

 BHOPAL	TECHNICAL PRE-QUALIFICATION REQUIREMENTS (T-PQR)	DOC. NO. : HGG-1903 DATE: 17-05-2019 REV. - 00 PAGE 1 OF 1
	HYDRO GENERATOR ENGINEERING DIVISION	

Technical Pre-Qualification Requirements (T-PQR) for lagging insulation material for hydro turbine & generators.

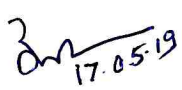
S. No.	Description of pre-qualification requirement	Bidder Response	
		Complied/Not complied	Supporting Documents required to accept compliance
1	Compliance to attached product standard HG10118 (Rev.02)		Bidder to fill the checklist attached with HG10118 (Rev.02) and send sign and seal copy of HG10118 (Rev.02).
2	Bidder and OEM to be ISO-9001 certified.		Valid ISO-9001 certificate of bidder and OEM to be submitted.
3	Source of Raw material - Use of only virgin raw material from reputed national/ international brands.		Necessary confirmation to be submitted.
4	The bidder or OEM should have experience of supplying at least 3 supplies of lagging material (Elastomeric foam based on rubber) in last 10 years i.e. F.Y 2010-11 onwards.		Copy of PO for supply of lagging material to be submitted.

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. OEM means Manufacturer of Lagging material (Elastomeric foam based on rubber).


 Prepared By
 Nishant Shah
 Dy.Mgr - HGE


 Checked By
 Ritesh Gajbhiye
 DGM-HGE


 Approved By
 A. Dixit
 AGM-HGE

	PRODUCT STANDARD	HG 10118
	<u>HYDRO GENERATOR ENGINEERING</u>	Rev. 02
COPYRIGHT & CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		Page 1 of 4
<u>PURCHASE SPECIFICATION FOR</u> <u>THERMAL INSULATION (ELASTOMERIC FOAM BASED ON RUBBER)</u>		

1. GENERAL:

The thermal insulation along with cladding shall be provided on pipes for insulation against condensation and freezing protection of cooling water pipeline inside hydroelectric power house.

The cooling water pipes draw water from tail race / penstock of the power house and pass it to the points of heat generation in the turbine, generator and transformers. The hot water is then discharged to the tail race. The exposed cooling water pipe lines are to be insulated by suitable lagging.

Both tubular and sheet form of insulation may be used depending on pipe sizes and suitability for desired performance.

All the cooling water piping is of carbon steel/stainless steel. In addition to pipes, insulation shall be applicable for all pipe fittings, joints, valves etc.

2. SCOPE:

The scope will include supply and installation of the insulation material at site. Consumables like adhesives, sealing compounds, screws, tape, red oxide (for painting pipes & its accessories before installation) etc., shall also be supplied as per requirement.

Cladding: Plain aluminum sheet to be used shall be of minimum 0.5 mm thickness to physically protect lagging.

Adhesive: Should be suitable for application of offered material on pipes and must be fire resistant.

Note: Supplied quantity of insulation material should be adequate for requirement indicated in of **Input Data Sheet**. In case of any shortage observed during installation to fulfill requirement mentioned in **Input Data Sheet**, vendor shall supply the shortage quantity free of cost.

3. MATERIAL & COMPLIANCE:

The material of thermal insulation shall be "Elastomeric foam based on rubber" as per BS EN 14304 or equivalent with properties as mentioned in the **Table-I** in page-2.

Rev. No.	Date of Rev.	Remarks	Approved		
01	11-04-2019	Spec updated along with input data.	A. Biswas, AGM (HOD)-HGE		
02	15-04-2019	Turbine data.added in Input data sheet.	Prepared	Checked	Date of issue
			Nishant Shah	Ritesh Gajbhiye	(Rev 00)
			Dy. Manager-HGE	DGM-HGE	30.03.19

	PRODUCT STANDARD	HG 10118
	<u>HYDRO GENERATOR ENGINEERING</u>	Rev. 02
COPYRIGHT & CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		Page 2 of 4
<u>PURCHASE SPECIFICATION FOR</u> <u>THERMAL INSULATION (ELASTOMERIC FOAM BASED ON RUBBER)</u>		

Table-I

Property	Value/Range/Class
Temperature Range	
Max. service temperature	(+) 105 Deg C
Min. service temperature	(-) 50 Deg C
Thermal Conductivity at 0 Deg C	≤0.035 W/m K
Thermal Conductivity at (+) 20 Deg C	≤0.037 W/m K
Thermal Conductivity at (+) 40 Deg C	≤0.039 W/m K
Water vapour diffusion resistance	≥ 7000
Water absorption W_p (max.)	0.1 kg/m ² (As per BS EN 14304 Clause 4.3.4)
Fire performance	Class "0" (Ref. Standard BS 476-6/BS 476-7)
Reaction to fire	Self –extinguishing, should not drip, should not spread flames
Chemical Resistance to Ozone	Very Good
Building Materials	Very Good
Oil & chemicals	Very Good
Health aspects	Dust & fiber free, free of formaldehyde, Anti-microbial protection

4. **CONSTRUCTION:**

Material shall be flexible, resistant to flame and have closed cell structure so that no vapour barrier is required. Insulation finish should be neat and there should not be any visual defect. All edges shall be clean cut. Rough or jagged edges of the insulation are not permitted.

All necessary tools required for installation shall be arranged by vendor.

The minimum insulation thickness shall be as given in **Input Data Sheet**.

5. **PACKING:**

The packing shall be suitable for long-term storage at site.

Rev. No.	Date of Rev.	Remarks	Approved		
01	11-04-2019	Spec updated along with input data.	A. Biswas, AGM (HOD)-HGE		
02	15-04-2019	Turbine data.added in Input data sheet.	Prepared	Checked	Date of issue
			Nishant Shah	Ritesh Gajbhiye	(Rev 00)
			Dy. Manager-HGE	DGM-HGE	30.03.19

	PRODUCT STANDARD	HG 10118
	<u>HYDRO GENERATOR ENGINEERING</u>	Rev. 02
COPYRIGHT & CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		Page 3 of 4
<u>PURCHASE SPECIFICATION FOR</u> <u>THERMAL INSULATION (ELASTOMERIC FOAM BASED ON RUBBER)</u>		

6. DOCUMENTS TO BE FURNISHED BY VENDOR

The vendor shall furnish the following documents:

With offer:

1. Calculation of thickness to be carried out as per ASTM C680 & same to be furnished along with calculation for quantity offered
2. BOM indicating thickness, size and quantity of insulation material for each item of our requirement indicated in Input Data Sheet
3. Catalogue of material used depicting BS or EN or DIN or ASTM standards and all properties.
4. Installation process
5. Storage instruction & details of packing
6. Reference list of installation, where vendor has supplied the offered material.

After placement of P.O.:

1. QA plan for approval by BHEL.
2. One copy of installation manual.
3. Box wise shipping list/packing list.
4. Certificate of conformance of material (Insulation & cladding).

7. WARRANTY

The insulation & cladding shall be warranted for a period of 24 months from the date of installation.

8. PROCUREMENT

Insulation as well as cladding for all pipes shall be procured from the same vendor.
In the offer, the vendor shall furnish item wise price.

9. INSTALLATION AT SITE

Unit wise installation of thermal insulation at site as per BHEL's requirement shall be in vendor's scope.
(Tentative schedule is given in Input data sheet)
Vendor to quote installation charges separately.

Rev. No.	Date of Rev.	Remarks	Approved		
01	11-04-2019	Spec updated along with input data.	A. Biswas, AGM (HOD)-HGE		
02	15-04-2019	Turbine data.added in Input data sheet.	Prepared	Checked	Date of issue
			Nishant Shah Dy. Manager-HGE	Ritesh Gajbhiye DGM-HGE	(Rev 00) 30.03.19

	PRODUCT STANDARD	HG 10118
	<u>HYDRO GENERATOR ENGINEERING</u>	Rev. 02
COPYRIGHT & CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		Page 4 of 4
<u>PURCHASE SPECIFICATION FOR</u> <u>THERMAL INSULATION (ELASTOMERIC FOAM BASED ON RUBBER)</u>		

Name of project: **BAIRASIUL PS (R&M)**

Enquiry no.: 340380614

CHECKLIST

(To be filled in by the vendor and submitted along with the offer)

S. No.	Description	Tick whichever applicable
1	Minimum thickness of insulation shall be as per input data sheet	Yes/No
2	Thickness of cladding shall be as per clause 2 i.e. 0.5 mm	Yes/No
3	Acceptance of material & compliance as per clause 3	Yes/No
4	Acceptance for construction shall be as per clause 4	Yes/No
5	Document/information submission shall be as per clause 6	Yes/No
6	Acceptance of warranty as per clause 7	Yes/No
7	Item wise price has been furnished in the offer.	Yes/No
8	Packing shall be suitable for long term storage	Yes/No
9	Details of packing furnished in the offer	Yes/No
10	Offered quantity of insulation material is sufficient to cater requirement mentioned in Input Data Sheet	Yes/No
11	Unit wise installation shall be done at site by vendor. Tentative schedule is given in Input data sheet.	Yes/No
12	Vendor has quoted separately for installation. All site arrangements required for installation along with travel, local conveyance, lodging, boarding and any other miscellaneous charges to be borne by vendor.	Yes/No
13	Reference list of installation, where vendor has supplied the offered material.	Yes/No

Name of vendor:

Authorized signature with stamp

Date:

Rev. No.	Date of Rev.	Remarks	Approved		
01	11-04-2019	Spec updated along with input data.	A. Biswas, AGM (HOD)-HGE		
02	15-04-2019	Turbine data.added in Input data sheet.	Prepared	Checked	Date of issue
			Nishant Shah Dy. Manager-HGE	Ritesh Gajbhiye DGM-HGE	(Rev 00) 30.03.19



HYDRO GENERATOR ENGINEERING

Annexure -I to PRODUCT STANDARD: HG10018

PROJECT:BAIRASIUL PS (R&M)

PI No.: 340380614

INPUT DATA SHEET

- Commissioning of project is scheduled likely in
UNIT-1-AUGUST 2019; UNIT-2-APRIL 2020 & UNIT-3-FEB 2021
- Address of project site:
Chief engineer Incharge (NHPC), Bairasiul power station, Surangini -176317, Himachal Pradesh

Quantities of Pipe, fittings & valves (for one Unit)

Sl. No.	Pipe Size (NB)	Pipe thickness (mm)	Total Length * (m)	No. of Elbow	No. of Reducer	No. of Tee	No. of Flange	No. of Valves	No. of NRV	No. of Flow-meter
1	15	3.73	7	1	-	-	-	1	-	-
2	25	3.38	24	34	-	-	40	4	-	-
3	32	3.56	30	20	-	-	70	8	-	-
4	40	3.68	275	30	4	9	140	0	0	2
5	50	3.91	126	21	4	9	158	22	9	2
6	65	5.16	216	85	-	-	108	16	-	-
7	80	5.49	93	30	-	2	130	3	-	1
8	100	6.02	50	20	4	17	40	4	2	1
9	150	7.11	7	-	4	-	17	-	-	-
10	200	8.18	104	30	-	2	143	3	-	2
11	250	9.27	237	80	8	32	171	17	5	3
12	350	11.13	2	2	4	-	-	-	-	-
13	400	12.7	2	-	-	-	-	-	-	-

- Wind velocity to be considered: **0 m/s**
- The temp. of the water inside the pipe will be around: (1) **17°C** (Ambient temp :**32°C**)
(2) **1°C** (Ambient temp : **12°C**)
- The relative humidity : **80 %**

Note:

- On the basis of above data (temperature and relative humidity) thickness of insulation shall be calculated.
- * Above pipe lengths are approximate and a variation of $\pm 10\%$ is possible depending on actual pipe routing at site.
- Minimum thickness of insulation shall be as per table given below. Vendor to calculate thickness at his end also & if he calculates higher thickness; the same to be furnished in the offer. Calculation to be done as per ASTM C680 considering emissivity of cladding & wind velocity as zero m/s.

# Size (NB)	15-32	40-80	100-250	300-400	Above 400
Min. thickness of insulation (mm)	19 (See note:3)	25 (See note:3)	30 (See note:3)	32 (See note:3)	35 (See note:3)

for pipe, elbow, reducer, tee, flanges, valves & flow meter