quantity required for each equipment for complete replacement is to be given				

6.7	List of vendors & Sub-vendors with their latest addresses, service centres ,Telephone Nos., Fax Nos., Mobile Nos., e-mail IDs etc.				
6.8	List of mandatory and recommended spare parts list				
6.9	Tentative Lead time required for ordering of spares from the equipment supplier				
6.10	Guarantee and warranty clauses				
7.0	Statutory and other specific requirements considerations.				

TECHNICAL SPECIFICATION

FOR

RATE CONTRACT

OF

LUBE OIL TRANSFER PUMPS

ANNEXURE - VI

(SITE STORAGE AND PRESERVATION MANUAL)

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA

SITE STORAGE AND PRESERVATION GUIDELINES

FOR

MECHNANICAL BOPs

(Doc No: PE-DC-SSG-A001 REV.00)

PROJECT ENGINEERING MANAGEMENT, POWER SECTOR

BHARAT HEAVY ELECTRICALS LIMITED-NOIDA

CONTENT

1. SCOPE OF THE DOCUMENT

This guideline is prepared in intent to provide proper site storage and preservation of the Mechanical, Electrical and C & I items / equipment supplied under various bought out packages/items. This storage procedure shall be followed at different power plant sites by concerned agency for storage and preservation from the date of equipment received at site until the same are erected and handed over to the customer.

2. PURPOSE OF STORAGE & PRESERVATION

Many of the items may be required to be kept in stores for long period. It shall therefore be essential that proper methods of storage and preservation be applied so that items do not deteriorate, loose some of their properties and become unusable due to atmospheric conditions and biological elements.

3. MEASURES TO BE TAKEN FOR STORAGE, HANDLING & PRESERVATION

a) GENERAL STORAGE REQUIREMENTS

1. To the extent feasible, materials should be stored near the point of erection. The storage areas should have adequate unloading and handling facilities with adequate passage space for movement of material handling equipment such as cranes, fork lift trucks, etc. The storage of materials shall be properly planned to minimise time loss during retrieval of items required for erection.
2. The outdoor storage areas as well as semi-closed stores shall be provided with adequate drainage facilities to prevent water logging. Adequacy of these facilities shall be checked prior to monsoon.
3. The storage sheds shall be built in conformity with fire safety requirements. The stores shall be provided with adequate lights and fire extinguishers. ‘No smoking’ signs shall be placed at strategic locations. Safety precautions shall be strictly enforced.
4. Adequate lighting facility shall be provided in storage areas and storage sheds and security personnel positioned to ensure enforcement of security measures to prevent theft and loss of materials.
5. Adequate number of competent stores personnel and security staff shall be deployed to efficiently store and maintain the equipment / material.
7. The equipment shall be stored in an orderly manner, preserving their identification slips, tags and instruction booklets, etc., required during erection. The storage of materials shall be equipment-wise. Loose parts shall be stored in sheds on racks,

preserving the identification marks and tags in good condition. The group codes shall be displayed on the racks

6. At no time shall any materials be stored directly on ground. All materials shall be stored minimum 200 mm above the ground preferably on wooden sleepers

b) GENERAL PRESERVATION REQUIREMENTS

1. All special measures to prevent corrosion shall be taken like keeping material in dry condition, avoiding the equipment coming in contact with corrosive fluid like water, acid etc.
2. Materials which carry protective coating shall not be wrapped in paper, cloth, etc., as these are liable to absorb and retain moisture. The material shall be inspected and in case of signs of wear or damages to protective coating, that portion shall be cleaned with approved solution and coated with an approved protective paint. Complete record of all such observations and protective measures taken shall be maintained.
3. Generally equipment supplied at site are properly greased or rust protective oil is applied on machined/ fabricated components. However periodic inspection shall be carried out to ensure that protection offered is intact.
4. While handling the equipment, no dragging on the ground is permitted. Avoid using wire rope for lifting coated components. Use polyester slings (if possible) otherwise protective material (e.g. clothes, wood block etc.) should be used while handling the components with rope / slings
5. For Equipment supplied with finished paint, touch paint shall be done in case any surface paint gets peeled off during handling. Otherwise such surfaces shall necessarily be wrapped with polythene to avoid any corrosion. Further for equipment wherein finish coat is to be applied at site, site to ensure that equipment is received with primer coat applied.
6. It shall be ensured by periodic inspection that plastic inserts are intact in tapped holes, wherever applicable.
7. Pipes shall be blown with air periodically and it shall be ensured that there is no obstruction.
8. Silica gel or approved equivalent moisture absorbing material in small cotton bags shall be placed and tied at various points on the equipment, wherever necessary.
9. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion/jamming due to prolonged storage.

10. All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months and a record of such measured insulation values shall be maintained.

11. Following preservatives/preservation methods can be used depending upon type of equipment

    a. Rust preventive fluid (RPF)

    b. Rust protective paints

    c. Tarpaulin covers, in case of outdoor storage

    d. De-oxy aluminate for weld-ments

c) GENERAL INSPECTION REQUIREMENTS

1. Period inspection of materials with specific reference to –

    - Ingress of moisture and corrosion damages.
    - Damage to protective coating.
    - Open ends in pipes, vessels and equipment -
        - In case any open ends are noticed, same shall be capped.

2. Any damages to equipment / materials.

    - In case of any damages, these shall be promptly notified and in all cases, the repairs / rectification shall be carried out.
    - Any items found damaged or not suitable as per project requirements shall be removed from site. If required to store temporarily, they shall be clearly marked and stored separately to prevent any inadvertent use.

4. TYPE OF STORAGE FOR VARIOUS EQUIPMENT

The types of storage are broadly classified under the following heads:

i **Closed storage with dry and dust free atmosphere**. (C)

The closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated asbestos sheets / galvanised iron sheets for roofing. Brick walls / asbestos sheets can be used to cover all the sides. The floor of the shed can be finished with plain cement concrete suitably glazed. The shed shall be provided with proper ventilation and illumination.

ii **Semi-closed storage**. (S)

The semi closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated / asbestos sheets for roofing. The floor shall be brick paved. If required a small portion of sides can be covered to protect components from rainwater splashing onto the components.

iii Open storage (O)

The open yard shall be levelled, well consolidated to achieve raised ground with the provision of feeder roads for crane approach along with access roads running all sides. One part of the open yard shall be stone pitched, levelled and consolidated with raised ground suitable for storing / stacking heavier and critical components with due space to handle them by cranes etc . Adequate number of sleepers, concrete block etc. to be provided to make raised platforms to stack critical materials.

A separate yard to be identified as “scrap yard” slightly away from main open yard to store wooden/steel scraps, which are to be disposed off. This is required to avoid mix up with regular components as well as to avoid fire hazard.

Some of the components, which are having both machined & un-machined surfaces and are bulky, shall be stored in open storage area on a raised ground and suitably covered with water proof / fire retardant tarpaulin.

The equipment listed below shall be stored and inspected as per requirement mentioned in the table below.

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
Raw material /mechanical items like pipes, plates, structure sections etc.)				
1.	Steel pipes (lined/unlined)	S	Damage , paint, corrosion, rubber lining peeling	Provide end cap
2.	MS Plates	S	Damage, paint, corrosion	
3.	SS Plates	S	Damage	
4.	Non-metallic pipes	S	Damage, cracks	Provide end cap
5.	Stainless steel pipes	S	Damage ,	Provide end cap
6.	MS sections, beams	S	Damage, paint, corrosion	
7.	Cable trays	S	Damage, condition of preservations	
8.	Insulation sheets	S	Damage	
9.	Insulation	C	Damage, packing	
10.	Hangers Rods	S	Damage, paint, packing	
11.	Tubes	S	Damage, paint , packing	Provide end cap
12.	Hume pipes	O	Damage	
13.	Castings	O	Damage, paint, corrosion	
Fabricated mechanical items (pressure vessels, tanks etc.)				
14.	Pressure vessels (unlined)	O	Damage, paint, corrosion,	Covered nozzles
15.	Atmospheric storage tanks (unlined)	O	Damage, paint, corrosion	Covered nozzles

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
16.	Pressure vessels (lined)	S	Damage, paint, corrosion, rubber lining	
17.	Atmospheric storage tanks(lined)	S	Damage, paint, corrosion, rubber lining	
18.	Support structures	O	Damage , paint, corrosion	
19.	Flanges	C	Damage , paint, corrosion	
20.	Fabricated pipes	S	Damage , paint, corrosion	Provide end cap
21.	Vessels internals	C	Damage , paint, corrosion ,packing	
22.	Grills	S	Damage , paint, corrosion	
23.	Angles	S	Damage , paint, corrosion	
24.	Bridge mechanism/clarifier mechanism	O	Damage , paint, corrosion	
25.	Cranes, rails	S	Damage , paint, corrosion	
26.	Stair cases	O	Damage , paint, corrosion	
27.	Ladders/handrails	O	Damage , paint, corrosion	
28.	Fabricated ducts	S	Damage , paint, corrosion	
29.	Isolation Gates	O	Damage , paint, corrosion	
30.	Fabricated boxes/panels	S	Damage , paint, corrosion	
Mechanical components like valves, fittings, cables glands, spares etc.)				
31.	Valves	S	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
32.	Fittings	S	Damage , packing	Provide end cap
33.	Cable glands	C	Damage , packing	
34.	Tools & tackles	C	Damage , packing	
35.	Nut , bolts, washers,	C	Damage , packing	
36.	Gasket & Packings	C	Damage , packing	
37.	Copper tubes	C	Damage , packing, corrosion	Provide end cap
38.	SS tubing	C	Damage , packing	Provide end cap
Rotating assemblies (pumps, blowers, stirrers, fans, compressors etc.)				
39.	Pumps	S	Damage , packing, corrosion	Shaft rotation
40.	Blowers/Compressors	S	Damage , packing, corrosion	Shaft rotation
41.	Agitators/stirrers/radial launders	C	Damage , packing, corrosion	Shaft rotation
42.	Rollers for chlorine tonner mounting	C	Damage , packing, corrosion	
43.	Centrifuge	S	Damage , packing,	
44.	Gear box	C	Damage , packing, corrosion	
45.	Bearings	C	Damage , packing, corrosion	
46.	Fans	S	Damage , packing, corrosion	
47.	Dosing skids	S	Damage , packing, corrosion	
48.	Pump assemblies	S	Damage , packing, corrosion	
49.	Air washers(INTERNALS)	S	Damage , packing	
50.	Air conditioners (split)	C	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
51.	Elevators(CONTAINERIZED)	O	Damage , packing, corrosion	
52.	Chillers/VA machines	S	Damage , packing	
53.	Air handling Unit/Package unit	S	Damage , packing	
54.	Chlorinators & Evaporators	C	Damage , packing	
55.	Ejectors	C	Damage , packing	
56.	Electrolyser	C	Damage , packing	
Miscellaneous items like chain pulley blocks, hoists etc.				
57.	Chain pulley blocks	S	Damage, Packing	
58.	Electric hoists	S	Damage, Packing	
59.	Fire extinguishers	C	Damage, expiry date	
60.	Fork Lift Truck	S	Damage, Packing	
61.	Hydraulic Mobile Crane	O	Damage, Packing	
62.	Mobile Pick Up & Carry Crane	O	Damage, Packing	
63.	Motor boats	O	Damage, Packing	
64.	Safety showers	S	Damage, Packing	
65.	Diffusers/dampers	S	Damage, Packing	
Chemicals and consumables (acid, alkali, paints, oils, reagents and special chemicals)				
66.	Hydro Chloric Acid (HCl)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical
67.	Sulphuric acid (H_2SO_4)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
68.	Sodium hydroxide (NaOH)	Store in canes/ storage tank in dyke area	Date of production/ leakage/ fumes/ breather	hazardous chemical ,breather to be checked for air ingress
69.	Sodium hypo chlorite	To be stored under shed	Date of production/ leakage/ fumes	hazardous chemical ,self-life normally 15-30 days after which strength of chemical decays
70.	Ammonia	S	Date of production/ leakage/ fumes	Store in closed storage tanks, hazardous chemical
71.	CW treatment chemicals	S	Date of production , Self-life	Store in closed canes
72.	RO/UF cleaning chemicals	S	Date of production , Self-life	Store in closed canes
73.	Lime	C	Damage to packing , seepage	Prevent moisture, rain
74.	Alum bricks	C	Damage to packing	Prevent moisture, rain
75.	Poly electrolyte	S		Store in closed storage tanks
76.	Laboratory chemicals(powder)	C	Damage, Packing self-life	
77.	Laboratory chemicals(liquid)	C	Damage, Packing self-life	
78.	Lubrication oils	C	Leakage	
79.	Paints	S	Leakage ,air tightness	
80.	Sand	O	Damage of packing	No hooks
81.	Salt (NaCl)	C	Damage of packing, water ingress	Prevent moisture, rain
82.	Anthracite	S	Damage of packing	
83.	Activated carbon	S	Damage of packing	

Sl. No.	**Description of the equipment**	**Type of Storage**	**Check for**	**Remarks**
84.	Thermal insulation	S	Damage of packing	
85.	Cement	C	Damage of packing	Prevent moisture, rain
86.	Gravels	O	Damage of packing	
87.	ION exchange resins	C	Damage , packing	Refer manufacturer guidelines
88.	RO membranes	C	Damage , packing	Refer manufacturer guidelines
89.	UF membranes	C	Damage , packing	Refer manufacturer guidelines
90.	Cleaning chemicals	C	Damage , packing	Refer manufacturer guidelines
91.	Chemicals for analysers/calibration	C	Damage , packing	Refer manufacturer guidelines
Electrical and C & I items (motors, cables etc.)				
92.	Motors	C	Damage , packing	
93.	Cable drums	O	Damage	
94.	Control Panel /control desk, UPS ,JB	S	Damage, Packing	
95.	Instruments(gauges/analysers)	C	Damage	
Special items		As per Manufacturer's item, like Hydrogen cylinders, Ozonator, Analyser, Chlorine dioxide generators etc.		

5. CONCLUSION

Concerned storage agency at site should make sure that loss in equipment performance and wear & tear are minimised through proper storage and preservation. The above are broad guidelines and cover major equipment / materials. However specific storage practices shall be followed as per manufacturer recommendation. All the necessary measures even in addition to the ones mentioned above, if found necessary, should be taken to achieve the objective.

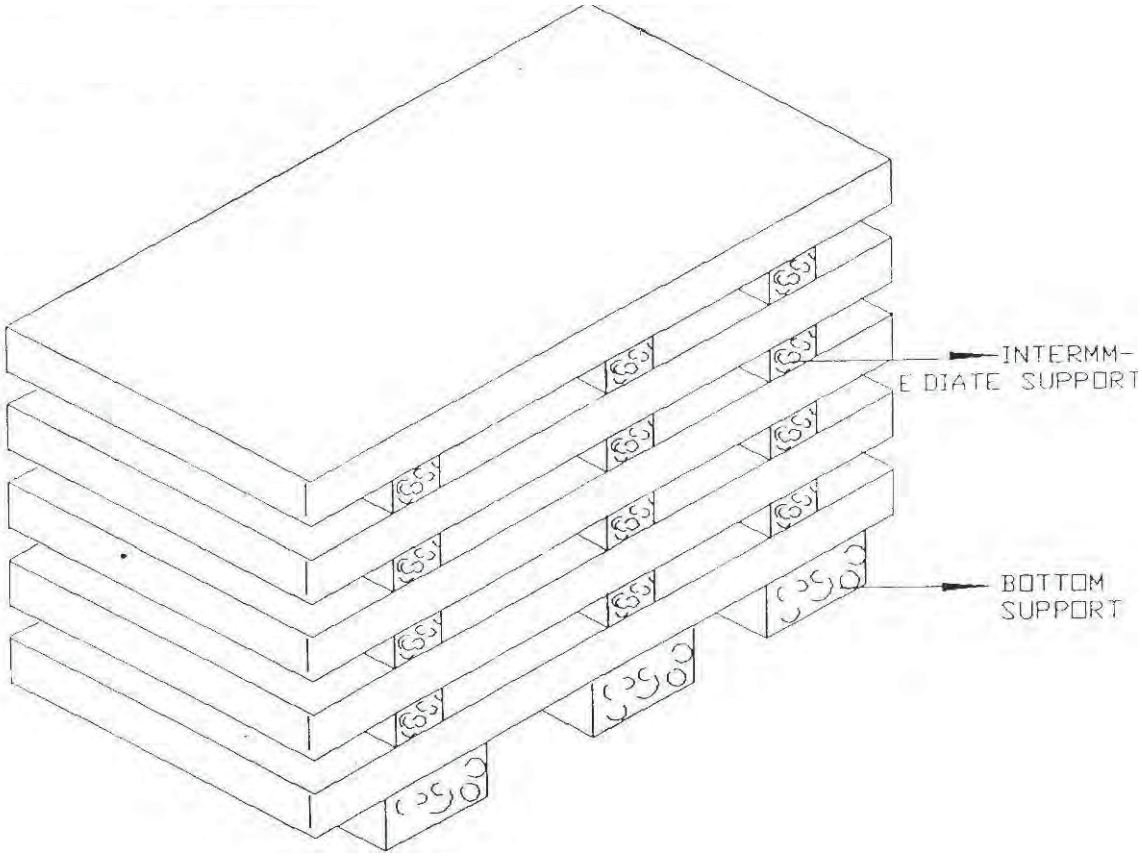


Figure – 1 – PLATE STACKING ARRANGEMENT

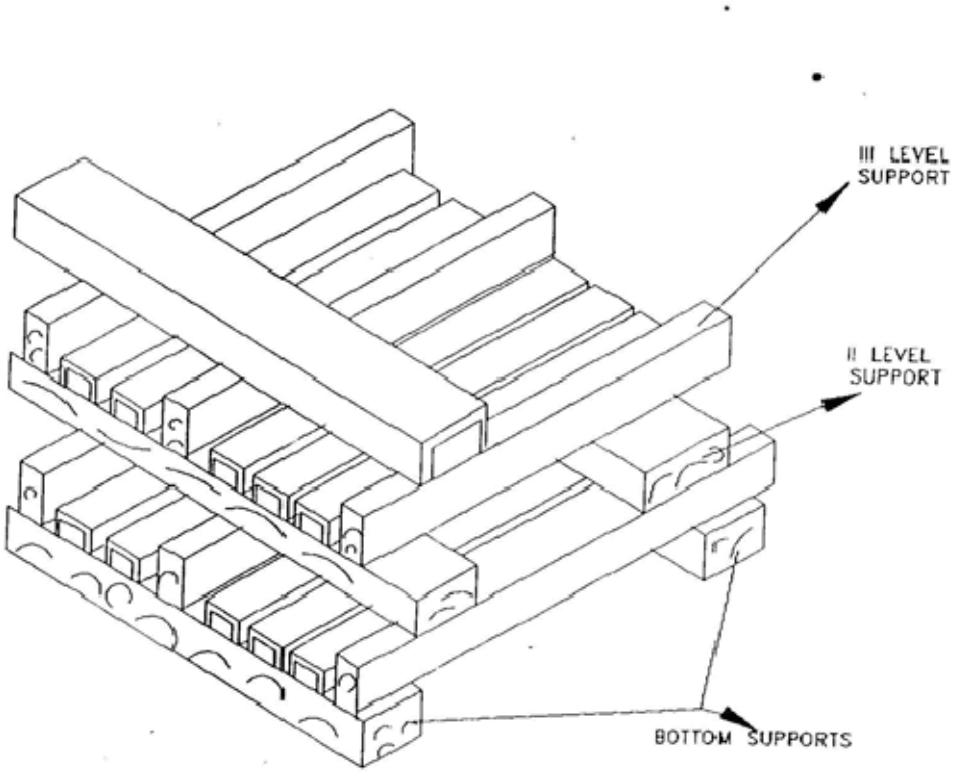


Figure – 2 – STRUCTURAL STEEL STACKING ARRANGEMENT

SECTION: C-2
TECHNICAL SPECIFICATION (ELECTRICAL PORTION)

SPECIFIC TECHNICAL REQUIREMENTS: ELECTRICAL

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 equipments.
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.
i) Vendor to clearly indicate equipment locations and local routing lengths in their cable listing furnished to BHEL.
j) Cable BOQ worked out based on routing of cable listing provided by the vendor for "both end equipment in vendor's scope" shall be binding to the vendor with +10 % margin to take care of slight variation in routing length & wastages.

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 The electrical specification without any deviation from the technical/quality assurance requirements stipulated shall be deemed to be complied by the bidder in case bidder furnishes the overall compliance of package technical specification in the form of compliance certificate/No deviation certificate.

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)
f) Quality Plan of Motor

STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR(FOR EPC PROJECTS)

PACKAGE: LUBE OIL PUMPS (Supply Package)

PROJECT:

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	415 V MCC	BHEL	BHEL	415 V AC (3 PHASE 4 WIRE / 3 WIRE) supply shall be provided by BHEL based on load data provided by vendor at contract stage for all equipment supplied by vendor as part of contract. Any other voltage level (AC/DC) required will be derived by the vendor.
2	Local Push Button Station (for motors)	BHEL	BHEL	Located near the motors.
3	Power cables, control cables and screened control cables	BHEL	BHEL	Incoming cable from BHEL supplied MCC will be informed by BHEL. Vendor shall provide lugs & glands accordingly.
4	Cable trays, accessories & cable trays supporting system	BHEL	BHEL	
5	Cable glands and lugs for equipments supplied by Vendor	Vendor	BHEL	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power and control cables.
6	Conduit and conduit accessories for cabling between equipments supplied by vendor	BHEL	BHEL	
7	Equipment grounding & lightning protection	BHEL	BHEL	
8	Below grade grounding	BHEL	BHEL	
9	LT Motors with base plate and foundation hardware	Vendor	BHEL	Makes shall be subject to BHEL approval at contract stage.
10	Mandatory spares	Vendor	-	Vendor to quote as per specification.
11	Recommended O & M spares	Vendor	-	As per specification
12	Any other equipment/material/service required for completeness of system but not specified above (to ensure trouble free and efficient operation of the system).	Vendor	BHEL	
13	Electrical equipment GA drawing	Vendor	-	For necessary interface review.

NOTES:

1. Make of all electrical equipments/items supplied shall be reputed make & shall be subject to approval of BHEL after award of contract.
2. All QPs shall be subject to approval of BHEL after award of contract without any commercial implication.

GENERAL TECHNICAL REQUIREMENTS

FOR

LV MOTORS

SPECIFICATION NO.: PE-SS-999-506-E101 Rev 00

1.0 INTENT OF SPECIFIATION

The specification covers the design, materials, constructional features, manufacture, inspection and testing at manufacturer's work, and packing of Low voltage (LV) squirrel cage induction motors along with all accessories for driving auxiliaries in thermal power station.

Motors having a voltage rating of below 1000V are referred to as low voltage (LV) motors.

2.0 CODES AND STANDARDS

Motors shall fully comply with latest edition, including all amendments and revision, of following codes and standards:

IS:325	Three phase Induction motors
IS : 900	Code of practice for installation and maintenance of induction motors
IS: 996	Single phase small AC and universal motors
IS: 4722	Rotating Electrical machines
IS: 4691	Degree of Protection provided by enclosures for rotating electrical machines
IS: 4728	Terminal marking and direction of rotation rotating electrical machines
IS: 1231	Dimensions of three phase foot mounted induction motors
IS: 8789	Values of performance characteristics for three phase induction motors
IS: 13555	Guide for selection and application of 3-phase A.C. induction motors for different types of driven equipment
IS: 2148	Flame proof enclosures for electrical appliance
IS: 5571	Guide for selection of electrical equipment for hazardous areas
IS: 12824	Type of duty and classes of rating assigned
IS: 12802	Temperature rise measurement for rotating electrical machnines
IS: 12065	Permissible limits of noise level for rotating electrical machines
IS: 12075	Mechanical vibration of rotating electrical machines

In case of imported motors, motors as per IEC-34 shall also be acceptable.

3.0 DESIGN REQUIREMENTS

3.1 Motors and accessories shall be designed to operate satisfactorily under conditions specified in data sheet-A and Project Information, including voltage & frequency variation of supply system as defined in Data sheet-A

3.2 Motors shall be continuously rated at the design ambient temperature specified in Data Sheet-A and other site conditions specified under Project Information
Motor ratings shall have at least a 15% margin over the continuous maximum demand of the driven equipment, under entire operating range including voltage & frequency variation specified above.

3.3 Starting Requirements

3.3.1 Motor characteristics such as speed, starting torque, break away torque and starting time shall be properly co-ordinated with the requirements of driven equipment. The accelerating torque at any speed with the minimum starting voltage shall be at least 10% higher than that of the driven equipment.

3.3.2 Motors shall be capable of starting and accelerating the load with direct on line starting without exceeding acceptable winding temperature.

The limiting value of voltage at rated frequency under which a motor will successfully start and accelerate to rated speed with load shall be taken to be a constant value as per Data Sheet - A during the starting period of motors.

3.3.3 The following frequency of starts shall apply

i) Two starts in succession with the motor being initially at a temperature not exceeding the rated load temperature.

ii) Three equally spread starts in an hour the motor being initially at a temperature not exceeding the rated load operating temperature. (not to be repeated in the second successive hour)

iii) Motors for coal conveyor and coal crusher application shall be suitable for three consecutive hot starts followed by one hour interval with maximum twenty starts per day and shall be suitable for mimimum 20,000 starts during the life time of the motor

3.4 **Running Requirements**

3.4.1 Motors shall run satisfactorily at a supply voltage of 75% of rated voltage for 5 minutes with full load without injurious heating to the motor.

3.4.2 Motor shall not stall due to voltage dip in the system causing momentary drop in voltage upto 70% of the rated voltage for duration of 2 secs.

3.5 **Stress During bus Transfer**

3.5.1 Motors shall withstand the voltage, heavy inrush transient current, mechanical and torque stress developed due to the application of 150% of the rated voltage for at least 1 sec. caused due to vector difference between the motor residual voltage and the incoming supply voltage during occasional auto bus transfer.

3.5.2 Motor and driven equipment shafts shall be adequately sized to satisfactorily withstand transient torque under above condition.

3.6 Maximum noise level measured at distance of 1.0 metres from the outline of motor shall not exceed the values specified in IS 12065.

3.7 The max. vibration velocity or double amplitude of motors vibration as measured at motor bearings shall be within the limits specified in IS: 12075.

4.0 **CONSTRUCTIONAL FEATURES**

4.1 Indoor motors shall conform to degree of protection IP: 54 as per IS: 4691. Outdoor or semi-indoor motors shall conform to degree of protection IP: 55 as per IS: 4691and shall be of weather-proof construction. Outdoor motors shall be installed under a suitable canopy

4.2 Motors upto 160KW shall have Totally Enclosed Fan Cooled (TEFC) enclosures, the method of cooling conforming to IC-0141 or IC-0151 of IS: 6362.

Motors rated above 160 KW shall be Closed Air Circuit Air (CACA) cooled

4.3 Motors shall be designed with cooling fans suitable for both directions of rotation.

4.4. Motors shall not be provided with any electric or pneumatic operated external fan for cooling the motors.

4.5 Frames shall be designed to avoid collection of moisture and all enclosures shall be provided with facility for drainage at the lowest point.

4.6 In case Class 'F' insulation is provided for LV motors, temperature rise shall be limited to the limits applicable to Class 'B' insulation.
In case of continuous operation at extreme voltage limits the temperature limits specified in table-1 of IS:325 shall not exceed by more than 10°C.

4.7 **Terminals and Terminal Boxes**

4.7.1 Terminals, terminal leads, terminal boxes, windings tails and associated equipment shall be suitable for connection to a supply system having a short circuit level, specified in the Data Sheet-A.

Unless otherwise stated in Data Sheet-A, motors of rating 110 kW and above will be controlled by circuit breaker and below 110 kW by switch fuse-contactor. The terminal box of motors shall be designed for the fault current mentioned in data sheet "A".

4.7.2 unless otherwise specified or approved, phase terminal boxes of horizontal motors shall be positioned on the left hand side of the motor when viewed from the non-driving end.

4.7.3 Connections shall be such that when the supply leads R, Y & B are connected to motor terminals A B & C or U, V & W respectively, motor shall rotate in an anticlockwise direction when viewed from the non-driving end. Where such motors require clockwise rotation, the supply leads R, Y, B will be connected to motor terminals A, C, B or U W & V respectively.

4.7.4 Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside terminal box cover giving the connection diagram for the desired direction of rotation and reverse rotation.

4.7.5 Motor terminals and terminal leads shall be fully insulated with no bar live parts. Adequate space shall be available inside the terminal box so that no difficulty is encountered for terminating the cable specified in Data Sheet-A.

4.7.6 Degree of protection for terminal boxes shall be IP 55 as per IS 4691.

4.7.7 Separate terminal boxes shall be provided for space heaters.. If this is not possible in case of LV motors, the space heater terminals shall be adequately segregated from the main terminals in the main terminal box. Detachable gland plates with double compression brass glands shall be provided in terminal boxes.

4.7.8. Phase terminal boxes shall be suitable for 360 degree of rotation in steps of 90 degree for LV motors.

4.7.9 Cable glands and cable lugs as per cable sizes specified in Data Sheet-A shall be included. Cable lugs shall be of tinned Copper, crimping type.

4.8 Two separate earthing terminals suitable for connecting G.I. or MS strip grounding conductor of size given in Data Sheet-A shall be provided on opposite sides of motor frame. Each terminal box shall have a grounding terminal.

4.9 **General**

4.9.1 Motors provided for similar drives shall be interchangeable.

4.9.2 Suitable foundation bolts are to be supplied alongwith the motors.

4.9.3 Motors shall be provided with eye bolts, or other means to facilitate safe lifting if the weight is 20Kgs. and above.

4.9.4 Necessary fitments and accessories shall be provided on motors in accordance with the latest Indian Electricity rules 1956.

4.9.5 All motors rated above 30 kW shall be provided with space heaters to maintain the motor internal air temperature above the dew point. Unless otherwise specified, space heaters shall be suitable for a supply of 240V AC, single phase, 50 Hz.

4.9.6 Name plate with all particulars as per IS: 325 shall be provided

4.9.7 Unless otherwise specified, the colour of finish shall be grey to Shade No. 631 and 632 as per IS:5 for motors installed indoor and outdoor respectively. The paint shall be epoxy based and shall be suitable for withstanding specified site conditions.

5.0 INSPECTION AND TESTING

5.1 All materials, components and equipments covered under this specification shall be procured, manufactured, as per the BHEL standard quality plan No. PED-506-00-Q-006/1 and PED-506-00-Q-007/3 enclosed with this specification and which shall be complied.

5.2 LV motors of type-tested design shall be provided. Valid type test reports not more than 5 year shall be furnished. In the absence of these, type tests shall have to be conducted by manufacturer without any commercial implication to purchaser.

5.3 All motors shall be subjected to routine tests as per IS: 325 and as per BHEL standard quality plan.

5.4 Motors shall also be subjected to additional tests, if any, as mentioned in Data Sheet A.

6.0 DRAWINGS TO BE SUBMITTED AFTER AWARD OF CONTRACT

a) OGA drawing showing the position of terminal boxes, earthing connections etc.
b) Arrangement drawing of terminal boxes.
c) Characteristic curves:
(*To be given for motor above 55 kW unless otherwise specified in Data Sheet*).

i) Current vs. time at rated voltage and minimum starting voltage.
ii) Speed vs. time at rated voltage and minimum starting voltage.
iii) Torque vs. speed at rated voltage and minimum voltage.
For the motors with solid coupling the above curves i), ii), iii) to be furnished for the motors coupled with driven equipment. In case motor is coupled with mechanical equipment by fluid coupling, the above curves shall be furnished with and without coupling.
iv) Thermal withstand curve under hot and cold conditions at rated voltage and max. permissible voltage.

1.0	Design ambient temperature	:	50 ^{o}C
2.0	Maximum acceptable kW rating of LV motor	:	160 KW
3.0	Installation (Indoors/ Outdoors)	:	As required
4.0	Details of supply system		
	a) Rated voltage (with variation)	:	415V $\pm$ 10%
	b) Rated frequency (with variation)	:	50 Hz + 3 % to - 5%
	c) Combined voltage & freq. variation	:	10% (sum of absolute values)
	d) System fault level at rated voltage	:	50 kA for 1 sec
	e) Short time rating for terminal boxes		
	o 110 kW and above (Breaker Controlled)	:	50 KA for 0.2 sec..
	o Below 110 kW (Contactor Controlled)	:	50 KA protected by fuse
	f) LV System grounding	:	Solidly
5.0	Class of insulation	:	Class 'F', with temp rise limited to class B.
6.0	Minimum voltage for starting (As percentage of rated voltage)	:	(a) 85% of rated voltage
7.0	Power cables data	:	Shall be given during detailed engg.
8.0	Earth Conductor Size & Material	:	As per attached Datasheet of Earthing.
9.0	Space heater supply	:	240 V, 1¢, 50 Hz
10.0	Rating up to which Single phase motor	:	Acceptable below 0.20 kW
11.0	Locked rotor current		
	a) Limit as percentage of FLC	:	As per IS 12615*
12.0	Flame-proof motor		
	a) Enclosure suitable (As per IS: 2148)	:	As per requirement
	b) Classification of Hazardous area (As per IS: 5572 part-I)	:	As per requirement
13.0	Paint shade	:	As per spec.
14.0	Degree Of protection for motor/ terminal box	:	IP 54/ IP 55

15.0 * Continuous duty LT motors up to 160 KW Output rating (at 50 deg.C ambient temperature), shall be Premium efficiency (IE3) as per IEC: 60034-30/ IS:12615

16.0 TESTING

16.1 Type Tests

For LT Motors above 55kW, type test reports for type tests as per IS: 325/ IS: 12615 conducted on equipment similar to those proposed to be supplied and carried out within last five years from the date of bid opening shall be submitted. However, if such reports are not available, one motor of each type shall be subjected to type tests for free of cost.

16.2 Routine Tests

All motors shall be subjected to routine tests as per IS: 325/ IS: 12615 in the presence of customer or customer representative.

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.	VERIFICATION FROM MOTOR DATASHEET (Y/N)	KKS 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	20	21
ANNEXURE-II																				

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)/ CUSTOMER

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)

LOAD DATA (ELECTRICAL)	JOB NO.	~~408~~	ORIGINATING AGENCY		PEM (ELECTRICAL)	
	PROJECT TITLE	~~1x800 MW WANAKBORI STPP~~	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	

CABLE SCHEDULE FORMAT

ANNEXURE III

UNITCABLENO	FROM	TO	PURPOSE	CABLE SCOPE (BHEL PEM/ VENDOR)	REMARKS	CABLESIZE	PATHCABLENO	TENTATIVE CABLE LENGTH

			CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
	QUALITY PLAN		BIDDER/ VENDOR :			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
	SHEET 1 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	W	V	REMARKS
1	2	3	4	5	6	7	8	9	10			11
1.0	RAW MATERIAL & BOUGHT OUT CONTROL											
1.1	SHEET STEEL, PLATES, SECTION, EYEBOLTS	1.SURFACE CONDITION	MA	VISUAL	100%	-	FREE FROM BLINKS, CRACKS, WAVINESS ETC	LOG BOOK	3	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	MANFR'S DRG./SPEC	MANFR'S DRG./SPEC	-DO-	3	-	-	
		3.PROOF LOAD TEST (EYE BOLT)	MA	MECH. TEST	-DO-	-DO-	-DO-	INSPEC. REPORT	3	-	2	
1.2	HARDWARES	1.SURFACE CONDITION	MA	VISUAL	100%		FREE FROM CRACKS, UN-EVENNESS ETC.	-DO-	3	-	-	
		2.PROPERTY CLASS	MA	VISUAL	SAMPLES	MANFR'S DRG./SPEC BOOK	RELEVENT IS/SPEC.	SUPPLIERS TC & LOG	3	-	2	PROPERTY CLASS MARKING SHALL BE CHECKED BY THE VENDOR
1.3	CASTING	1.SURFACE CONDITION	MA	VISUAL	100%		FREE FROM CRACKS, BLOW HOLES ETC.	LOG BOOK	3	-	2	
		2.CHEM. & PHY. PROP.	MA	CHEM & MECH TEST	1/HEAT NO.	MANFR'S DRG./SPEC	RELEVENT IS/	SUPPLIER'S TC	3	-	2	HEAT NO. SHALL BE VERIFIED
		3.DIMENSIONS	MA	MEASUREMENT	100%	MANUFR'S DRG.	MANUFR'S DRG.	LOG BOOK	3	-	2	
1.4	PAINT & VARNISH	1.MAKE, SHADE, SHELF LIFE & TYPE	MA	VISUAL	100% CONTINUOUS	MANFR'S DRG./SPEC	MANFR'S DRG./SPEC	LOG BOOK	3	-	2	

BHEL	**PARTICULARS**	**BIDDER/VENDOR**	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/VENDORS COMPANY SEAL

	QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
			BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
	SHEET 2 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	**W**	**V**	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			**11**
1.5	SHAFT (FORGED OR ROLLED)	1. SURFACE COND.	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	-DO-	3	-	-	VENDOR'S APPROVAL IDENTIFICATION SHALL BE MAINTAINED
		2. CHEM. & PHYSICAL PROPERTIES	MA	CHEM. & PHYSICAL TESTS	1/HEAT NO. OR HEAT TREATMENT BATCH NO	MFG. DRG. SPEC.	RELEVANT IS	SUPPLIER'S TC	3	-	2	
		3. DIMENSIONS	MA	MEASUREMENT	100%	-DO-	MANUFR'S DRG.	LOG BOOK	3	-	2	
		4.INTERNAL FLAWS	CR	UT	-DO-	ASTM-A388	MANUFR'S SPEC. BHEL SPEC.	-DO-	3	2	1	FOR DIA OF 55 MM & ABOVE
1.6	SPACE HEATERS, CONNEC-TORS, TERMINAL BLOCKS, CABLES, CABLE LUGS, CARBON BRUSH TEMP. DETECTORS, RTD, BTD'S	1. MAKE & RATING	MA	VISUAL	-DO-	MANUFR'S DRG. SPEC.	MANUFR'S DRG. SPEC.	-DO-	3	-	2	
		2. PHYSICAL COND.	MA	-DO-	-DO-	-	NO PHYS. DAMAGE, NO ELECTRICAL DISCONTINUITY	-DO-	3	-	2	
		3.DIMENSIONS (WHEREVER APPLICABLE)	MA	MEASUREMENT	SAMPLE	MANUFR'S DRG./ SPEC.	MANUFR'S DRG. / SPEC.	-DO-	3	-	2	
		4.PERFORMANCE/ CALIBRATION	MA	TEST	100%	-DO-	-DO-	INSP. REPORT	3	-	2	

BHEL	**PARTICULARS**	**BIDDER/VENDOR**	
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	DATE		BIDDER'S/VENDORS COMPANY SEAL

	QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
			BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
	SHEET 3 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
1.7	OTHER INSULATING MATERIALS LIKE SLEEVES, BINDINGS CORDS, PAPERS, PRESS BOARDS ETC.	1. SURFACE COND. ETC.	MA	VISUAL	100%	-	NO VISUAL DEFECTS	INSPT. REPORT	3	-	2	
		2. OTHER CHARACTERISTICS	MA	TEST	SAMPLE	MANUF'S SPEC.	MANUF'S SPEC.	LOG BOOK AND OR SUPPLIER'S TC	3	-	2	
1.8	SHEET STAMPING (PUNCHED)	1. SURFACE COND.	MA	VISUAL	100%	-	NO VISUAL DEFECTS (FREE FROM BURS)	LOG BOOK	3	-	-	
		2.DIMENSIONS INCLUDING BURS HEIGHT	MA	MEASUREMENT	SAMPLE	MANUFR'S DRG. .	MANUFR'S DRG.	-DO-	3	-	2	FOR MV MOTOR INSULA-TION/VARNISH THICKNESS SHALL BE MORE THAN THE BURS HEIGHT
		3. ACCEPTANCE TESTS	MA	ELECT. & MECH TESTS	-DO-	MANUF'S SPEC./ RELEVANT IS	RELEVANT IS	SUPPLIER'S TC	3	-	2	
1.9	CONDUCTORS	1. SURFACE FINISH	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	LOG BOOK	3*	-	2*	* MOTOR MANUFACTURER TO CONDUCT VISUAL CHECK FOR SURFACE FINISH ON RANDOM BASIS (10% SAMPLE) AT HIS WORKS AND MAINTAIN RECORD FOR VERIFICATION BY BHEL/CUSTOMER.
		2.ELECT. PROP, & MECH. PROP	MA	ELECT. & MECH.TEST	SAMPLES	RELEVANT IS/ BS OR OTHER STANDARDS	RELEVANT IS/ BS OR OTHER STANDARDS	SUPPLIERS TC & VENDOR'S INSPN. REPORTS	3	-	2	

BHEL	**PARTICULARS**	**BIDDER/VENDOR**	
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	SIGNATURE		
	DATE		BIDDER'S/VENDORS COMPANY SEAL

	QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
			BIDDER/ VENDOR :			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
	SHEET 4 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9	10			11
		3.DIMENSIONS	MA	MEASUREMENT	-DO-	-DO-	-DO-	Log Book	3	-	2	
1.10	BEARINGS	1.MAKE & TYPE	MA	VISUAL	100%	MANFR'S DRG./ APPROVED DATASHEET	MANFR'S DRG./ APPROVED DATASHEET	-DO-	3	-	2	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	BHEL DATA SHEET	BHEL DATA SHEET BEARING MANUF'S CATALOGUES	-DO-	3	-	2	
		3.SURFACE FINISH	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	-DO-	3	-	2	
1.11	SLIP RING (WHEREVER APPLICABLE)	1.SURFACE COND.	MA	VISUAL	100%	-	-DO-	-DO-	3	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	MANUF'S DRG	MANUF'S DRG	-DO-	3	-	-	
		3.TEMP.WITH-STAND CAPACITY	MA	ELECT.TEST	-DO-	MANUF'S SPEC./ BHEL SPEC.	MANUF'S SPEC./ BHEL SPEC.	-DO-	3	-	2	
		4.HV/IR	MA	-DO-	100%	-DO-	-DO-	-DO-	3	-	2	
1.12	OIL SEALS & GASKETS	1.MATERIAL OF GASKET	MA	VISUAL	100%	MANUF'S DRG/SPECS	MANUF'S DRG./ SPECS.	-DO-	3	-	-	
		2.SURFACE COND.	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	-DO-	3	-	-	
		3.DIMENSIONS	MA	MEASUREMENT	SAMPLE	MANUF'S DRG	MANUF'S DRG	-DO-	3	-	-	

BHEL	**PARTICULARS**	**BIDDER/VENDOR**	
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	DATE		BIDDER'S/VENDORS COMPANY SEAL

	QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
			BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
	SHEET 5 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	**W**	**V**	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			**11**
2.0	IN PROCESS											
2.1	STATOR FRAME WELDING (IN CASE OF FABRICATED STATOR)	1.WORKMANSHIP & CLEANNESS	MA	VISUAL	100%	-DO-	GOOD FINISH	LOG BOOK	3/2	2	-	
		2.DIMENSIONS	MA	MEASUREMENT	-DO-	MANUF'S DRG	MANUF'S DRG	-DO-	2	-	-	
2.2	MACHINING	1.FINISH	MA	VISUAL	100%	-DO-	GOOD FINISH	LOG BOOK	2	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	-DO-	MANUF'S DRG	MANUF'S DRG	-DO-	2	-	-	
		3.SHAFT SURFACE FLOWS	MA	PT	-DO-	RELEVENT SPEC./ ASTM-E165	MANUFR'S SPEC./ BHEL SPEC./	-DO-	2	-	1	
2.3	PAINTING	1.SURFACE PREPARATION	MA	VISUAL	100%	MANFR'S SPEC/BHEL SPEC./ RELEVANT STAND	BHEL SPEC. SAME AS COL.7	LOG BOOK	2	-	-	
		2.PAINT THICKNESS (BOTH PRIMER & FINISH COAT)	MA	MEASUREMENT BY ELCOMETER	SAMPLE	-DO-	-DO-	-DO-	2	-	-	
		3.SHADE	MA	VISUAL	-DO-	-DO-	-DO-	Log Book	2	-	-	
		4.ADHESION	MA	CROSS CUTTING & TAPE TEST	-DO-	-DO-	-DO-	Log Book	2	-	-	

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	QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
			BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
	SHEET 6 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	**W**	**V**	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			**11**
2.4	SHEET STACKING	1.COMPLETENESS	MA	MEASUREMENT	SAMPLE	MANUFR'S SPEC.	MANUFR'S SPEC.	Log Book	2	-	-	
		2.COMPRESSION & TIGHTENING	MA	MEASUREMENT	100%	-DO-	-DO-	Log Book	2	-	-	
		3.CORE LOSS & HOTSPOT	MA	ELECT.TEST	-DO-	-DO-	-DO-	Log Book	2	1*	1	(FOR MOTORS OF 2MW AND ABOVE) * ON 10% RANDOM SAMPLE
2.5	WINDING	1.COMPLETENESS	CR	VISUAL	100%	MANUFR'S SPEC./BHEL SPEC.	MANUFR'S SPEC./BHEL SPEC.	Log Book	2	-	-	
		2.CLEANLINESS	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	-	
		3.IR-HV-IR	CR	ELECT. TEST	-DO-	-DO-	-DO-	Log Book	2	-	1	
		4.RESISTANCE	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	1	
		5.INTERTURN INSULATION	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	-	
		6.SURGE WITH STAND AND TAN. DELTA TEST	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	1	FOR MV MOTOR
2.6	IMPREGNATION	1.VISCOSCITY	MA	PHY. TEST	AT STARTING	-DO-	-DO-	Log Book	2	-	-	
		2.TEMP. PRESSURE VACCUM	MA	PROCESS CHECK	CONTINUOUS	-DO-	-DO-	Log Book	2	-	-	
		3.NO. OF DIPS	MA	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	1	THREE DIPS TO BE GIVEN
BHEL			**PARTICULARS**		**BIDDER/VENDOR**							
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			

	QUALITY PLAN	CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
		BIDDER/ VENDOR :			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
	SHEET 7 OF 9	SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	W	V	REMARKS
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			**11**
		4.DURATION	MA	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	1	
2.7	COMPLETE STATOR ASSEMBLY	1.COMPACTNESS & CLEANLINESS	MA	VISUAL	100%	-DO-	-DO-	Log Book	2	-	-	
2.8	BRAZING/COMPRESSION JOINT	1.COMPLETENESS	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	-	
		2.SOUNDNESS	CR	MALLET TEST & UT	-DO-	-DO-	-DO-	Log Book	2		1	
		3.HV	MA	ELECT. TEST	-DO-	-DO-	-DO-	Log Book	2		1	
2.9	COMPLETE ROTOR ASSEMBLY	1.RESIDUAL UNBALANCE	CR	DYN. BALANCE	-DO-	MFG SPEC./ ISO 1940	MFG. DWG.	Log Book	2		1	VERIFICATION FOR MV MOTOR ONLY
		2.SOUNDNESS OF DIE CASTING	CR	ELECT. (GROWLER TEST)	-DO-	MFG. SPEC.	MFG. SPEC.	Log Book	2		1	
2.10	ASSEMBLY	1.ALIGNMENT	MA	MEAS.	-DO-	-DO-	-DO-	Log Book	2	-	-	
		2.WORKMANSHIP	MA	VISUAL	-DO-	-DO-	-DO-	Log Book	2	-	-	
		3.AXIAL PLAY	MA	MEAS.	-DO-	-DO-	-DO-	Log Book	2	-	1	
		4.DIMENSIONS	MA	-DO-	-DO-	MFG.DRG./ MFG SPEC.	MFG. DRG/ RELEVANT IS	Log Book	2	-	-	
		5.CORRECTNESS, COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	MFG SPEC. RELEVANT IS	MFG SPEC. RELEVANT IS	Log Book	2	-	-	
		6. RTD, BTD & SPACE HEATER MOUNTING.	MA	VISUAL	100%	MFG SPEC. RELEVANT IS	MFG SPEC. RELEVANT IS	Log Book	2		1	

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	SIGNATURE		
	DATE		BIDDER'S/VENDORS COMPANY SEAL

	QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
			BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE			
	SHEET 8 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	W	V	REMARKS
1	2	3	4	5	6	7	8	9	10			11
3.0	TESTS	1.TYPE TESTS INCLUDING SPECIAL TESTS AS PER BHEL SPEC.	MA	ELECT.TEST	1/TYPE/SIZE	IS-325/ BHEL SPEC./ DATA SHEET	IS-325/ BHEL SPEC./ DATA SHEET	TEST REPORT	2	1*	1	* NOTE - 1
		2.ROUTINE TESTS INCLUDING SPECIAL TEST AS PER BHEL SPEC.	MA	-DO-	100%	-DO-	-DO-	-DO-	2	1$	1	$ NOTE - 2
		3.VIBRATION & NOISE LEVEL	MA	-DO-	100%	IS-12075 & IS-12065	IS-12075 & IS-12065	-DO-	2	1$	1	$ NOTE - 2
		4.OVERALL DIMENSIONS AND ORIENTATION	MA	MEASUREMENT & VISUAL	100%	APPROVED DRG/DATA SHEET	APPROVED DRG/DATA SHEET & RELEVANT IS	INSPC. REPORT	2	1	-	
		5.DEGREE OF PROTECTION	MA	ELECT. & MECH. TEST	1/TYPE/ SIZE	RELEVANT IS	BHEL SPEC. AND DATA SHEET	TC	2	-	1	TC FROM AN INDEPENDENT LABORATORY, REFER NOTE-3
		6. MEASUREMENT OF RESISTANCE OF RTD & BTD	MA	-DO-	100%	-DO-	-DO-	-DO-	2	1$	1	$ NOTE - 2
		7. MEASUREMENT OF RESISTANCE, IR OF SPACE HEATER	MA	-DO-	100%	-DO-	-DO-	-DO-	2	1$	1	$ NOTE - 2
		8. NAMEPLATE DETAILS	MA	VISUAL	100%	IS-325 & DATA SHEET	IS-325 & DATA SHEET	INSPC. REPORT	2	1$	1	$ NOTE - 2
		9.EXPLOSION FLAME PROOF NESS (IF SPECIFIED)	MA	EXPLOSION FLAME PROOF TEST	1/TYPE	IS-3682 IS-8239 IS-8240	IS-3682 IS-8239 IS-8240	TC	2	-	1	TC FROM AN INDEPENDENT LABORATORY, REFER NOTE-3
		10. PAINT SHADE, THICKNESS & FINISH	MA	VISUAL & MEASUREMENT BY ELKOMETER	SAMPLE	BHEL SPEC. & DATA SHEET	BHEL SPEC. & DATA SHEET	TC	2	1$	1	SAMPLING PLAN TO BE DECIDED BY INSPECTION AGENCY $ NOTE - 2

BHEL	**PARTICULARS**	**BIDDER/VENDOR**	
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	SIGNATURE		
	DATE		BIDDER'S/VENDORS COMPANY SEAL

	QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :		
			BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03			SPECIFICATION : TITLE		
	SHEET 9 OF 9		SYSTEM			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)			SECTION		VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	W	V	REMARKS
1	2	3	4	5	6	7	8	9	10			11

NOTES:

1 DEPENDING UPON THE SIZE AND CRITICALLY, WITNESSING BY BHEL SHALL BE DECIDED.

2 ROUTINE TESTS ON 100% MOTORS SHALL BE DONE BY THE VENDOR. HOWEVER, BHEL SHALL WITNESS ROUTINE TESTS ON RANDOM SAMPLES. THE SAMPLING PLAN SHALL BE MUTUALLY AGREED UPON.

3 IN CASE TEST CERTIFICATES FOR THESE TESTS ON SIMILAR TYPE, SIZE AND DESIGN OF MOTOR FROM INDEPENDENT LABORATORY ARE AVAILABLE, THESE TEST MAY NOT BE REPEATED.

4 WHEREVER CUSTOMER IS INVOLVED IN INSPECTION, AGENCY (1) SHALL MEAN BHEL AND CUSTOMERS BOTH TOGETHER.

Legends for Inspection agency

1. BHEL/CUSTOMER
2. VENDOR (MOTOR MANUFACTURER)
3. SUB-VENDOR (RAW MATERIAL/COMPONENTS SUPPLIER)

P. PERFORM
W. WITNESS
V. VERIFY

BHEL	**PARTICULARS**	**BIDDER/VENDOR**	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/VENDORS COMPANY SEAL

		QUALITY PLAN	CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
			BIDDER/ VENDOR :			QUALITY PLAN NUMBER PED-506-00-Q-006, REV-01			SPECIFICATION TITLE			
		SHEET 1 OF 2	SYSTEM			ITEM AC ELECT. MOTORS BELOW 55KW (LV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			**11**
1.0	ASSEMBLY	1.WORKMANSHIP	MA	VISUAL	100%	MANUF'S SPEC	MANUF'S SPEC	-DO-	2	-	-	
		2.DIMENSIONS	MA	-DO-	-DO-	MFG. DRG./ MFG. SPEC.	MFG. DRG./ MFG. SPEC.	-DO-	2	-	-	
		3.CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/COLOUR CODE	MA	VISUAL	100%	MFG.SPEC./ RELEVANT IS	MFG.SPEC. RELEVANT IS	-DO-	2	-	-	
2.0	PAINTING	1.SHADE	MA	VISUAL	SAMPLE	MANUFR'S SPEC/BHEL SPEC./RELEVANT STANDARD	BHEL SPEC. SAME AS COL.7	LOG BOOK	2	-	-	
3.0	TESTS	1.ROUTINE TEST INCLUDING SPECIAL TEST AS PER BHEL SPEC.	MA	-DO-	100%	IS-325/ BHEL SPEC./ DATA SHEET	SAME AS COL.7	TEST REPORT	2	1		NOTE -1 & NOTE-3
		2.OVERALL DIMENSIONS & ORIENTATION	MA	MEASUREMENT & VISUAL	100%	APPROVED DRG/DATA SHEET	APPROVED DRG/DATA SHEET & RELEVANT IS	INSPN. REPORT	2	1	-	NOTE -1 & NOTE-3
	BHEL		**PARTICULARS**		**BIDDER/VENDOR**							
			NAME									
			SIGNATURE									

	QUALITY PLAN	CUSTOMER :		PROJECT TITLE			SPECIFICATION : NUMBER :			
		BIDDER/ VENDOR :		QUALITY PLAN NUMBER PED-506-00-Q-006, REV-01			SPECIFICATION : TITLE :			
	SHEET 2 OF 2	SYSTEM		ITEM AC ELECT. MOTORS BELOW 55KW (LV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	W	V	REMARKS
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			**11**
		3.NAMEPLATE DETAILS	MA	VISUAL	100%	IS-325 & DATA SHEET	IS-325 & DATA SHEET	INSPN. REPORT	2	1	-	

NOTES:

1 ROUTINE TESTS ON 100% MOTORS SHALL BE DONE BY THE VENDOR. HOWEVER, BHEL SHALL WITNESS ROUTINE TESTS ON RANDOM SAMPLES. THE SAMPLING PLAN SHALL BE MUTUALLY AGREED UPON

2 WHERE EVER CUSTOMER IS INVOLVED IN INSPECTION, (1) SHALL MEAN BHEL AND CUSTOMERS BOTH TOGETHER.

3 FOR EXHAUST/VENTILATION FAN MOTORS OF RATING UPTO 1.5KW , ONLY ROUTINE TEST CERTIFICATES SHALL BE FURNISHED FOR SCRUTINY.

Legends for Inspection agency

1. BHEL/CUSTOMER
2. VENDOR (MOTOR MANUFACTURER)
3. SUB-VENDOR (RAW MATERIAL/COMPONENTS SUPPLIER)

P. PERFORM
W. WITNESS
V. VERIFY

BHEL	**PARTICULARS**	**BIDDER/VENDOR**	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/VENDORS COMPANY SEAL

SECTION: D
STANDARD TECHNICAL SPECIFICATIONS

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 advise 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 hours 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 VOID.

4.5 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.

4.6 VOID.

4.7 VOID.

4.8 VOID.

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

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

4.11 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 dBa measured at a distance of 1 metre horizontal and 1.5 metre vertical from the edge of pump motor set.

4.12 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.

4.13 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.

4.14 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.

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

a) Scope of work by BHEL and vendor shall be indicated with different legend or in the form of note.

b) Weight of moving parts, its frequency and its height from floor shall be furnished.

c) Recommended location of cable trench for feeding cable to machine along with the details of cable entry.

d) Civil loads per bolt / pocket (static and dynamic) in tabular form considering worst case.

4.16 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.

4.17 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.

4.18 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.

4.19 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 VOID

5.2 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.

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

5.4 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.

5.5 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.

5.6 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.

5.7 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.

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

5.9 **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.

a) Establish flow and pressure characteristic

b) Establish flow and power characteristic

c) 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.

5.10 **Test 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.

5.11 **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 fetting.

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:**

i) Clarification Schedule as per format given under Vol-III.

ii) Deviation Schedule as per format given under Vol-III.

iii) Compliance cum Confirmation certificate 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.

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

a) Flow Vs. Pressure

b) Flow Vs. Power

c) Flow Vs. Efficiency

v) Duly filled up data sheet of Pump, Motor

vi) Calculation for selection of Motor Rating

vii) Pressure drop calculation across strainer

viii) Operation maintenance manual .

ix) 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:

a) Manufacturer's name and trade mark.

b) Capacity and Pressure.

c) Design Pressure.

d) 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.

TECHNICAL SPECIFICATION

FOR

RATE CONTRACT

OF

LUBE OIL TRANSFER PUMPS

VOLUME-III

(TECHNICAL SCHEDULES)

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT PPEI,
NOIDA-INDIA

LIST OF DOCUMENTS TO BE SUBMITTED WITH THE BID

a. Prebid clarification schedule as per format given under Vol-III, in case of any clarifications.
b. Deviation schedule as per format given under Vol-III, in case of any deviations by bidder.
c. Compliance cum confirmation certificate as given under Vol-III.
d. Stamped copy of unpriced price schedule (section6 of vol-III)
e. Stamped copy of electrical load list (section 5 of vol-III).

In addition to the above, docs required along with bid given under **electrical portion of specification**

shall be furnished by bidder.

NOTES:

OFFER WILL BE CONSIDERED AS INCOMPLETE IN ABSENCE OF ANY OF THE ABOVE DOCUMENTS.

DOCUMENTS OTHER THAN ABOVE, IF ANY, SUBMITTED WITH THE OFFER WILL NOT FORM PART OF CONTRACT AND ACCORDINIGLY WILL NOT BE CONSIDRED FOR BID EVALUATION.

VOLUME-III
SECTION 2
COMPLIANCE CUM CONFIRMATION CERTIFICATE

COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing/ stamping this compliance certificate (every sheet) and furnish 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" 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.

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.

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

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

h) Guarantee for plant/equipment as applicable, shall be as per relevant clause of GCC /SCC /Other Commercial Terms & Conditions.

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) 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.

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

l) 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

VOLUME-III
SECTION 3
PRE BID CLARIFICATION SCHEDULE

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

VOLUME-III
SECTION 4
SCHEDULE OF TECHNICAL DEVIATION

DEVIATION SHEET (COST OF WITHDRAWL)

PACKAGE:- LUBE OIL TRANSFER PUMPS

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 withdrawl of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.
2. For directly dispatchable items, cost of withdrawl 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 withdrawl 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 withdrawl 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 withdrawl 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 withdrawl is to be given seperately for each deviation. In no event bidder should club cost of withdrawl of more than one deviation else cost of withdrawl of such deviations which have been clubbed together shall be considered as NIL.
13. In case nature of cost of withdrawl (positive/negative) is not specified it shall be assumed as positive.
14. In case of descrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.

VOLUME-III
SECTION 5
ELECTRICAL LOAD DATA

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
LUBE OIL TRANSFER PUMP	3.7 KW		-	-	-	D	U	-	-	-								

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	RATE CONTRACT	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

VOLUME-III
SECTION 6
SUGGESTIVE PRICE FORMAT

DEVIATION SHEET (COST OF WITHDRAWL)

PACKAGE:- LUBE OIL TRANSFER PUMPS

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 withdrawl of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.
2. For directly dispatchable items, cost of withdrawl 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 withdrawl 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 withdrawl 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 withdrawl 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 withdrawl is to be given seperately for each deviation. In no event bidder should club cost of withdrawl of more than one deviation else cost of withdrawl of such deviations which have been clubbed together shall be considered as NIL.
13. In case nature of cost of withdrawl (positive/negative) is not specified it shall be assumed as positive.
14. In case of descrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.

Annex-V

बी एच ई एल BHEL	Power Sector – PEM Noida Technical Pre - Qualification Requirements (For Open /Global Tender/Registration) To be read in conjunction with PEM General PQR	PROJECT: RATE CONTRACT PACKAGE: LUBE OIL TRANSFER PUMPS DEPARTMENT: MECHANICAL AUXILIARY
	Sheet 1 of 1	REV. NO. 01 / DATE: 02/09/2015

Lube oil pumps supply packages with following technical details:

- Pumps should be of gear type.

Supplier should have designing/manufacturing capability and having testing facility (in house or outsourced).

Product/package should have been successfully in use for at least one year in power plant or other industries e.g. refinery/steel/process/commercial etc. For this the supplier has to submit either of following supporting documents meeting below mentioned conditions

I. Copy of minimum two performance certificate from end user along with copy of related Purchase Order specifying that the product is running successfully for one (1) year from date of commissioning.

OR

II. Minimum three customer's/third party inspection reports along with purchase order copy meeting the minimum pre-qualifying requirement.

OR

III. Minimum three purchase orders (placed with minimum gap of 6 months from previous purchase order) from same purchaser meeting the minimum pre-qualifying requirement

Note:

1) Vendor shall submit design documents to substantiate technical parameters specified in PQR, if the same is not mentioned in performance certificate/purchase order.

2) Minimum two (2) nos. Purchase orders shall be submitted which should not be more than ten (10) years old as on date of application for registration/bid submission, for establishing continuity in business.

3) Vendor may also qualify based on the credential of principal meeting package specific pre-qualifying requirements having technical valid collaboration/licensing agreement.

4) In case documents submitted for meeting PQR are in language other than English, notarized English translation shall also be submitted.

General:

1) PEM registered vendors are also required to submit the credentials to meet the PQR.

2) Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder/collaborators to perform the contract, as per BHEL evaluation procedure, should the circumstances warrant such assessment in the overall interest of BHEL.

3) Final acceptance of bidder is subject to End Customer approval.

PREPARED BY			CHECKED & REVIEWED BY			APPROVED BY		
VIPIN NAUNI		02/09/2015	HARISH KUMAR / S. K. BHOMIK			P. KISHORE		
Name	Signature	Date	Name	Signature	Date	Name	Signature	Date