

3X660MW NORTH KARANPURA STPP

TECHNICAL SPECIFICATION FOR CERAMIC FIBER BLANKETS

SPECIFICATION NO. PE-TS-405-169-M039



BHARAT HEAVY ELECTRICALS LIMITED, POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA

	TITLE: TECHNICAL SPECIFICATION CERAMIC FIBER BLANKET 3X660MW NORTH KARANPURA STPP	SPECIFICATION NO. PE-TS-405-169-M039
		REV. NO.: 00
		DATE: 29.11.2022
		SHEET 1 OF 1

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1.00.00 GENERAL

This specification covers the requirements of manufacture, physical & chemical properties, inspection & testing and packing for supply of Ceramic Fibre Blankets suitable for service temperatures upto 1260 deg C. In case of contradiction between Section-I and Data Sheet-A of Section-II, Data Sheet-A of Section-II will prevail.

2.00.00 CODES AND STANDARDS

2.01.00 INDIAN STANDARD

2.01.01 The manufacture, physical & chemical properties, inspection and testing of the Ceramic Fibre Blankets shall conform to the latest editions of the following appropriate standards.

IS: 15402 Specification for Ceramic Fibre Blanket Insulation.

IS: 14656 Methods of test for Ceramic Fibre Products.

IS: 3346 Methods for the determination of thermal conductivity of thermal insulation materials (two slab, guarded hot plate method).

2.02.00 INTERNATIONAL STANDARD

2.02.01 For procurement as per ASTM: C 892-10 (Standard specification for Ceramic Fibre Blanket insulation), requirement of ASTM shall be applicable in place of mentioned IS codes.

2.03.00 In case of any conflict between the above standards and technical specification, the latter shall prevail and in case of any further conflict in the matter, the interpretation of the specification by the Purchaser's Representative shall be final and binding.

3.00.00 MATERIAL COMPOSITION

3.01.00 Zirconia or non-zirconia based material with a classification temperature of 1260 degree C (Type-I).

3.02.00 The Ceramic Fibre Blankets shall be made from soft inorganic refractory fibres made by melting alumina and silica followed by fibrillation either by blowing the melt or by drawing the melt over a set of spinning wheels. Zirconia (ZrO) shall be added alongwith alumina and silica to improve the properties, if required.

3.03.00 The blankets shall be needled type with the same fibres.

4.00.00 DIMENSIONS AND DIMENSIONAL TOLERANCES

4.01.00 The blankets shall be supplied in rolls and width of the blankets shall be 610mm or 1220mm. Length of the blanket shall be as per IS. Nominal thickness shall be 25mm & 50mm.

4.02.00 The method of measuring the dimensions i.e. length, width and thickness & Tolerances shall be as prescribed in IS: 14656.

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5.00.00 BULK DENSITY AND TOLERANCES ON DENSITY

- 5.01.00 The bulk density of the Ceramic Fibre blankets shall be 128 kg/m³. Tolerances on bulk density when tested as per method prescribed in IS: 14656 shall be as per IS 15402.
- 5.02.00 The bulk density shall be calculated by dividing the actual weight of the blanket in kilograms by the volume in cubic meters arrived at as the product of the average actual length, average actual width and nominal / specified thickness (subject to the condition that the thickness is maintained within the specified tolerance limits).

6.00.00 MATERIAL PROPERTIES & TESTING

- 6.01.00 Material properties of ceramic fibre blankets shall be as per IS 15402 when testing is carried out as per the methods prescribed in IS 14656 for the following:

1. SHOT CONTENT
2. THERMAL SHRINKAGE
3. TENSILE STRENGTH
4. FIBRE DIAMETER
5. CHLORIDE CONTENT

6.02.00 THERMAL CONDUCTIVITY

The thermal conductivity (K-value) of the Ceramic Fibre blankets shall not exceed the values given in IS: 15402 when determined in accordance with the method prescribed in IS: 3346.

K' Value test (for minimum three mean temperatures i.e. 400°C, 500°C & 550°C) results to be provided to BHEL for acceptance in accordance with conditions given below:-

If 'K' Value test has been conducted against any BHEL order, on sample collected within 12 months prior to the date of present inspection, the related test results may be provided. Otherwise, the test will be carried out on samples identified and sealed by customer / BHEL authorized representative and related test results to be provided. The test will be carried out at govt. approved labs or test houses (like CBRI – Roorkee, IIT – Chennai, PIBCO R & D Centre - N. Delhi) recognized by reputed customers.

6.03.00 COMPRESSIBILITY AND RESILIENCE:

- 6.03.01 The objects of this test are firstly to ensure that the blankets applied at greater than nominal thickness shall be sufficiently compressible to be fitted as its nominal thickness and secondly that the Ceramic Fibre blankets shall be sufficiently resilient to recover its nominal thickness after being subjected to compression.

- 6.03.02 The material shall be tested as per the method prescribed in IS: 14656

When tested in accordance with the method, the recovery, after compression of $50 \pm 2\%$ of the original thickness, shall not be less than 90% of the original thickness.

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7.00.00 PACKING AND MARKING

7.01.00 Stack of Ceramic Fibre blankets shall be packed in Polythene lined HDPE bags and sealed / properly stitched to prevent moisture absorption during transit and storage.

In case of export orders stack of Ceramic Fibre blankets shall be packed in 0.2 mm thick Polythene all around and further shall be packed in HDPE Bags and sealed / properly stitched to prevent moisture absorption during transit and storage. For moisture absorption minimum four (4) packets of silica gel (25 grams each) shall be placed inside Polythene at different positions in each package. Silica gel shall be of indicating type conforming to IS: 3401-1992 packed in cotton bags and shall not come into direct contact with the material inside the package.

7.02.00 Each bag of Ceramic Fibre blankets shall be serial numbered.

7.03.00 Following details shall be legibly and indelibly marked on the packages:

- a) Project Name
- b) Purchase Order No.
- c) Sl. No. of package
- d) Size of Ceramic Fibre blankets (Thickness x Length x Width)
- e) Density of Ceramic Fibre blankets
- f) Weight of the package
- h) No. of Ceramic Fibre blankets in the package
- i) A caution note "Always store under covered shed and on raised platforms"

8.00.00 INSPECTION AND TESTING

8.01.00 Ceramic Fibre blankets to be supplied under this specification shall be of tested quality and workmanship. Inspection and testing of thermal insulation materials shall be as per this specification / quality plan enclosed. Manufacturer shall conduct all tests and stage inspections as per the approved quality plan to ensure that the material conforms to the requirements of this specification and of applicable standards. All shop tests shall be conducted in the presence of BHEL's / BHEL's customer's representative, on the samples identified by him / them.

8.02.00 The Quality Plan enclosed with this specification specifies minimum quality control requirement. During contract stage vendor shall furnish this Quality Plan duly signed & stamped for BHEL approval. Quality plan shall be approved by BHEL and customer. Inspection and testing shall be carried out as per Quality Plan by BHEL/ BHEL representative and customer (as applicable). In case inspection is by both BHEL and their customer, then the inspection can be carried out jointly or separately, which will be informed later. In case of the foreign bidder, inspection shall be carried out by reputed third party.

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8.03.00 The charges for third party inspection (Lloyds, TUV or equivalent) for foreign bidders shall be included in the base price of the item by the bidder. This third party agency shall be approved by BHEL. Bidder to inform the same in the offer and mention the same in Quality Plan.

Note: There may be minor changes in quality plan depending on customer/consultant comments which will **HAVE TO BE ACCOMMODATED BY VENDOR AT NO EXTRA COST.**

9.00.00 DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT:


1. Quality plan duly signed and stamped.

Approval of Quality plan shall be required for manufacturing clearance and the same shall be considered for delay analysis by BHEL.

	TITLE: THERMAL INSULATION: CERAMIC FIBER BLANKETS 3X660MW NORTH KARANPURA STPP	SPECIFICATION NO. PE-TS-405-169-M039	
		VOLUME : II B	
		SECTION: D	
		REV. NO.: 00	DATE: 28.11.2022
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The quantities of **Thermal Insulation- Ceramic Fiber Blankets** to be ordered are as given below:

S. No.	Description	Quantity (Sq. M.)
1.	CERAMIC FIBER BLANKETS-128 Kg/m ³ DENSITY- 25 MM THICKNESS	7700
2.	CERAMIC FIBER BLANKETS-128 Kg/m ³ DENSITY- 50 MM THICKNES	7200

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS BHEL/Customer Approved Suppliers		QUALITY PLAN					SPEC. NO : PE-TS-405-169-M039		DATE: 25.11.2022			
			CUSTOMER : M/s NTPC					QP NO.: PE-QP-405-169-M039		DATE: 25.11.2022			
			PROJECT: 3X660MW NORTH KARANPURA STPP					PO NO.:		DATE:			
			ITEM: THERMAL INSULATION – CERAMIC FIBER BLANKET					SECTION:		SHEET 1 OF 2			
SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY		REMARKS
1	2	3	4	5	6		7	8	9	*	**		10
					M	C/N				D	M	C	N


1.0 MATERIAL														
1.1	CHEMICAL COMPOSITION (RAW MATERIAL)	CHEMICAL PROPERTIES	MA	CHEMICAL	ONE SAMPLE PER LOT	ONE SAMPLE PER LOT	MANUFACTURER STANDARD	MANUFACTURER STANDARD	TC	√	P	V	V	
2.0 IN-PROCESS INSPECTION														
2.1	FINISHED MATTRESS	DIMENSION & TOLERANCE	MA	MEASUREMENT	IS 15402	IS 15402	IS 14656	IS 15402/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	V	V	
3.0 FINAL INSPECTION														
3.1	CERAMIC FIBER BLANKETS (FINISHED PRODUCT)#	1. DIMENSIONS	MA	MEASUREMENT	IS 15402	IS 15402	IS 14656	IS 15402/ BHEL/CUSTOMER APPROVED DATA SHEET	IR	√	P	W	V	
		2. APPEARANCE	MA	VISUAL	IS 15402	IS 15402	IS 14656	SHALL BE FREE FROM VOIDS, CRACKS	IR					
		3. BULK DENSITY	MA	LAB. TEST	IS 15402	IS 15402	IS 14656	IS 15402/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	W	V	Routine tests
		4. SHOT CONTENT	MA	LAB. TEST	IS 15402	IS 15402	IS 14656		TC	√	P	W	V	
		5. LEACHABLE CHLORIDE CONTENT	MA	LAB. TEST	IS 15402	IS 15402	IS 14656		TC	√	P	W	V	
		6. THERMAL CONDUCTIVITY (K VALUE)	CR	LAB. TEST	IS 15402	IS 15402	IS 3346		IS 15402/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	W	
		7. TENSILE STRENGTH	MA	LAB. TEST	IS 15402	IS 15402	IS 14656	IS 15402/ BHEL/CUSTOMER APPROVED DATA SHEET	TC	√	P	W	V	Type tests REFER NOTE 6
		8. FIBRE DIAMETER	MA	LAB. TEST	IS 15402	IS 15402	IS 14656		TC	√	P	W	V	
		9. COMPRESSIBILITY & RESILIENCY	MA	LAB. TEST	IS 15402	IS 15402	IS 14656		TC	√	P	W	V	
		10. LINEAR SHRINKAGE	MA	LAB. TEST	IS 15402	IS 15402	IS 14656		TC	√	P	W	V	
3.2	PACKING & MARKING	PACKING TYPE AND IDENTIFICATION MARKING	MA	VISUAL	RANDOM	RANDOM	BHEL/CUSTOMER APPROVED DATA SHEET/PACKING PROCEDURE	BHEL/CUSTOMER APPROVED DATA SHEET/ PACKING PROCEDURE	SOFT COPY OF PHOTO GRAPH	√	P	W	-	REFER NOTE 2

NOTES:

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	Lakhan Pal	Lakhan Pal	Checked by:	Ashish Panigrahi	Ashish Panigrahi
Reviewed by:	SANJAY KUMAR	Sanjay Kumar	Reviewed by:	HARISH KUMAR	Harish Kumar

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS BHEL/ Customer Approved Suppliers		QUALITY PLAN					SPEC. NO : PE-TS-405-169-M039		DATE: 25.11.2022	
			CUSTOMER : M/s NTPC					QP NO.: PE-QP-405-169-M039		DATE: 25.11.2022	
			PROJECT: 3X660MW NORTH KARANPURA STPP					PO NO.:		DATE:	
			ITEM: THERMAL INSULATION – CERAMIC FIBER BLANKET					SECTION:		SHEET 2 OF 2	
SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS	
1	2	3	4	5	6		7	8	9	10	
					M	C/N					*

1. In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier's TPI.
2. Following to be noted for packing:
 - a. Material shall be packed suitably in order to avoid damage during transit and also during storage at site in tropical climate conditions for a period of 15-18 months.
 - b. Photographs of the packing (with LR No.) as per approved packing procedure (if applicable) just before dispatch.
3. BHEL reserves the right for conducting repeat test, if required.
4. If 'K' Value test has been conducted against any BHEL order, on samples collected within twelve (12) months prior to the date of present inspection, the related test results may be provided. Otherwise, the tests will be carried out on samples identified and sealed by Customer/BHEL authorized representative and related test results to be provided. The tests will be carried out at govt. approved labs or test houses (at CBRI - Roorkee, IIT - Chennai or PIBCO R & D Centre, N. Delhi, NIRMA University, Ahmedabad) recognized by reputed customers. 'K' Value test will be carried out for at least three mean temperatures i.e. 400 °C, 500 °C & 5500 °C for each density.
5. Thermal conductivity type test reports shall be submitted to BHEL Engineering for review and approval.
6. Type tests (except thermal conductivity) shall be done once in 3 months in the presence of BHEL/BHEL AIA.
7. The latest revisions/year of issue of all the IS indicated in the QP shall be referred.

LEGENDS:

- *D: Records, identified with "Tick"(√) shall be essentially included by supplier in QA Documentation.
- ** M: Supplier/ Manufacturer/ Sub-Supplier
- P: Perform
- MA: Major Characteristic
- IR: Inspection Report
- C: Main Supplier/BHEL/ Third Party Inspection agency
- W: Witness
- MI: Minor Characteristic
- TC: Test Certificate
- N: Customer
- V: Verification
- CR: Critical Characteristic

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	Lakhan Pal	Lakhan Pal	Checked by:	Ashish Panigrahi	Ashish Panigrahi
Reviewed by:	SANJAY KUMAR	Sanjay Kumar	Reviewed by:	HARISH KUMAR	Harish Kumar

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

1247617/2023/PS-PEM-MPL

	COMPLIANCE SHEET CERAMIC FIBER BLANKET 3X660MW NORTH KARANPURA STPP	SPECIFICATION NO. PE-TS-405-169-M039
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I hereby comply/not comply (*) to all the requirements of this technical specification in totality.

* In case the bidder does not comply to the technical specification, the deviations shall be explicitly listed in the technical deviation sheet of GCC. Deviations listed in technical deviation sheet shall only be considered.

Name of Bidder / Authorized Representative :- -----

Designation :- -----

Signature :- -----

Company Seal :- -----

Date :- -----

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	
				COMPANY SEAL



Bharat Heavy Electricals Limited

(A Govt. Of India Undertaking)

PROJECT ENGINEERING MANAGEMENT

THERMAL INSUALTION-CERAMIC FIBER BLANKET for 3X660MW NORTH KARANPURA STPP

Price Variation Clause:

Ex-works prices shall be variable as per PVC formula given below:

$$\text{Current Price} = \text{Order Price} * (0.15 + 0.4 * M1/M0 + 0.15 * F1/F0 + 0.25 * L1/L0)$$

Where

M0 = INDICES AS PER RBI BULLETIN TABLE 21 SL NO.: 1.3.13.2 (REFRACTORY PRODUCTS) FOR MONTH OF ORDERING.

M1 = INDICES AS PER RBI BULLETIN TABLE 21 SL NO.: 1.3.13.2 (REFRACTORY PRODUCTS) FOR 1 MONTH PRIOR TO DESPATCH.

F0 = INDICES AS PER RBI BULLETIN TABLE 21 SL NO.: 1.2 (FUEL & POWER) FOR MONTH OF ORDERING.

F1 = INDICES AS PER RBI BULLETIN TABLE 21 SL NO.: 1.2 (FUEL & POWER) FOR 1 MONTH PRIOR TO DESPATCH

L0 = INDICES AS PER RBI BULLETIN TABLE 19 (CONSUMER PRICE INDEX FOR INDUSTRIAL WORKERS) FOR MONTH OF ORDERING.

L1 = INDICES AS PER RBI BULLETIN TABLE 19 (CONSUMER PRICE INDEX FOR INDUSTRIAL WORKERS) FOR 1 MONTH PRIOR TO DESPATCH

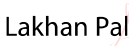
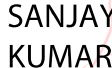
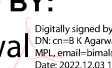
Total PVC shall be limited to \pm 10% of Ex-Works Value.

Note: RBI Indices considered for refractory, Fuel & Power, Mild steel are as per base year 2011-12 and for Industrial worker as per base year 2016 of RBI Bulletin. The above PV Clause is subject to change based on latest RBI Bulletin.

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		REVISION NO: 00, DATE: 02.12.2022
		SHEET: 1 of 3

Standard document No.: PE-TS-999-000-M053

Enquiry No. (To be filled by PG):
Project: 3X660 MW NORTH KARANPURA STPP
Package: Thermal Insulation – Ceramic Fiber Blankets
CRITERIA FOR EVALUATION (TECHNICAL / FINANCIAL):
<p>1. Technical Pre-Qualifying Requirements:</p> <p>1.1 The bidder (including cases as defined in clause no. 2.1 below) should have designed, in-house manufactured, tested, inspected and supplied thermal insulation - Ceramic Fiber Blankets for use in a power plant or for similar application.</p> <p>Supply of material through requisite tie-up with specified manufacturing unit(s) shall also be acceptable. In such cases, tied up manufacturing unit(s) shall be binding for the contract and bidder shall meet PQR pertaining to all manufacturing units individually. Manufacturing units quoting through such tie-up shall not be eligible to quote separately or through any other tie-up.</p> <p>Bidder to provide authorization letter from manufacturing units along with scope matrix in support of such Tie-up.</p> <p>Manufacturing units, which have tie-up with parties quoting to BHEL, shall not be qualified for separately quoting to BHEL.</p> <p>1.2 The item(s) mentioned in point 1.1 should have performed successfully in similar installations for atleast one year. To establish meeting this requirement, the bidder shall conform to any one of the following clauses:</p> <p>(i) Execution of two purchase orders for different End-users with the item(s) performing successfully for one (1) year from date of commissioning to the date of bid submission as defined by BHEL-PEM in NIT. Different projects of a customer shall be considered as different End-users.</p> <p>(ii) Minimum one (1) repeat contract from two (2) different Purchasers (i.e. 2 Nos of Purchase orders from each purchaser). A contract shall be considered as repeat, when the second contract is given by the same purchaser after lapse of minimum one (1) year from supply completion of first contract.</p> <p>(iii) Execution of one (1) purchase order as per sl. no. (i) above from one End-user and one (1) repeat contract from another Purchaser as per sl. No. (ii) above.</p> <p>(iv) Three (3) contracts from one (1) Purchaser. Second and third contract shall be after lapse of minimum one (1) & two (2) years respectively from supply completion of first contract.</p>

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	PRE - QUALIFYING REQUIREMENTS	DOCUMENT NO: PE-TS-405-000-M053
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1.3 The bidder to furnish the following documents, as applicable, in support of the above:

- a) For point 1.2(i): Performance certificates from End-user (duly signed & dated) specifying that the product is performing successfully for one (1) year from date of commissioning along with correlated purchase order(s).
- b) For point 1.2 (ii) & (iv): Purchase order(s), Material dispatch clearance certificate (MDCC)/ Material receipt certificate (MRC)/Lorry receipt (LR)/ Supply invoice.

1.4 In addition to above, bidder or its tied up manufacturing units should have the following facilities:

- a) In-house capability of manufacturing thermal insulation - Ceramic Fiber Blankets of minimum 20 MT per month.
- b) In-house testing facilities for carrying out tests as per relevant standards & Quality plan. In case, the in-house testing facilities are not available, then bidder shall furnish undertaking that test(s) will be carried out from govt. approved lab or test house recognized by reputed customers.

Bidder to submit supporting documents (Certificate indicating capacity and details/ undertaking of manufacturing & testing facilities) for point (a) & (b) above.

1.5 To establish business continuity, bidder to submit minimum two (2) Purchase order for item(s) as specified in points 1.1 in last 3 (three) years prior to the date of bid submission defined by BHEL-PEM.

2.0 Bidder to also comply with general points mentioned below.

2.1 Offers of the JV companies/ Joint Bidders/ bidders having collaboration/ licensing agreement/ MOU/ Indian subsidiaries shall be evaluated as follows:

- a) If bidder happens to be an Indian subsidiaries of foreign OEM, then the credentials of the foreign OEM can also be considered for meeting PQR.
- b) If bidder happens to be the Joint Venture Company, then the credentials of any of JV partners can be also considered for meeting PQR.
- c) If bidder happens to be the having valid collaboration agreement/ MOU/ licensing agreement with some other company, then the credentials of collaborator/ MOU partner/ licensing company can also be considered for meeting PQR.

Note: If bidder(s) qualifies on the basis of credentials of his principal/ JV partner/ Collaborator/ joint bidder etc., then the principal/ JV partner/ Collaborator/ MOU partner/ joint bidder shall be responsible for overall design vetting and warranty/ guarantee of the package. The scope

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	PRE - QUALIFYING REQUIREMENTS	DOCUMENT NO: PE-TS-405-000-M053
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matrix clearly defining their respective roles including design vetting, manufacturing of critical component, E&C etc. and warranty/ guarantee shall be submitted along with the offer.

2.2 Bidder to note that the arrangement of bidding (joint bid partners/ collaborator/ MOU partner/licensing company etc.) once offered to BHEL as a part of bidding documents cannot be changed till the execution of contract(s).

2.3 Consideration of offer shall be subject to customer's approval of bidders, if applicable.

2.4 Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.

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

2.6 After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

2.7 Bidder to ensure that Third Party/customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document/ certificate issuing authority such as name & designation of issuing authority and its organization contact number and email-id etc. In case the same found not available, purchaser has right to reject such document from evaluation.

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