

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	B	N			
1	2	3	4	5	6		7	8	9	10	11		12	
1.1) RAW MATERIAL														
a)	Steel-based	Chemical & Mechanical analysis including carbon equivalent	MAJ	Chem./Mech.	Sample	Sample	As per drawing.	As per drawing.	TC	-	V	V	-	
b)	PTFE	Chemical/Mechanical analysis	MAJ	Chem./Mech.	sample	sample	Manufacturer document	Manufacturer document	TC	-	V	V	-	
1.2) MACHINED COMPONENTS IN PROCESS														
a)	Steel-based	Dimensional	MAJ	MEAS	100%	100%	As per drawing.	As per drawing.	RR	✓	P	V	-	
b)	PTFE	Dimensional, preparation and its Coating on Steel Base	MAJ	Mechanical	100%	100%	As per drawing	AA0850118 (BHEL)	RR	✓	P	V	V	
c)	PTFE thrust bearing pads	Dimensional & Flatness of the pad surface	MAJ	MEAS	100%	100%	As per drawing.	As per drawing.	RR	✓	P	V	-	
		Bonding of PTFE with steel base	MAJ	Mechanical	100%	100%	Manufacturer document	Manufacturer document	TC	✓	P	W	V	
1.3) FINAL INSPECTION														
a)	Over all dimensions	Dimensional	MAJ	MEAS	100%	100%	As per drawing.	As per drawing.	RR	✓	P	W	V	
b)	Visual checks (Measurement)	Mfg. defects i.e blow holes, cracks, adhesion and thickness	MAJ	VISUAL	100%	100%	Manufacturer document	Manufacturer document	RR	-	P	W	V	
		Flatness, Surface finish check (PTFE Face & base metal)	MAJ	MEAS	100%	100%	As per drawing.	As per drawing.	RR	✓	P	W	V	
1.4) FINAL INSPECTION AT BHEL BHOPAL (REPEAT TEST)														
a)	Over all dimensions	Dimensional	MAJ	MEAS	100%	100%	As per drawing.	As per drawing.	RR	✓	-	W	W	
b)	UT	UT of base metal	MAJ	UT	100%	100%	As per specification	As per specification	TC	✓	-	W	W	
c)	DPT	DPT of top surface of PTFE pad	MAJ	VISUAL	100%	100%	As per specification	As per specification	RR	✓	-	W	W	
d)	Surface finish	Surface finish check (PTFE Face & base metal)	MAJ	MEAS	100%	100%	As per drawing.	As per drawing.	RR	✓	-	W	W	
							CATEGORY:							
MANUFACTURER / SUB-SUPPLIER SIGN.			FOR THDC USE				REVIEWED BY SIGN.		APPROVED BY SIGN.		APPROVAL SEAL.			

SPECIFICATION

HG/PTFE/VPHEP (REV 01)

FOR

POLY-TETRA-FLOURO-ETHYLENE FACED

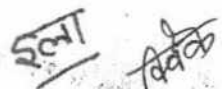
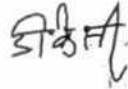
THRUST BEARING PADS

FOR

HYDROGENERATOR FOR VISHNUGAD PIPALKOTI HEP



HYDROGENERATOR ENGINEERING DIVISION
BHARAT HEAVY ELECTRICALS LIMITED
BHOPAL – 462021

	PREPARED BY:	CHECKED BY:	APPROVED BY:	
NAME	ILA / VG	DKC	AB	
SIGN				
DATE	12.07.2018	12.07.2018	12.07.2018	

1) GENERAL CONDITIONS

1.1) GENERAL INSTRUCTIONS TO SUPPLIERS

1.1.1 a.) Bid shall be in two parts i.e. Part-1: Technical & Part-2: Commercial; Details shall be as per specification enclosed.

1.1.2) 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.

1.1.3) 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).

1.2) QUALIFICATION CRITERIA:

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 equal or more than 100,000 kg AND

b) Atleast 1 supply where thrust bearing design load is equal or more than 20,000 kg

(For this the supplier should furnish relevant details of those power houses like name of power house, thrust bearing design load in kg, pad size and PTFE lining thickness). Latest version of the technology for bonding of the PTFE lining with the steel base should be adopted.

2) SCOPE OF SUPPLY

2.1) 6 sets of PTFE faced thrust bearing pads. Each set consisting of 12 numbers of pads as per drawing 02550186601.

2.2) Design of PTFE lining is in the scope of supply of supplier.

2.2.1) Supplier to decide the technology to be adopted for bonding of the PTFE lining with the steel pad.

2.2.2) Type & details of PTFE material shall be informed along with offer.

2.2.3) Supplier to decide the design of the mesh to be used i.e. the supplier to decide the material of the wire, mesh density and thickness of mesh to be adopted & details shall be furnished along with the offer.

2.2.4) Based on the bonding technology to be adopted & the mesh design, the supplier is to prepare his thrust pad manufacturing drawings.

2.3) Manufacturing drawings and requirement mentioned in clause-2.2.4 are to be submitted to BHEL for approval before going ahead with manufacturing.

2.4) Manufacturing of 6 sets of PTFE thrust pads as per BHEL approved design/drawings.

2.5) The finished pads as per BHEL approved drawing to be transported to BHEL-Bhopal.

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 plug design at the end of HS lubrication hole 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. The capacity of each cooler is 70 kw with maximum cooling water temperature of 25°C (Bottom oil coolers/machine = Nos.), relevant facts about the thrust bearing are as follows-

S.NO.	DESCRIPTION	REMARKS
1)	Thrust bearing design load	520,000 K (Including hydraulic thrust)
2)	Normal speed	250 RPM
3)	Runaway speed	422 RPM
4)	Grade of oil	ISO VG-4
5)	Approx. oil quantity in housing	8000 L
6)	Guide bearing losses At Normal Speed At Runaway speed	30 KW (Bottom guide brg.) 60 KW (Bottom guide brg.)
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

4) GUARANTEE: The supplier shall guarantee for the material and the workmanship of PTFE pads for 24 months from commissioning or 48 months from supply whichever is earlier.

4.1) 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.

4.3) Maximum permissible pad operating temperature $\leq 80^{\circ}\text{C}$, no damage shall occur to bearings even if temperature reaches 105°C .

4.4) Bearing should not incur any damage during start and stop operations of the machine.

5) GENERAL TERMS & CONDITIONS:

5.1) The pads will be inspected at vendors works by BHEL's/third party's engineers for which minimum 6 weeks' notice is required alongwith an internal test report to mobilise deputation of engineers.

5.2) The expected life of bearing to be informed by vendor along with offer, supported by technical literature / write up.

5.3) 5 copies of test certificates, manual & guarantee certificates to be submitted with packing boxes.

5.4) Pads shall be supplied in a suitably packed in water tight condition to avoid any damage during transit and long term storage of 5 years.

5.5) Suppliers have to submit their drawing, quality assurance plan "QA/HG/PTFE/VPHEP" and filled up Sub-Vendor Questionnaire form with all required details & documents along with their technical offer. Suppliers credentials i.e. Sub-Vendor Questionnaire form with required details & documents will be submitted to the Customer (THDC) for approval of the Supplier for PTFE lined Thrust bearing pads. Price bid of only those Suppliers will be opened whose credentials are approved by the Customer (THDC).

5.6) Supplier's QA plan should comply with BHEL QA plan QA/HG/PTFE/VPHEP.

5.7) After sales services shall be done either directly by the manufacturer or through their Authorized representatives. However, Primary responsibility will be of manufacturer only.

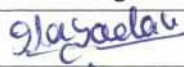
 BHOPAL	TECHNICAL PRE-QUALIFICATION REQUIREMENTS (T-PQR)	DOC. NO. : HGG-1912 DATE: 16/01/2021 REV. - 01 PAGE 1 OF 1
	HYDRO GENERATOR ENGINEERING DIVISION	

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	Only Indian manufacturers will be considered. (Class-I supplier as per Make in India policy)		Certificate of being Original manufacturer to be submitted along with self-certification of class-I supplier.
2	The experience of manufacturing PTFE lining based thrust bearing pads for Hydrogenerator having capacity more than 30MW.		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
3	Compliance to specifications HG/PTFE/VPHEP (REV 01).		Clause wise compliance to specifications HG/PTFE/VPHEP (REV 01).

Note:

1. This TPQR is applicable for Indian manufacturers only.
2. Compliance to above Pre-qualification requirements are mandatory. In absence of compliance of above requirements vendor PQ application is liable to be rejected.
3. BHEL has right to verify information/ confirmation furnished, by asking additional documents proofs etc.
4. Suppliers to fill Sub –Vendor Questionnaire form (enclosed in enquiry) along with all required details & documents, which will be forwarded to the Customer (THDC) for approval. Price bid of only Suppliers, approved by the Customer (THDC), will be opened.
5. Make in India Policy attached.

	Name	Signature	Date
Prepared By	ILA YADAV		16.01.2021
Checked By	VIVEK GOSWAMI		16.01.2021
Approved By	A DIXIT		16.01.2021