

"TECHNO-COMMERCIAL BID"**Enquiry No.: E1143176R Dated 14.12.2024****Due date: 13.01.2025**

IMPORTANT: [1] Suppliers to ensure submission of completely filled & duly signed/stamped of this sheet along-with the Offer.

Sl no	IMPORTANT INSTRUCTIONS FOR TENDERER	
	BHEL's Parameter	Accepted/ Deviation
1	Any bidder from a country which shares a land border with India will be eligible to bid in this tender.	
2	<p><u>Tax and Duties:</u></p> <p><u>Foreign Bidders:</u> The offered prices in case of foreign bidders shall be inclusive of all the Taxes and duties as applicable in the country of bidder / country of dispatch for the quoted CFR / CIF price.</p> <p>Foreign bidders to submit declaration of Permanent Establishment and Business Connection (PEBC) for remittances (Refer sl.no. 16.4 of GTC BP 200102B for more details) and Tax Residency Certificate (TRC) & Form 10F (for obtaining DTAA benefits) (Refer sl.no. 16.5 of GTC BP 200102B for more details).</p> <p><u>Indigenous Bidders</u> -Bidders to ensure timely remittance of SGST, CGST, IGST as applicable in time as per law.</p> <p>Vendor to ensure compliance to timely filing of monthly GST return. GST portion of invoice shall be released only upon the invoice being reflected in GSTR 2A of BHEL and invoices being compliant to GST Invoice rules.</p> <p>Bidders to comply with all statutory provisions as may be applicable at the time of dispatch/sale. Any additional financial liability to BHEL on account of non-compliance by bidders shall be borne by them and shall be adjusted / recovered from the bidders. BHEL reserves the right to review the existing offers / contracts for any revision in terms, which may arise due to change in any statutory provisions to ensure that the benefit accrues to BHEL</p>	
3	<p><u>Payment Terms: -</u></p> <p><u>Foreign Bidders:</u></p> <p>100% against irrevocable, unconfirmed LC, payable within 90 days of the Bill of Lading (B/L) date or Payment terms of CAD payable on 90th day of B/L / AWB.</p> <p>In case BHEL considers any deviation in payment terms i.e. early payment based on bidder's request, then bids shall be evaluated with loading of State bank of India Base rate plus 6%, for the credit period short of 90 days.</p> <p>The LC shall be established 2 months prior to shipment date, valid for period of 90 days, unless agreed otherwise. Documents to be submitted as per UCP600 and should reach BHEL/ BHEL's bank at least 7 days prior to vessel arrival.</p> <p><u>Indigenous Bidders:</u></p> <p>100% payment in 90 days of receipt (45 days for Micro & Small and 60 days for Medium enterprises as registered in Udyam certificate as per relevant MSME act in force) and subject to acceptance of material and relevant documents at BHEL.</p> <p>Any deviation from the above payment terms, if accepted (by BHEL), shall be loaded @ SBI base rate + 6% for the purpose of bid evaluation.</p>	

4	<p>Delivery Schedule / LD applicability: - Unless covered under Force Majeure conditions aforesaid, Penalty for late delivery shall be 0.5% of the undelivered portion per week of delay or part thereof, subject to a maximum of 10% of the undelivered order value owing to delayed deliver.Total undelivered order value above shall be item wise, lot wise order value of PO .</p> <p>Any deviation from above, which is based on specific requirement/LD clause, shall be specified in particular tender /Special terms and condition(STC) /Additional terms and conditions(ATC) and same shall have overriding effect on anything mentioned in instant GTC. Imposition, recovery or settlement of this penalty shall not adversely affect BHEL's right to performance, compensation and termination of the order.</p> <p>Any loading on penalty clause shall be to the extent to which it is not agreed to by the bidder (at offered value)</p>	
5	<p>Delivery Schedule & Completion date: - In case of foreign supplies, the date of Bill of Lading (B/L) or AWB shall be taken as actual date of delivery where freight until discharge port in India is in Seller's scope like CFR/CIF/CIP delivery terms. For Ex-works/FCA/FOB or any other delivery term where freight is in buyer's scope, date of material readiness /Test certificate/ Warehouse receipt/Freight forwarder receipt may be considered as actual date of delivery (mutually agreed).</p> <p>In case of Indigenous bidders, the date of delivery at named destination in India shall be taken as contractual delivery completion date where delivery terms are FOR destination. In case of 'Ex-works' delivery terms, the date of LR / RR shall be the contractual delivery completion date.</p>	
6.	<p>Transit Insurance: Except where delivery terms are agreed on CIF basis for Imports & FOR destination basis for indigenous purchases, transit insurance will be covered by BHEL under its Open Marine Transit Insurance Policy. Bidder shall inform dispatch particulars with value of consignment to the Purchaser within 07 days of dispatch for BHEL to arrange insurance coverage in its policy. Failure on the part of bidder to inform dispatch particulars will make him liable to pay for any transit damages / losses suffered by the Purchaser</p>	
7.	<p>Documentation:</p>	
(i)	<p>For Indigenous Purchase: Bidder shall arrange to send to the consignee following documents immediately on despatch of the goods. Documents can also be uploaded at Incoming Material Document Management System (IMDMS) available at BHEL Bhopal B-2-B site of BHEL Bhopal internet page at https://bpl.bhel.com/mm/.Online submission of Invoices /e-invoices for payment can also be done in IMDMS system.</p> <ol style="list-style-type: none"> 1) Original Tax invoice in triplicate (Buyer's copy and duplicate for Transporter), 2) Consignee copy of LR & 2 sets each of Packing list, 3) Test certificate, Guarantee / Warranty certificate, 4) O & M manuals (where applicable) 5) In case of labour / mixed basis jobs, material is issued free of cost. Necessary material reconciliation is to be done and Free Issue Material Statement (FIMS) is to be submitted with each bill. 6) Pre-dispatch Inspection report /Third Party Inspection Certificates/MDCC certificate 7) Any other documents as specified in Enquiry /PO /STC/ATC of enquiry /annexure <p>The distribution of such documents will be specified in the Purchase order Terms and Conditions (BP 205315 for indigenous and BP205316 for Imported Purchases)).</p>	

(ii) **For Foreign Purchase — Imports:**

Seller shall send 1 set of following documents, in English, within 7 days of B/L date / 1 day of AWB date by courier to the Purchaser

1. Express / Original 'Clean on board' Bill of Lading / AWB.
2. One set of Commercial Invoice, Packing list indicating container-wise Gross weight, Net weight, CBM volume, No. of packages with Dimensions of each package.

3. Original Certificate of Country of Origin (COO) issued by Chamber of Commerce. COO shall be as per requisite format where duty concession is available under Preferential Trade/Comprehensive Economic Partnership/Free Trade agreement. Customs tariff heading (CTH)/ Harmonized System of Nomenclature (HSN) code of material should be mentioned on invoice and COO in all such cases.

4. One set of Original Test Certificates and O&M Manual where called for.

5. Fumigation / Phyto-Sanitary Certificate wherever cargo is packed in wooden packing or packing of plant origin material is used.

6. Supplier should additionally forward 2 sets of original documents mentioned at point nos. 1 to 5 above along with Original Bill of Lading (OBL) or AWB through any international courier service/registered airmail within three (3) days of obtaining the same directly to the following:

AGM (M.S) Regional Operations Division
BHEL 14th Floor Centre-1 World Trade
Centre, Cuffe Parade Mumbai 400 005
INDIA
Email: msseabpl@bhel.in (In case of Sea
freight)
msair@bhel.in (In case of Air freight)

DGM (FIN- FP) 4 th Floor, Administrative
Bldg. BHEL Bhopal - 462022 (India) E-
mail : fin_fp.bpl@bhel.in

And confirm forwarding details to AGM (CMM- FE), BHEL Bhopal at
mmfe.bpl@bhel.in

7. In case the Seller decides to negotiate all 3 originals of B/L / AWB along with all original documents through negotiating Bank, non-negotiable documents (NNDs) consisting of copy of B/L / AWB & documents mentioned at Sl. no. 11- B2 to B5 will be sent by e-mail to the Purchaser at his e-mail address given in the PO with one copy to be mailed at mmfe.bpl@bhel.in as well as at msseabpl@bhel.in (for Sea shipment) or msair@bhel.in (for Air shipment). Other documents, as required, will be separately indicated in the Purchase Order. Additional expenditure, if any, incurred by the Purchaser by way of detention / demurrage, resulting out of delay attributable to the Seller in providing Negotiable documents, will be recovered from the Seller. In case any discrepancy is raised by the Bankers / BHEL with respect to the documents submitted, vendor to facilitate clearance of goods through Delivery Order. Additionally, following requirements to be taken care of by the bidder during PO execution stage:

i) IEC (0588138690), GSTIN (23AAACB41461ZN) and email ID (mmfe.bpl@bhel.in) of BHEL Bhopal shall be clearly BP 200102B HEAVY ELECTRICALS PLANT, BHOPAL GENERAL TERMS AND CONDITIONS OF ENQUIRY Page 7 of 16 Ref: MI 2001A3 Annexure II mentioned on B/L or AWB.

ii) As per Uniform Customs Practice (UCP 600) for documentary credits(L/C), presentation period allowed is maximum 21 days after the date of shipment. However, for geographically closer ports where sea voyage time is less than 3- 4 weeks, a shorter presentation period shall be agreed upon.

	<p>iii) In case of CAD payment terms, Supplier shall send documents to BHEL's bank within 5 days of shipment. One set of original may be sent to any one of ROD, CMM-FE and MM, copy may be marked to the others.</p> <p>iv) For Air shipments through non-CONSOL (i.e., not through BHEL ROD's contract), Delivery Order (DO) should be given to BHEL without insisting for Bank Release Order (BRO). AWB to be drawn with BHEL Bhopal as consignee.</p> <p>v) It must be ensured that original shipping/commercial documents, if not provided to BHEL outside banking channel, should reach BHEL's bank at least 10 days prior to cargo arrival at port.</p> <p>vi) Part shipment and trans-shipment to be avoided to the extent possible especially where it is not possible to split shipping & commercial documents. Part shipment shall be strictly avoided for Air shipments.</p>	
8	Applicable BHEL Conciliation Scheme : Enclosed	
9	<p><u>Public Procurement (Preference to Make in India), Order 2017:</u></p> <p>For this procurement, Public Procurement (Preference to Make in India), Order 2017 Dtd 15.06.2017 and 28.05.2018 and subsequent orders issued by both DPIIT and the respective nodal ministries shall be applicable.</p> <p>For this procurement, the local content to categorise a supplier as a Class I local supplier/ Class II local Supplier / Non-Local supplier is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. In case of subsequent orders issued by the nodal ministry changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT.</p> <p>Bidder to mention the percentage of local content and place of value addition to manufacture these items in the tender.</p>	
10	Type of GST applicable – IGST / CGST_SGST with percentage	
11	HSN code of item.	
12	Delivery Schedule: quote in nos. of weeks from the date of P.O. or drawing approval whichever is later.	
13	Terms & Conditions: - BHEL STD T&C BP 200102B, BP 205315, BP205316 [as available at B2B Portal https://bpl.bhel.com/mm/] are applicable.	
14	The bidder / supplier /contractor will, when presenting his bid, declare whether other family firms or sister concern affiliates / subsidiary firms are participating in the same tender or not.	
15	Offer Validity: 90 days from the date of Tender opening.	
16	Prices : 'Firm Price'	
17	Reverse auction: BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com). If tender specific conditions call for reverse auction, RA shall be conducted among the techno-commercially qualified bidders. Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered for RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking. Please give your acceptance for Reverse Auction (RA) as above.	
18	Delivery terms for indigenous supply : F.O.R Destination (All freight & Insurance charges shall be borne by Supplier)	
19	<p>Delivery terms for Foreign supply: Terms of Delivery for Sea shipment shall be on CFR / CIF basis with 14 days' detention free period preferably at Nhava Sheva (JNPT-INNSA1) for FCL (Full Container Load) Cargo of GP & HC Containers.</p> <p>Freight amount shall be indicated separately in the offer in case of CIP/CFR/CIF.</p>	

20	"In the course of evaluation, if more than one bidder happens to occupy L-1 status effective L-1 will be decided by soliciting discounts from the respective L-1 bidders in sealed envelope and will be open in tender room. In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss/ draw of lots, in presence of the respective L-1 bidders or their representatives. Ranking will be done accordingly. BHELs decision in such situations shall be final and binding"	
21	Contact Person & details (email & telephone no)	

Supplier's authorized signature
Firm Name:


Krishna Kumar Mall
Manager [MEX, BHEL Bhopal]

TECHNICAL SPECIFICATION
FOR
POLY-TETRA-FLOURO-ETHYLENE FACED
THRUST BEARING PADS
FOR
HYDROGENERATOR (4x111 MW, 250 RPM)



HYDROGENERATOR ENGINEERING DIVISION
BHARAT HEAVY ELECTRICALS LIMITED
BHOPAL – 462021

Doc.No.	HG/PTFE/VPHEP	Rev.	00
		Rev. date	22.04.2024
Revision Details			
PREPARED BY:	CHECKED BY / APPROVED BY		
VG	DKC		
			

1) GENERAL CONDITIONS**1.1) GENERAL INSTRUCTIONS TO SUPPLIERS**

- a.) Bid shall be in two parts i.e. Part-1: Technical & Part-2: Commercial; Details shall be as per specification enclosed.
- b) Any deviations shall be clearly brought out in the offer clause-wise and document-wise in the first instance itself with clarifications/justifications. Incomplete offer will be rejected. BHEL has the right to verify information / confirmation furnished, by asking additional documents, proofs etc.
- (c) As per Customer's (THDC) requirement, Supplier's Credentials have to be approved by THDC. Therefore, price bid of only those Suppliers will be opened whose credentials are approved by the Customer (THDC). Therefore, Suppliers have to MANDATORILY submit their drawing, quality assurance plan "QA/HG/PTFE/VPHEP" and filled up Sub-Vendor Questionnaire form with all required details & documents signed and sealed along with their technical offer.

1.2) QUALIFICATION CRITERIA: Refer annexure "A"**2) SCOPE OF SUPPLY**

- 2.1)** Refer enquiry and annexure B for quantity i.e. (nos. and set) and other technical specifications for designing of PTFE lined thrust bearing pads. Each set consisting of PTFE lined thrust pads as per drawing (attached separately with the enquiry).
- 2.2)** Design of PTFE lining is in the scope of supply of supplier.
 - a) Supplier to decide the proven and established PTFE material and technology for manufacturing PTFE thrust bearing pads. Metal wire or any other material as per proven technology may be used for bonding of PTFE with base metal and shall not projected out / upward on the edges of the pads. Supplier to confirm that the bonding edges shall be smooth, with no cracks on it and shall not tear out during running of the machine.
 - b) Type & details of PTFE material along with composition percentage shall be informed along with offer.
 - c) Supplier to decide the design of the mesh to be used i.e. the supplier to decide the material of the wire / any other proven material, mesh density and thickness of mesh to be adopted & details shall be furnished along with the offer.
 - d) The supplier to prepare manufacturing drawings as per proven and established technology of PTFE thrust bearing pad.
 - e) The finished PTFE thrust pad shall not have blow holes, cracks, uneven surface, blisters, raised face, swelling and dirt. Steel base shall not have rusting and unmachined surfaces. No crack at outer edge of PTFE. Wire mesh material shall not project at top and periphery of PTFE.

f) The radial holes for RTD, DTT and HS lubrication hole shall not interfere or get punctured with each other.

g) Soldering of any kind, which is done for aesthetic purpose in PTFE thrust pads, is not permitted.

2.3) Manufacturing drawings as per requirement mentioned in clause-2.2 d) are to be submitted to BHEL for approval before going ahead with manufacturing.

2.4) Supplier shall specify and submit the international / internal standards for PTFE thrust pads with technical offer.

2.5) The TPI (Third party inspection) charges shall be solely borne by the supplier. The PTFE thrust bearing pads shall be inspected by TPI and TC shall be send for verification & MDCC before despatch. Internationally recognised TPI agency i.e., LLOYDS/TUV/SGS, supplier can opt from these agencies.

3) TECHNICAL SPECIFICATION

3.1) INTRODUCTION:

This specification covers the scope of supply, bearing design, performance & manufacturing requirements for Poly Tetra Fluoro Ethylene (PTFE) faced hydrodynamic thrust bearing pads.

3.2) DESCRIPTION OF THRUST BEARING:

Thrust bearing is of tilted pad type and it will be supported on spring mattress. PTFE shall also reduce friction losses and increase resistance to scoring as well as improve unit's reliability. Besides very high reliability under extreme condition, the PTFE shall operate with low thermal losses and low temperatures. The details of copper/brass plug design at the end of HS lubrication hole in the pad shall be furnished by the supplier as mentioned in the drawing. The thrust bearing shall be mounted in a bracket that is common for thrust bearing and a guide bearing. Operation of the thrust bearing shall be unidirectional. Plug-in type oil coolers, mounted inside the bearing housing are provided for cooling. Refer annexure B for relevant facts about the thrust bearing and details of oil coolers.

4) TESTING OF PTFE THRUST PADS:

4.1) One number test pad shall be randomly selected from complete lot i.e. 6 set. Therefore, supplier has to manufacture one number extra PTFE thrust pad along with 6 set of pads i.e. 6 set + 1 nos.

4.2) The PTFE percentage shall be decided by supplier to suit technical requirement as mentioned in this specification. Supplier to provide the composition of PTFE material along with the offer. To evaluate the composition of PTFE in the lining, X-ray Diffraction (XRD) and FTIR (Fourier Transform Infra-Red) analysis shall be done at supplier works.

- 4.3) The shore hardness of PTFE lining on finished pads shall be 50 to 52 on D-Scale.
- 4.4) The UTS of PTFE lining shall be more than 20MPa. Test sample shall be cut from the randomly selected test pad at sr. no. 4.1.
- 4.5) Elastic modulus load test shall be done on test pad at load as per sr. no. 1.1 of the table of clause 4 of Annexure B at 80°C temperature. No variation in thickness of pads is allowed. Impression, cracks, deformation like uneven surface, blisters, raised face, swelling shall not appear on PTFE lining.
- 4.6) Elastic modulus load test shall be done on all remaining finished pad at load as per sr. no. 1 of the table of clause 4 of annexure B. No variation in thickness of pads is allowed. Impression, cracks, deformation like uneven surface, blisters, raised face, swelling shall not appear on PTFE lining.
- 4.7) Bonding strength test of PTFE bonding with base metal shall be carried out on test piece and value shall be more than 15MPa.
- 4.8) After test at sl. no. 4.5 & 4.6, DPT on PTFE lining shall be done on all finished pads.

Test certificates for all the test mentioned in clause no. 4 shall be furnished. Supplier to furnish the actual test results instead of writing ok / not ok for dimension and other test results. Supplier to use internationally acclaimed standards for carrying out above mentioned testing. Also submit copy of the applicable standards with the offer.

- 5) **GUARANTEE:** The supplier shall guarantee for the material and the workmanship of PTFE pads for **30 months from commissioning or 48 months from supply**, whichever is earlier.
- 5.1) Bonding strength of PTFE with steel pads shall be adequate enough to avoid ripping off of the lining from pads during operation, even at runaway speed condition. Test to be conducted for bonding strength as per clause no. 4 & test certificate to be furnished.
- 5.2) Maximum permissible pad operating temperature $\leq 80^{\circ}\text{C}$, no damage shall occur to bearings even if temperature reaches 100°C . Load test on sample pad/piece as per clause no. 4 & test certificate to be furnished.
- 5.3) Bearing should not incur any damage during start and stop operations of the machine. Also shall be capable of safe operation without any damage under following conditions and Supplier to provide the compliance of the same:
- a) Continuous operation at any speed from 50% to 110% of rated speed.
 - b) Operation for a period of at least 15 minutes under maximum runaway speed conditions with cooling water on.

- c) Operation for a period of at least 15 minutes at maximum allowable load & rated speed without cooling water followed by safe shutdown.
- d) Operation for a period of at least 30 minutes at low speed of 0-10rpm.

5.4) Supplier to provide document for safe working temperature range of PTFE thrust pads.

6) GENERAL TERMS & CONDITIONS:

- 6.1) The pads will be inspected at vendors works by third party's engineers for which minimum 3 weeks' notice is required alongwith an internal test report to mobilise deputation of engineers.
- 6.2) The expected life of bearing to be informed by vendor along with offer, supported by technical literature / write up.
- 6.3) 5 copies of test certificates, manual & guarantee certificates to be submitted with packing boxes.
- 6.4) 1 set of pad shall be supplied separately in 2 / 3 number boxes in a suitably packed water tight condition to avoid any damage during transit and long term storage of 5 years. Steel strap shall be strapped all around each box , tensioned and crimped. The PTFE lining surface shall be adequately protected to avoid damage during transit and storage. Instructions shall be marked on packing box i.e. for PTFE surface as "TOP" & for steel surface as "BOTTOM", "FRAGILE, HANDLE WITH CARE" etc.
- 6.5) During inspection of pads at BHEL works, if pads were found damaged due to improper packing and handling in transit etc, the Supplier have to replace / repair the damaged pads free of cost, as soon as possible.
- 6.6) Clause by clause of compliance of BHEL's Technical Specification, Drawing, Quality Assurance Plan along with documentary proof / seal signed shall be submitted by supplier with the initial offer for technical scrutiny. Supplier shall also submit filled Sub Vender Questionnaire form (attached separately with the enquiry) along with required documentary proof and seal and signed for Customer's approval along with their technical offer.
- 6.7) The supplier shall provide detail procedure for prolonged storage and repair / rectification in case of damage of PTFE lining surface.
- 6.8) After sales services shall be done either directly by the manufacturer or through their Authorized representatives. However, Primary responsibility will be of manufacturer only.
- 6.9) Supplier to submit their manufacturing drawing, quality assurance plan for approval before placement of PO.

Annexure A**QUALIFICATION CRITERIA:** *(To be filled as per project specific requirement)*

The experience of manufacturing PTFE lining based thrust bearing pads and supply of the same during last 10 years for hydrogenerators with following criteria and are performing satisfactorily:-

- a) Atleast 1 supply where thrust bearing design load is in range 200,000 kg to 350,000 kg AND
- b) Atleast 1 supply where thrust bearing design load is in range 350,000 kg to 520,000 kg or more.

IMPORTANT: Fulfilling above criteria, the Supplier have to furnish following relevant details of their supplies. These details will be given to the enduser (i.e. THDC) for review / approval of the Supplier's credentials.

- i. Name of power house
- ii. Location of power house,
- iii. Rating details of power house (i.e. MW, Nos of machines, RPM etc),
- iv. Thrust bearing design load (in Ton or kg),
- v. Nos of pads per machine
- vi. Pad size (outer diameter, inner diameter, total thickness of pad)
- vii. Total pad area (in mm²)
- viii. Pressure (in MPA)
- ix. Final PTFE thickness (on pad)
- x. Final wire mesh thickness (on pad)
- xi. Type of PTFE (virgin white, graphite filled)
- xii. Commissioning date
- xiii. Performance certificate (self/customer) and
- xiv. PO copies OR invoice copies *(pertaining to the given performance certificate only)*,

Latest version of the proven and established technology for bonding of the PTFE lining with the steel base should be adopted.

- c) End user's (Customer's) Requirement : *(To be filled as per project specific requirement)*

Supplier's Credentials have to be approved prior opening of the price bid. Price bid of only Customer approved Suppliers will be opened.

Therefore Suppliers have to **MANDATORILY** submit their drawing, quality assurance plan, Sub-Vendor Questionnaire form (attached separately with the enquiry) with all required details & documents sealed and signed, as called in the form, along with the technical offer.

Annexure B**RELEVANT FACTS ABOUT THE THRUST BEARING** (To be filled as per project specific requirement)


1. PTFE thrust pads per machine = 6 set (where 1 set = 12 nos. PTFE lined thrust pads)
2. No of oil coolers/machine = 3Nos.
3. The capacity of each oil cooler is 70 kw (at rated speed) & 121 kw (at runaway speed), with maximum cooling water temperature of 25°C.
4. Relevant facts about the thrust bearing are as follows:-

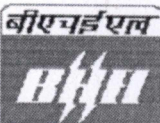
S.NO.	DESCRIPTION	REMARK
1)	Thrust bearing design load (Including hydraulic thrust)	<ul style="list-style-type: none"> • 520,000 Kg (total load) • 43333.33 Kg (load per pad)
1.1)		47666.67 Kg (load per pad, considering 10% higher load i.e. $1.1 \times 43333.33 = 47666.67$ kg)
2)	Normal speed	250 RPM
3)	Runaway speed	422 RPM
4)	Grade of oil	ISO VG-46
5)	Approx. oil quantity in housing	8000 Liter
6)	Guide bearing losses At Normal Speed At Runaway speed	30 KW 60 KW
7)	Expected mean temperature of oil bath At Normal Speed At Runaway Speed	55 °C 65 °C
8)	Direction of rotation	Clockwise Looking From Top

Note: Supplier shall confirm the loading capacity, temperature w.r.t load & rpm and specific pressure and submit the supporting documents for record purpose.

597706/2024/HEP-HGE40300

MANUFACTURER'S NAME AND ADDRESS:			MANUFACTURING QUALITY PLAN						PROJECT				REMARKS		
SL.N O.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK**		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD*	AGENCY**			REMARKS		
					M	B				M	I	B			
1	2	3	4	5	6		7	8	9	10	11		12		
1.1) RAW MATERIAL															
a)	Steel base	Chemical analysis including carbon equivalent	MAJ	Chem.	Sample	Sample	As per drawing & spec.	As per drawing & spec.	TC	-	V	V	R		
b)	PTFE (raw material)	Mechanical analysis (UTS, YS, elongation etc.)	MAJ	Mech.	Sample	Sample	As per approved drawing & spec.	As per approved drawing & spec.	TC	-	V	V	R		
c)	PTFE sheet	Chemical/Mechanical analysis	MAJ	Chem./Mech.	Sample	Sample	As per approved drawing & spec.	As per approved drawing & spec.	TC	-	V	V	R		
1.2) MACHINED COMPONENTS IN PROCESS															
a)	Steel base	Dimensional	MAJ	Measurement	100%	100%	As per drawing & spec.	As per drawing & spec.	RR	✓	P	V	R		
		Ultrasonic test	MAJ	Mechanical	100%	100%	As per drawing & spec.	AA0850118 (BHEL)	RR	✓	P	V	R		
b)	PTFE	Dimensional, preparation and its bonding on Steel Base	MAJ	Measurement	100%	100%	As per approved drawing & spec.	As per approved drawing & spec.	RR	-	P	V	R		
1.3) FINAL INSPECTION															
a)	Over all dimensions (Measurement)	Dimensional	MAJ	Measurement	100%	100%	As per drawing & spec.	As per drawing & spec.	TC	✓	P	W	R		
b)	PTFE thrust pad test	Bonding strength test	MAJ	Measurement	Sample	Sample	As per approved drawing & spec.	As per approved drawing & spec.	TC	✓	P	W	R		
		Wear resistance test	MAJ	Measurement	Sample	Sample	As per approved drawing & spec.	As per approved drawing & spec.	TC	✓	P	W	R		
		Elastic modulus, load test	MAJ	Measurement	100%	100%	As per approved drawing & spec.	As per approved drawing & spec.	TC	✓	P	W	R		
		PTFE composition test	MAJ	Measurement	100%	100%	As per approved drawing & spec.	As per approved drawing & spec.	TC	✓	P	W	R		
		Shore hardness (D-Scale)	MAJ	Measurement	100%	100%	As per approved drawing & spec.	As per approved drawing & spec.	TC	✓	P	W	R		

MANUFACTURER'S NAME AND ADDRESS:				MANUFACTURING QUALITY PLAN						PROJECT				REMARKS	
				Item: PTFE thrust bearing pads		QP NO. : QA/HG/PTFEVPHPEP		PACKAGE : Electro mechanical							
				SUB-SYSTEM: Generator & Auxiliaries		REV NO. : 01		CONTRACT NO. :							
						CONT. NO. :		PO NO. :							
						DATE : 30.10.2023		MAIN SUPPLIER : BHEL, Bhopal							
SL.N O.		CHARACTERISTICS		CLASS	TYPE OF CHECK	QUANTUM OF CHECK**		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD*	AGENCY**		REMARKS		
						M	B				M	I	B		
1	2	3	4	5	6	7	8	9	10	11	12				
c)	Visual checks	Mfg. defects i.e blow holes, cracks (surfaces & bonding edges), scratch marks, rusting, unmachined surface, uneven surface, blisters, raised face, swelling adhesion and dirt. RTD, DTT and HS hole shall not puncture with each other.	MAJ	VISUAL	100%	100%	As per drawing & spec.	As per drawing & spec.	TC	-	P	W	R		
d)	PTFE thrust bearing pads	Dimensional, Flatness & Roughness of the pad surface	MAJ	Measurement	100%	100%	As per drawing & spec.	As per drawing & spec.	TC	✓	P	W	R		
e)	Packing	DP of PTFE lining top surface.	MAJ	Mechanical	100%	100%	As per drawing & spec.	As per drawing & spec.	TC	✓	P	W	R	Refer TS clause 4.8	
		To avoid damage during transit, long storage, labelling and marking	MAJ	VISUAL	100%	100%	As per drawing & spec.	As per drawing & spec.	TC	-	P	W	R	Refer TS Clause 6.4	
1.4) FINAL INSPECTION AT BHEL (REPEAT TEST)															
a)	Over all dimensions (Measurement)	Dimensional	MAJ	Measurement	100%	100%	As per drawing & spec.	As per drawing & spec.	RR	✓	-	-	P, W		
b)	Visual checks	Mfg. defects i.e blow holes, cracks (surfaces & bonding edges), scratch marks, rusting, unmachined surface, uneven surface, blisters, raised face, swelling adhesion and dirt. RTD, DTT and HS hole shall not puncture with each other.	MAJ	VISUAL	100%	100%	As per drawing & spec.	As per drawing & spec.	RR	-	-	-	P, W		
c)	PTFE thrust bearing pads	Dimensional, Flatness & Roughness of the pad surface	MAJ	Measurement	100%	100%	As per drawing & spec.	As per drawing & spec.	RR	✓	-	-	P, W		
		DP of PTFE lining top surface.	MAJ	Mechanical	100%	100%	As per drawing & spec.	As per drawing & spec.	TC	✓	-	-	P, W		
LEGEND: * Records, indentified with "Tick" (✓) shall be essentially submitted by supplier in QA documentation. ** M: Manufacturer/Sub-supplier, B: BHEL, I: TPL P: Perform, W: Witness, R: Review and V: Verification as appropriate. RR: Review of record. CHP: TPI shall identify in column "I" as "W". TS: Technical specification															
MANUFACTURER / SUB-SUPPLIER SIGN.				MAIN SUPPLIER SIGN.				FOR THDC USE				APPROVED BY SIGN.		APPROVAL SEAL	

 BHOPAL	TECHNICAL PRE-QUALIFICATION REQUIREMENTS (T-PQR)	DOC. NO. : HGG-1912 DATE: 10/09/2024 REV. - 01 PAGE 1 OF 1
	HYDRO GENERATOR ENGINEERING DIVISION	

Technical Pre-Qualification Requirements (T-PQR) for PTFE lined thrust bearing pads for hydro-generators.

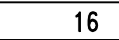
S. No.	Description of pre-qualification requirement	Vendor Response	
		Complied /Not complied	Supporting Documents required to accept compliance
1	Manufacturers of PTFE lined thrust bearing pads / their authorized representative.		Certificate of being manufacturer (for manufacturer) / authorization from the manufacturer (for authorized representative).
2	Company to be certified with ISO 9001 – 2015 <u>OR</u> certified with Quality Management system		Valid certificate / certified Quality Management System to be submitted.
3	The experience of manufacturing PTFE lining based thrust bearing pads and supply of the same during last 10 years with following criteria: a) Atleast 1 supply where thrust bearing design load is in range 200,000 kg to 350,000 kg <u>AND</u> b) Atleast 1 supply where thrust bearing design load is 520,000 kg or more.		Supplier to furnish following relevant details of those power houses i. Name & location of power house, ii. Thrust bearing design load (in kg), iii. Pad size (Note. Sl. No. i, ii and iii above can be on self-certification basis) iv. unpriced PO or invoice copies. v. Product satisfactory performance feedback letter/ certificate/ end user feedback
4	All correspondence and documents shall be in ENGLISH language. If any document provided by vendor is in any language other than English, it must be supported with its English translation.		Compliance

Note:

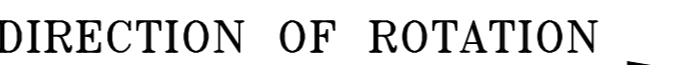
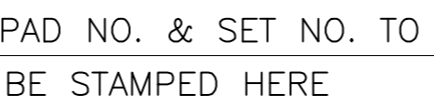
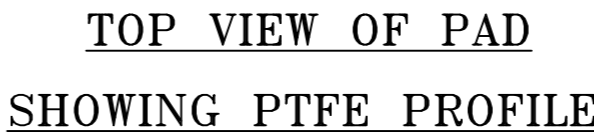
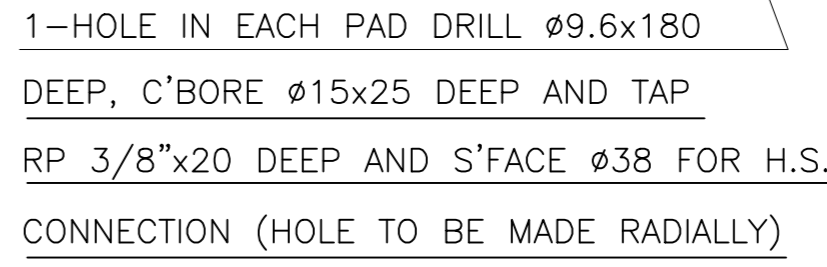
1. Compliance to above Pre-qualification requirements are mandatory. In absence of compliance of above requirements vendor PQ application is liable to be rejected.
2. BHEL has right to verify information/ confirmation furnished, by asking additional documents proofs etc.
3. Suppliers to **mandatorily** fill Sub –Vendor Questionnaire form (enclosed in enquiry) along with all required details & documents, which will be forwarded to the Customer (THDC) for approval. If Supplier fails to submit the Sub vendor Questionnaire form and relevant documents along with offer, then their offer will be rejected.
4. Price bid of only Suppliers, approved by the Customer (THDC), will be opened.
5. The reference date for 10 years experience shall be the date of Enquiry.

अधिक
बि प्रमाणिक
हचडी

HK 1/12



1. COPPER PLUG DESIGN AND DETAIL TO BE FURNISHED BY SUPPLIER AT THE TIME OF APPROVAL.
2. PTFE SURFACES OF THE PADS MUST BE FREE FROM DIRT, DENTS, SCRATCH & HAIRLINE MARKS ETC.
3. SHARP EDGES OF PTFE TO BE REMOVED AS SHOWN IN THE DRAWING. CHAMFERING SHOULD NOT BE DONE FOR REMOVING SHARP EDGES.
4. THE METAL BASE SURFACES SHOULD BE PROPERLY CLEANED & SURFACE FINISH SHOULD BE AS PER DRAWING AND METAL SURFACES SHOULD BE FREE FROM DENTS MARKS, RUSTING AND BLACK COLOUR PATCH MARK ETC.
5. THE COPPER PLUG FITMENT SHOULD BE ADEQUATE IN THE PADS. THE BONDING EDGES OF COPPER PLUG SHOULD BE NOT HAVE ANY CAVITY, DEFECT ETC.
6. TOP EDGE OF COPPER PLUG SHOULD HAVE PROPER CHAMFER AS SHOWN IN THE DRG.
7. THERE SHOULD BE NO PROJECTION OF METAL WIRE AT BONDING EDGE I.E. BETWEEN PTFE AND METAL.

AC

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

007 10 10 99Z E ORG. NO.

PACKING SPECIFICATIONS FOR THRUST
AND GUIDE BEARING PADS

1.0 GENERAL

THIS PACKING SPECIFICATION COVERS METHOD OF PACKING FOR THRUST AND GUIDE BEARING PADS FOR HYDROGENERATORS

2.0 TIMBER

THE TIMBER USED FOR THE PACKING CASES SHOULD BE DRY AND SEASONED AND FREE FROM FUNGUS AND ROT

3.0 LINING OF PACKING CASES

3.1 THE FOUR SIDES AND THE TOP WILL BE LINED FROM INSIDE BY BITUMINISED KRAFT PAPER TACKED AT SUITABLE PLACES THERE SHOULD NOT BE ANY GAP BETWEEN THE PLANKS OF THE PACKING CASES. OVERLAPPING JOINTS SHOULD BE USED.

3.2 IN ADDITION TO THE BITUMINISED KRAFT PAPER THE TOP COVER WILL HAVE A LAYER OF TARFELT/POLYTHENE ADDED OVER THE PAPER. THIS TARFELT/POLYTHENE SHOULD PROJECT ABOUT 50 mm ON ALL SIDES.

4.0 METHOD OF PACKING THRUST AND GUIDE BEARING PADS

4.1 CLEAN THE STEEL SURFACES TO MAKE THEM FREE FROM MOISTURE & DIRT. BRUSH THE PAD EXCEPT THE WHITE METAL SURFACE WITH TEMPORARY RUST PREVENTIVE PAINT. AFTER DRYING, BRUSH THE PAD EXCLUDING WHITE METAL SURFACE WITH PLASTIPEEL AND DRY.

4.2 WRAP THE PAD IN POLYTHENE PAPER

4.3 PUT VCT PAPER INSIDE THE BAG ON BOTH SIDES, ACTIVE SURFACE FACING THE PAD.

4.4 SEAL THE POLYTHENE PAPER AND PUT IT IN A WOODEN BOX HORIZONTALLY, KEEPING WHITE METAL SURFACE UPWARDS. PUT A 10 mm THK THERMO COLE SHEET ON THE WHITE METAL SURFACE. CLOSE THE BOX WITH WOODEN COVER. THE COVER SHALL BE SCREWED/ BOLTED ON TO THE BOX LIFTING HANDLES/HOOKS SHALL BE PROVIDED ON EACH BOX.

4.5 STACK HALF SET OF WOODEN BOXES CONTAINING INDIVIDUAL PADS (OR MAXM 6 NOS) SIDE BY SIDE IN ANOTHER WOODEN BOX PUT AND NAIL THE STAYS BETWEEN THE TWO INDIVIDUAL BOXES TO SECURE THEM FIRMLY

AGAINST ANY RELATIVE MOVEMENT.

5.0 STRAPPING OF THE CASE

5.1 STEEL STRAP 20/25 mm WIDE SHOULD BE STRAPPED AROUND THE CASE, TENSIONED AND CRIMPED. THERE SHOULD BE ATLEAST 2 STRAPS PER CASE. THESE STRAPS SHOULD BE ACROSS THE TOP COVER. NAILS SHOULD NOT BE USED FOR FIXING THE STEEL STRAPS TO THE CASING INSTEAD, TACKS NOT MORE THAN 20mm LONG TO BE USED IF AT ALL REQUIRED.

5.2 USE STEEL CORNER STRAPS WHEREVER NECESSARY

6.0 MARKINGS

THE CASE WILL HAVE THE FOLLOWING MARKINGS.

- a) SLINGING POSITION INDICATOR
- b) UPRIGHT POSITION INDICATOR
- c) ADDRESS OF CONSIGNEE
- d) CASE IDENTIFICATION NUMBER
- e) DIMENSIONS OF CASE (OUTSIDE) L W H
- f) WEIGHTS: NET GROSS
- g) ANY SPECIAL INSTRUCTION THAT IS ADDED IN PACKING INSTRUCTION SHEET
- h) CAUTION "DO NOT THROW"
- i) PROJECT:-
- j) WORK ORDER NO/ PURCHASE ORDER ORDER NO WITH DATE

ADDITIONAL INFORMATION				TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT				STANDARD DRAWING REVISIONS TO BE APPROVED BY STANDARD GROUP			
STATUS OF DRAWING				HYDROGENERATOR							
DISTRIBUTION OF PRINTS				BHARAT HEAVY ELECTRICALS LTD.				DRN.			
HGE 1 P I M 4				BHO PAL				CHD.			
TFX TCX (HRP) 1 1								APPD. V.S.A. sd- 13-5-81			
REV. DATE ALTERED 17-4-92				DEPT. HGE				NAME			
CHECKED				GRADE OF UN.TOL. DIM. C/M/F				SIGN			
DRG. RETRACED. CLAUSE 4.4 MODIFIED IN CLAUSE 6.0 h,i,j ADDED.				SCALE 1:1				DATE 73 74			
				WEIGHT (Kg) N A				NO. OF VAR. NA			
				REF. TO ASSY. DRG. NA				ITEM NO. 75 77			
				TITLE				NO. OF ITEMS NA			
				PACKING SPECIFICATIONS FOR THRUST AND GUIDE BEARING PADS				DRAWING NO. 3 255 01 01 400			
				CARD CODE				SHEET NO. 1 NO. OF SHEETS 1			

SIZE A3

3-255-01-01-400