

1x525MW MEIL TUTICORIN BTG

TECHNICAL SPECIFICATION FOR BONDED MINERAL (ROCK) WOOL MATTRESSES

SPECIFICATION NO. PE-TS-422-169-M032



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

	TITLE: TECHNICAL SPECIFICATION BONDED MINERAL (ROCK) WOOL MATTRESSES 1x525MW MEIL TUTICORIN BTG	SPECIFICATION NO. PE-TS-422-169-M032
		REV. NO.: 0
		DATE: 24.11.2017
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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 bonded mineral (rock) wool mattresses having metallic hexagonal wire netting as facing on one side, suitable for service temperatures upto 750 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 bonded mineral wool mattresses shall conform to the latest editions of the following appropriate standards.
- 2.01.02 IS:8183 Specification for bonded mineral wool.
- 2.01.03 IS:3144 Methods of test for mineral wool thermal insulation materials.
- 2.01.04 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 592-13 (Standard specification for Mineral fiber blanket insulation and blanket type pipe insulation, metal mesh covered-industrial type), 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 this specification, the latter shall prevail and in case of any further conflict in the matter, the interpretation of the specification by the Purchaser's Engineer shall be final and binding.

3.00.00 MANUFACTURE

- 3.00.01 The mattresses shall be made from rock processed from a molten state into fibrous form with minimum organic thermosetting binder, and shall be machine felted, baked and metallic stitched / faced with metallic hexagonal wire netting on one or both sides (as specified in the BOM).
- 3.02.00 The metallic hexagonal wire netting shall be of Galvanized steel (made from wire conforming to IS: 280 medium coated to IS: 4826) / Stainless steel (made from wire to IS: 6528) having wire size and aperture conforming to IS: 3150, as specified in the BOM.
- 3.03.00 The mattress shall be continuously stitched / tied on to the wire netting with minimum 0.4 mm dia galvanized steel / stainless steel wire, as specified in the BOM. The spacing between the stitching / ties shall not be more than 250 mm along the width and 150 mm along the length.

4.00.00 DIMENSIONS AND DIMENSIONAL TOLERANCES

- 4.01.00 The length and width of the mattresses shall be 1520 mm x 1220 mm or 1640 mm x 1220 mm except for export orders where the length and width of the mattresses shall be 1520 mm x 1150 mm in order to make optimum use of the container. Nominal thickness shall be 25, 40, 50, 60 or 75 mm.

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- 4.02.00 The method of measuring the dimensions i.e. length, width and thickness shall be as prescribed in IS:3144. The following dimensional tolerances are applicable for the bonded mineral wool mattresses:

Length	+ 3% and - 2% of nominal length
Width	+ 3% and - 2% of nominal width
Thickness	+ 6 mm and - 2 mm for thickness not exceeding 40 mm
Thickness	+ 10 mm and - 2 mm for thickness over 40 mm

5.00.00 BULK DENSITY AND TOLERANCES ON DENSITY

- 5.01.00 The bulk density of the bonded mineral (rock) wool mattresses without the facings, shall be 150 / 100 kg/m³ unless otherwise specified. Tolerances on bulk density shall be +15 % and - 5% when tested as per method prescribed in IS: 3144.
- 5.02.00 The bulk density shall be calculated by dividing the actual weight of the mattress 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

6.01.00 SHOT CONTENT:

The shot content, when sieved through the 500 and 250 micron IS Sieves (Refer IS:460 for IS Sieve) shall not be more than 5% and 15% (by weight) respectively.

The method for determination of shot content shall be as prescribed in IS:3144. Any shot present in the materials shall not be greater than 5 mm in any dimension.

6.02.00 THERMAL CONDUCTIVITY

The thermal conductivity (k-value) of the bonded mineral wool mattresses shall not exceed the values given in IS:8183 when determined in accordance with the method prescribed in IS:3346.

The thermal conductivity (k-value) test will be carried out for minimum three mean temperatures i.e. 100 °C, 200 °C & 300 °C on samples identified and sealed by customer / BHEL Inspector once in twelve (12) months. The tests will be carried out at govt. approved labs (at CBRI-Roorkee, IIT-Chennai or PIBCO R & D Centre, N. Delhi).

6.03.00 HEAT RESISTANCE

When a sample of mattress is heated to the maximum recommended temperature of use (550 °C for 100 kg/m³ density and 750 °C for 150 kg/m³ density) as per method prescribed in IS:3144 (test for maximum recommended temp), the material shall not suffer any fusion of fibers and visible deterioration of the fibrous structure. Any color change shall not be considered as deterioration of fibrous structure.

6.04.00 MOISTURE CONTENT

The bonded mineral (rock) wool mattress shall not contain more than 2% moisture when determined by the method prescribed in IS:3144.

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6.05.00 MOISTURE ABSORPTION

The mattress shall not gain in weight by more than 2% when tested by the method prescribed in IS:3144.

6.06.00 INCOMBUSTIBILITY

The material shall be rated as incombustible when tested by the method as prescribed in IS:3144. The loss in total weight when determined by this test shall not exceed 5%.

6.07.00 SULPHUR CONTENT

The material, after removal of the facing (wire netting), shall not contain more than 0.6% of Sulphur when determined by the method as prescribed in IS:3144.

6.08.00 COMPRESSIBILITY AND RESILIENCE:

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

6.08.02 The material shall be tested as stated in Annex A of IS:8183

When tested in accordance with the method, the recovery, after compression of 75% of the original thickness, shall not be less than 90% of the original thickness.

6.09.00 ALKALINITY

When tested as described in Annex B of IS:8183, the pH value of the solution of the material shall be between 7.0 and 10.0.

6.10.00 CHLORIDE CONTENT

The material shall not contain leachable chloride in excess of 0.01% when determined by the method prescribed in IS:3144.

6.11.00 FIBRE DIAMETER

The average fibre diameter of mineral (rock) wool shall not be more than 7 microns when determined by the method prescribed in IS:3144.

6.12.00 RESISTANCE TO VIBRATION

The mattress shall show not more than 1% height of settlement when tested by the method prescribed in IS 3144.

6.13.00 RESISTANCE TO JOLTING

The mattress shall show not more than 3% height of settlement when tested by the method prescribed in IS:3144.

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7.00.00 PACKING AND MARKING

7.01.00 Stack of mattresses 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 mattresses 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 mattresses shall be serial numbered. Also, printed sheets indicating the nominal thickness, density and wire netting details (i.e. material and size) shall be placed below the wire netting.

7.03.00 For easy identification of mattresses as per density & wire netting material, following color codes for the HDPE bags is to be followed:

- Yellow bags with marking as shown in Fig 1 (Page 6 of 6) for 150 kg/m³ with Galvanized steel wire netting (Single side/Double side)
- White bags with marking as shown in Fig 1 (Page 6 of 6) for 100 kg/m³ with Galvanized steel wire netting (Single side/Double side)
- Yellow bags with marking as shown in Fig 1 (Page 6 of 6) for 150 kg/m³ with SS wire netting (Single side/Double side)

7.04.00 Following details shall be legibly and indelibly marked on the packages.

- Project Name
- Purchase Order No.
- Sl. No. of package
- Size of mattresses (Thickness x Length x Width)
- Density of mattresses
- Wire netting material and size
- Weight of the package
- No. of mattresses in the package
- A caution note "Always store under covered shed and on raised platforms"

7.05.00 Vendor to provide soft copy of photos/snaps of duly packed insulation material. The soft copies to be provided by vendor after final inspection of Insulation material. Clearance for dispatch of insulation material will be given only after satisfactory packing conditions from vendors work.

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8.00.00 INSPECTION AND TESTING

- 8.01.00 Bonded mineral wool mattresses 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 customer's representative, on the samples identified by him / them.
- 8.02.00 All reports, test certificates etc. to be submitted during contract shall be subject to BHEL / Customer review / approval.



**SPECIFIC TECHNICAL REQUIREMENT
FOR BONDED MINERAL (ROCK)
WOOL MATTRESSES
1x525MW MEIL TUTICORIN**

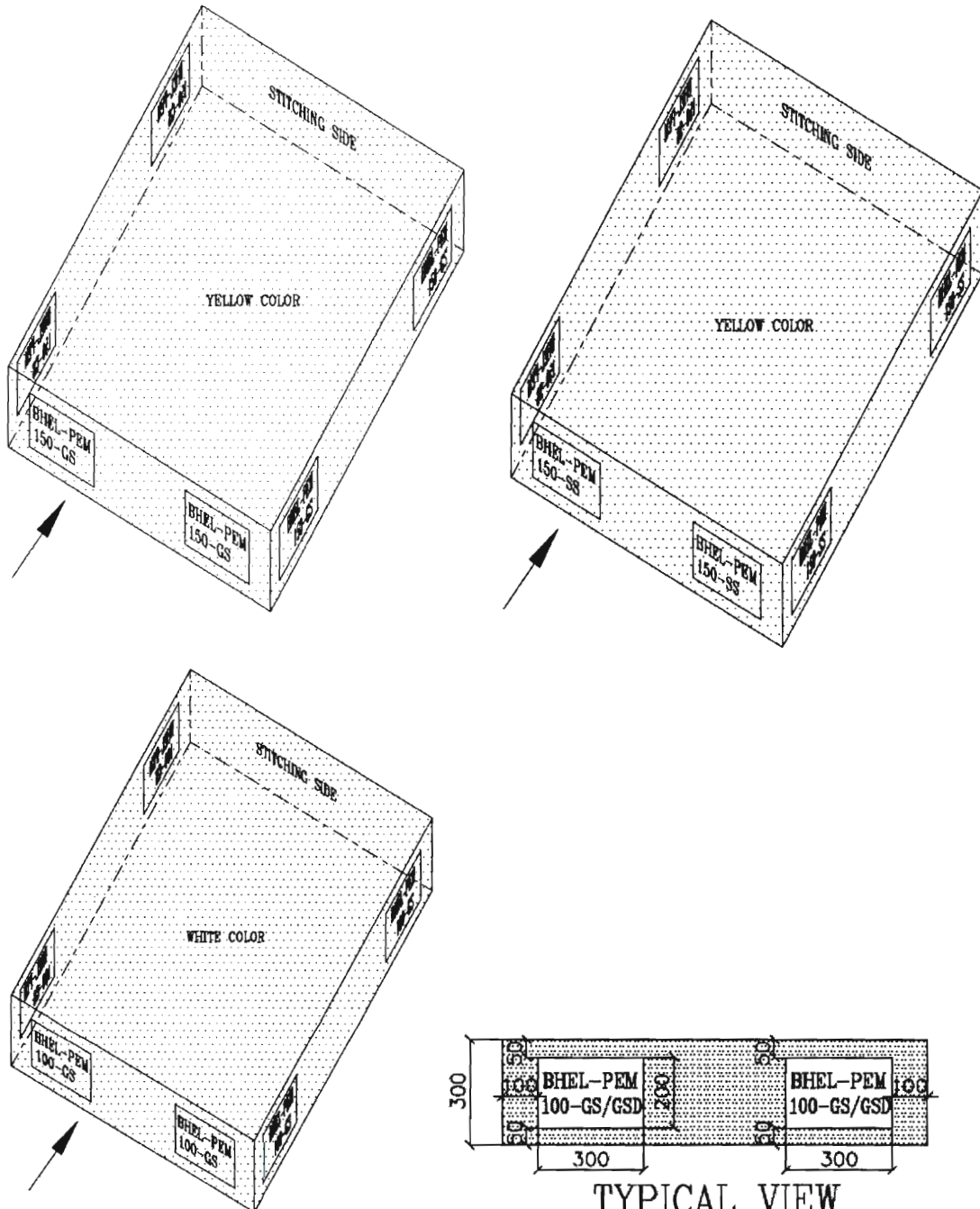
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Note:

- Yellow bags with marking for 150 kg/m³ with GS wire netting (GS-Single side/GSD-Double side)
- White bags with marking for 100 kg/m³ with GS wire netting (GS-Single side/GSD-Double side)
- Yellow bags with marking for 150 kg/m³ with SS wire netting (SS-Single side/SSD-Double side)

	TITLE: BONDED MINERAL (ROCK) WOOL MATTRESS 1x525MW MEIL TUTICORIN BTG DATA SHEET- A	SPECIFICATION NO. PE-TS-422-169-M032	
		VOLUME : II B	
		SECTION: D	
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S. No	MATERIAL	SPECIFICATION	DENSITY/SI ZE/ THICK	UNIT	QUANTITY FOR ONE UNIT
1	Bonded mineral (Rock) wool mattresses with one side GS wire netting of 13 mm x0.71 mm size stitched with 0.4 mm GS wire.	PE-TS-422-169-M032	150 Kg/cub.m	Sq.M.	25mm- 1100 40mm – 2700 50 mm – 2650 60 mm – 1850 75 mm - 8550
2	Bonded mineral (Rock) wool mattresses with one side GS wire netting of 13 mm x0.71 mm size stitched with 0.4 mm GS wire.	PE-TS-422-169-M032	100 Kg/cub.m	Sq.M	25mm - 1800 40 mm - 3300 50 mm - 3300 60 mm - 2950 75 mm - 3400

Handwritten signature and date:
24.11.17

		QUALITY PLAN		CUSTOMER: MEIL		PROJECT: 525MW MEIL TUTICORIN BTG				SPEC. NO : PE-TS-422-169-M032			
				VENDOR : ---		Q.P. NO. PE-QP-422-169-M032		REV. 00		DT: 24.11.17		SPEC. TITLE : THERMAL INSULATION	
SHEET 1 OF 2		SYSTEM		EXTENT OF CHECK		REFERENCE DOCUMENT		ACCEPTANCE NORMS		FORMAT OF RECORD		CONTRACTOR : BHEL, PEM, NODA	
S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE GORY	TYPE OF CHECK	EXTENT OF CHECK	Vendor std.	Vendor std.	Test Certificate	AGENCY W	P	REMARKS		

1.	Bonded Mineral (Rock) wool mattresses	Chemical composition	MA	Chemical	1 / Lot	Vendor std.	Vendor std.	Test Certificate	-	-	
	Bulk density		MA	Lab. Test	Sampling as per IS: 8183	IS: 3144 & spec	IS: 8183 & spec	-do-	2	3	
	Dimensions		MA	Physical	-do-	-do-	-do-	-do-	2	3	
	Shot content		MA	Lab. Test	-do-	-do-	-do-	-do-	2	3	
	Chloride content		MA	Chemical	-do-	-do-	-do-	-do-	2	3	
	Thermal Conductivity		MA	Lab. Test	-do-	IS: 3346 & spec	-do-	-do-	2	3	Ref. Note "A"
	Heat Resistance		MA	Physical	-do-	IS: 3144 & spec	-do-	-do-	2	3	
	Moisture Content		MA	-do-	-do-	-do-	-do-	-do-	2	3	
	Moisture Absorption		MA	-do-	-do-	-do-	-do-	-do-	2	3	
	Recovery after compression		MA	-do-	-do-	IS: 8183 & spec	-do-	-do-	2	3	
	Resistance to vibration		MA	-do-	-do-	IS: 3144 & spec	-do-	-do-	2	3	
	Resistance to jolting		MA	-do-	-do-	-do-	-do-	-do-	2	3	
	Fibre diameter		MA	-do-	Sampling as per IS: 3144	-do-	Tech. spec	-do-	2	3	
	Incombustibility		MA	-do-	Sampling as per IS: 8183	-do-	IS: 8183 & Tech. spec	-do-	2	3	
	Sulphur Content		MA	Chemical	-do-	-do-	-do-	-do-	2	3	
	Alkalinity		MA	Chemical	-do-	IS: 8183 & spec	-do-	-do-	2	3	
	Appearance		MA	Visual	-do-	-----	To be free from Voids, Cracks	Inspection Report	2	3	

BHEL		PARTICULARS		BIDDER/VENDOR	
AJAY KUMAR SHARMA		NAME			
		SIGNATURE			
24.11.17		DATE		BIDDERS/VENDORS COMPANY SEAL	

		QUALITY PLAN		CUSTOMER: MEIL		PROJECT: 525MW MEIL TUTICORIN BTG		SPEC. NO : PE-TS-422-169-M032				
				VENDOR : ---		Q.P. NO. PE-QP-422-169-M032 REV. 00 DT: 24.11.17		SPEC. TITLE : THERMAL INSULATION				
SHEET 2 OF 2		SYSTEM		ITEM: THERMAL INSULATION - RESIN BONDED MINERAL (ROCK) WOOL MATTRESSES		CONTRACTOR : BHEL, PEM, NOIDA						
S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	P	AGENCY W	V	REMARKS

2.	Hexagonal wire netting & stitching wire											
i)	GS Wire	Dimension, Gauge dia, Coating test, Tensile test, Wrapping test, Bend test	MA	Physical	1 sample per lot	IS:4826, IS:3150, IS:280 & Tech. spec.	IS:4826, IS:3150, IS:280 & Tech. spec.	Test report	3	-	2	Ref. note "B"
		Appearance, Dimension, Gauge dia.	MA	Visual	Random	Tech. Spec.	Shall be bright & free from defects	Inspection Report	3	2	-	
ii)	SS Wire	Dimension, Gauge dia, Chemical analysis, Tensile test, Wrapping test, Reverse Bend test	MA	Physical	1 sample per lot	IS:6528 & Tech. spec.	IS:6528 & Tech. spec.	Test report	3	-	2	
		Appearance Dimension, Gauge dia.	MA	Visual	Random	Tech. Spec.	Shall be bright & free from defects	Inspection Report	3	2	-	Ref. note "B"
3.	Packing and marking	Packing type and identification marking	MA	Visual	Random	Tech. Spec.	Tech. Spec.	(Soft copy of photographs)	3	2	-	
												Photographs of packed material to be verified by BHEL before issuing MDCC.

NOTES:

- A) 'K' Value test will be carried out for minimum three mean temperatures i.e. 100°C, 200°C and 300°C on samples identified and sealed by customer / BHEL Inspector once in twelve (12) months. The tests will be carried out at govt. approved labs (at CBRI - Roorkee, IIT - Chennai or PIBCO R & D Centre, N. Delhi).
- B) Manufacturer's / supplier's compliance certificate will be furnished.

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

BHEL		BIDDER/VENDOR	
NAME		SIGNATURE	
DATE		DATE	
AJAY KUMAR SHARMA  24.11.17		BIDDERS/VENDORS COMPANY SEAL	

	COMPLIANCE SHEET BONDED MINERAL (ROCK) WOOL MATTRESSES 1x525MW MEIL TUTICORIN BTG	SPECIFICATION NO: PE-TS-422-100-M032
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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	