
	TITLE: TECHNICAL PRE-QUALIFICATION REQUIREMENTS FOR CALCIUM SILICATE PREFORMED INSULATION FOR 1x125 MW SENEGAL TPP		SPECIFICATION NO. PE-TS-999-169-M036
	REV. NO.: 00	DATE: 17.04.2014	
	Sheet 1 of 1		

1. Specific technical prequalification requirement (PQR) for submitting technical offer for supply of Calcium Silicate. The bidder should have designed, manufactured, tested, inspected, and supplied these Calcium Silicate preformed pipe section insulation material meeting the parameters in totality (Refer detailed technical specification).
2. The vendor shall be Original product manufacturer of the product.
3. The vendor shall have well established quality systems in the company and shall be able to demonstrate the implementation of same.
4. Bidder should have in-house facilities for carrying out all tests as per BHEL standard technical specification (PE-SS-999-169-M036-REV04) & QAP (PE-QP-315-169-M033). In case the bidder does not have the above testing facilities, he shall have a permanent tie up for the testing with any Govt. approved lab or test House. In case of foreign bidders, this inspection shall be carried out by third party TUV/Llyod at bidder's cost.
5. The bidders (who are not registered vendors of BHEL-PEM for this package) shall furnish following documents for assessing Bidder's prequalification for Calcium Silicate along with the technical offer:
 - a. Bidder's experience list for this package.
 - b. Satisfactory performance certificate (in English) (along with relevant purchase order copy) from the end-user for at-least two (different customers) successfully executed contracts which are in operation for at-least two years in similar industry/application.

Or

The supplier has been awarded repeat contracts by two different customers for similar industry/application after two years of supply on regular basis. Supplier to submit relevant documents such as MDCC/MRC/LR copy or other supporting documents which confirms the successful execution and delivery of order.

- c. Approved drawings, technical data sheets of which the bidder has furnished (under point no. 5b) the performance feedback/ repeat order for reference purpose.
6. The Material to be supplied shall be of tested quality. Inspection and Testing of Calcium Silicate shall as per BHEL standard technical specification (PE-SS-999-169-M036-REV04) & QAP (PE-QP-315-169-M033). Manufacturer shall furnish test certificate indicating the chemical composition and Mechanical properties. For other details refer standard Technical specification.
7. The bidders who are already registered with BHEL-PEM without any technical limit need not submit documents listed in point no. 5.


	QUALITY PLAN		CUSTOMER: COMPAGNIE D'ELECTRICITE DU SENEGAL			PROJECT: 1X125MW SENEGAL TPP			SPEC NO : PE-SS-999-169-M036 Rev.3			
			BIDDER / VENDOR: As per approved Vendor list			QP NO: PE-QP-315-169-M033 REV. 00 DT : 20.11.2013			SPEC. TITLE: THERMAL INSULATION			
	SHEET 1 OF 1		SYSTEM			ITEM: CALCIUM SILICATE PREFORMED PIPE INSULATION			CONTRACTOR : BHEL, PEM, NOIDA			
S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	P	AGENCY W	V	REMARKS

1.	CALCIUM SILICATE PREFORMED INSULATION	Bulk Density	MA	Lab. Test	Sampling as per IS:8154	IS:5688 and Tech. Spec.	Tech. Spec.	Test certificate	3	2	1	*Please refer note below.
		Dimensions	MA	-do-	-do-	IS:8154 and Tech. Spec.	-do-	-do-	3	2	1	
		Compressive Strength	MA	-do-	-do-	IS:5688 and Tech. Spec.	-do-	-do-	3	2	1	
		Thermal Conductivity	MA	-do-	-do-	IS:3346 OR IS:9490 and Tech. Spec.	-do-	-do-	3	2	1	
		Heat Resistance	MA	-do-	-do-	IS:5724 and Tech. Spec.	-do-	-do-	3	2	1	
		Flexural Strength	MA	-do-	-do-	IS: 5688 and Tech.Spec.	-do-	-do-	3	2	1	
		Moisture Content	MA	-do-	-do-	IS:8154 and Tech. Spec.	-do-	-do-	3	2	1	
		Alkalinity	MA	-do-	-do-	-do-	-do-	-do-	3	2	1	
		Chloride Content	MA	-do-	-do-	IS:3144 and Tech. Spec.	-do-	-do-	3	2	1	
		Appearance	MA	Visual	Random	---	Shall be free from cracks	Inspection Report	3	2	1	
2.0	PACKING AND MARKING	Packing type and identification marking	MA	-do-	-do-	Tech. Spec.	Tech. Spec.	-do-	3	2	1	

LEGEND

* Note: The test of compressive strength is to be conducted on blocks only.

MA	MAJOR CHARACTERISTIC	1	CUSTOMER
P	PERFORM	2	BHEL
W	WITNESS	3	VENDOR OR SUBVENDOR
V	VERIFICATION		

BHEL		PARTICULARS	BIDDER/VENDOR
SHIV BAHADUR VERMA		NAME	
		SIGNATURE	
15.02.2014		DATE	BIDDER'S / VENDOR'S COMPANY SEAL

PEM-6666-0 	TITLE: STANDARD TECHNICAL SPECIFICATION FOR CALCIUM SILICATE PREFORMED INSULATION	Form No.	
		STD SPECIFICATION No: PE-SS-999-169-M036	
		VOLUME: II-B	
		SECTION "D"	
		REV. NO. 04	DATE: 23.07.2012
SHEET 1 OF 4			

1.00.0 GENERAL

This specification covers the design, materials, manufacture and testing of Calcium silicate preformed insulation (suitable for service temperature upto 650 °C.) at Vendor's or/ and sub-Vendor's works inclusive of packing requirements.

2.00.00 CODES & STANDARDS

- 2.01.01 The manufacture, physical & chemical properties, inspection and testing of Calcium silicate preformed insulation shall conform to the latest edition of the following standards.
- 2.01.02 IS:8154 Specification for preformed Calcium silicate insulation (for temperature upto 650°C).
- 2.01.03 IS:3346 Methods for determination of thermal conductivity of thermal insulation materials (two slab, guarded hot-plate method).
- 2.01.04 IS:9490 Method for determination of thermal conductivity of thermal insulation materials (water calorimeter method).
- 2.01.05 IS:5688 Methods of test for preformed block type and pipe-covering type thermal insulation.
- 2.01.06 IS:5724 Methods of test for thermal insulation cement.
- 2.01.07 IS:3144 Methods of test for mineral wool thermal insulation materials (for test for Chloride Content).
- 2.01.08 IS:7509 Thermal Insulating Cements-Specification.
- 2.01.09 In case of any conflict between the above standards and this specification, the latter shall prevail and in case of any further conflict in the matter, the interpretation of the specification by the BHEL Engineer shall be final and binding.

3.00.00 MANUFACTURE

Preformed Calcium silicate insulation shall be made from reacted hydrous Calcium silicate reinforced with suitable inorganic fibres, and shall be formed into Pipe sections (two semi-cylinders), Curved segments (radiused & bevelled lags), Bevelled Lags and Flat blocks.

4.00.00 DIMENSIONS AND DIMENSIONAL TOLERANCES

- 4.01.00 The dimensions of the various forms of Calcium silicate insulation shall be as follows

4.01.01 PIPE SECTIONS

- Length : 450, 500, 600 or 900 mm
- Diameter (internal) : To fit standard pipes of external dia upto 219.1 mm
- Thickness : 25, 40, 50, 60 or 75 mm

4.01.02 CURVED SEGMENTS (RADIUSSED & BEVELLED LAGS)

- Length : 450, 500, 600 or 900 MM
- Diameter (internal) : To fit standard pipes of external dia above 219.1 mm and upto 610 mm.
- Thickness : 25, 40, 50, 60 or 75 mm

PEM-6666-0 	TITLE: STANDARD TECHNICAL SPECIFICATION FOR CALCIUM SILICATE PREFORMED INSULATION	<div>Form No.</div> STD SPECIFICATION No: PE-SS-999-169-M036 VOLUME: II-B SECTION "D" REV. NO. 04 DATE: 23.07.2012 SHEET 2 OF 4
---	---	---

4.01.03 BEVELLED LAGS

Length : 450, 500, 600 or 900 mm
 Width : 75 or 150 mm to fit standard pipes of external diameter above 610 mm.
 Thickness : 25, 40, 50, 60 or 75 mm.

4.01.04 FLAT BLOCKS

Length : 450, 500, 600 or 900 mm
 Width : 150, 300 or 600 mm
 Thickness : 25, 40, 50, 60 or 75 mm

4.02.00 Flat blocks shall be free from warp. Mating faces shall be plane and edges shall be square to the surfaces and to one another.

4.03.00 Pipe sections and bevelled lags shall be concentric and free from warp. Mating faces shall be plane and ends shall correspond with a plane at right angles to the long axis.

4.04.00 Bevelled edges of curved segments (radiused & bevelled lags) shall correspond with the radii of the curved surface to be insulated.

4.05.00 The dimensional tolerance of preformed calcium silicate insulation shall be as follows. The method of measuring dimensions shall be as per IS:5688.

4.05.01 FLAT BLOCKS AND BEVELLED LAGS

Length : + 3 mm
 Width : ± 3 mm
 Thickness : +3 mm and -1.5 mm

4.05.02 PIPE SECTIONS AND CURVED SEGMENTS (RADIUSED & BEVELLED LAGS)

Length : +3 mm
 Diameter (inside) : + 5 mm and -0 mm
 Thickness : +3 mm and -1.5 mm

5.00.00 BULK DENSITY AND TOLERANCES ON DENSITY

5.01.00 The bulk density of the preformed calcium silicate insulation shall be in the range of 200 to 280 kg/m³. The tolerance on manufacturer's declared nominal / specified density shall be +10% and -5%. The method of determining the bulk density shall be as prescribed in IS:5688.

6.00.00 MATERIAL PROPERTIES

6.01.00 COMPRESSIVE STRENGTH

The reduction in thickness under the following conditions shall not exceed 5% when tested as per the method given in IS:5688

- Dry condition under a load of 415 kN/m²
- Wet condition (after 18 hours immersion in water) under a load of 170 kN/m²

PEM-6666-0 	TITLE: STANDARD TECHNICAL SPECIFICATION FOR CALCIUM SILICATE PREFORMED INSULATION	Form No.	
		STD SPECIFICATION No: PE-SS-999-169-M036	
		VOLUME: II-B	
		SECTION "D"	
		REV. NO. 04	DATE: 23.07.2012
SHEET 3 OF 4			

6.02.00 THERMAL CONDUCTIVITY

The thermal conductivity (k-value) of the calcium silicate insulation shall not-exceed the values given below when determined in accordance with the method prescribed in IS:3346 or IS:9490, at a cold face temperature of not more than 80 °C (during testing)

Mean Temp (°C)	Thermal conductivity (mW/cm°C)
100	0.61
150	0.67
200	0.74
250	0.80
300	0.87

6.03.00 HEAT RESISTANCE

When tested in accordance with IS:5724 under conditions of soaking heat for 24 hrs at the temperature of use i.e. 650 °C, the material shall be deemed suitable when the following requirements are met

- a) Linear shrinkage : 2% Max.
- b) Compressive Strength : Max 5% reduction in thickness under a load of 345 KN/m²
- c) Loss in weight : 12 % Max.

6.04.00 FLEXURAL STRENGTH

The flexural strength of the material shall not be less than 250 kN/m² when tested as per the method given in IS:5688.

6.05.00 MOISTURE CONTENT

The moisture content of the material shall not exceed 6.0% by weight when tested in accordance with the method prescribed in Annex - A of IS:8154.

6.06.00 ALKALINITY

When tested in accordance with the method prescribed in Annex - B of IS:8154, the pH value recorded shall be between 7.0 and 10.0

6.07.00 CHLORIDE CONTENT

The material shall not contain leachable chloride in excess of 0.02% when tested as per IS:3144.

7.00.00 INSPECTION AND TESTING

- 7.00.01 Bonded mineral wool pipe sections 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 materials conform to the requirements of this specification and of applicable standards. All shop tests shall be conducted in the presence of BHEL's / BHEL's Customers representative, on the samples identified by him / them.
- 7.02.00 Sampling of calcium silicate testing shall be as per Appendix-C of IS:8154,

PEM-6666-0	TITLE: STANDARD TECHNICAL SPECIFICATION FOR CALCIUM SILICATE PREFORMED INSULATION	Form No.	
		STD SPECIFICATION No: PE-SS-999-169-M036	
		VOLUME: II-B	
		SECTION "D"	
		REV. NO. 04	DATE: 23.07.2012
		SHEET 4 OF 4	

8.00.00 PACKING AND MARKING

- 8.01.00 Calcium silicate insulation shall be packed in Polythene all around and sealed to prevent moisture absorption during transit and storage, and further shall be packed in cardboard boxes & sealed and then stretch wrapped.
- 8.02.00 Insulation as well as the packages shall be serial numbered. Also, printed sheets indicating the nominal thickness, density and BHEL's serial no. (given in bill of materials / insulation schedule) shall be placed inside the Polythene cover for proper identification.
- 8.03.00 Following details shall be legibly written on the packages with the help of stencils. Also, these details shall be typed on a sheet of paper and kept in a sealed polythene cover, inside the package.
- Project Name
 - Purchase Order No.
 - Sl. No. of package
 - BHEL's Sl. no.
 - Nominal thickness
 - Pipe size for which it is suitable and Length
 - Density
 - Weight of the package.