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EPOXY GLASS MAT LAMINATED SHEETS & COMPONENTS FIRE RETARDANT		
1. GENERAL : This specification governs the quality of fire retardant epoxy based, press moulded chopped strand Glass Mat Laminated sheets & components. The material has good electrical & fire retardant properties, low water absorption high mechanical strength and the temperature index of at least 155. NOTE :- Sheets & Components of thickness 6 mm & above are covered in this specification. For lower thicknesses material to BP 22493 shall be used. 2. APPLICATION: Used for components of controlgear etc. 3. COMPLIANCE WITH NATIONAL STANDARDS: There is no Indian Standard covering this type of material. 4. DIMENSIONS AND TOLERANCES: 4.1 Thickness x width x length of the sheet shall be as stated on the order. Dimensions of components shall be as per drawing accompanying the order. 4.2 Preferred Thickness 6, 8, 10, 12, 20, 25, 30, 40, 50, 60, 70 mm. NOTE :- For thickness below 6 mm refer "NOTE" in CL1 above.		
Revision : Reviewed & Brought upto date		Issued by : <i>[Signature]</i> STANDARDS AND MATERIALS GROUP TECHNICAL SERVICES DEPARTMENT
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4.3 Tolerance on nominal thickness :

Nominal Thickness (mm)		Tolerance (± mm)
Above	Upto and including	
-	6	0.6
6	10	0.8
10	20	1.0
20	30	1.2
30	40	1.5
40	50	1.8
50	-	2.1

4.4 Tolerance on Width & Length :

Size (mm)	Tolerance (±) mm
Below 1000	35
Above 1000	50

4.5 Flatness (For sheets 6 mm thick and above)

The flatness of sheets shall be such that when a sheet is placed without restraint on a flat surface, concave side, if present, up departure at any point of the surface from a light straight edge laid in any direction upon it shall not exceed the following :

- a) 1 mm under a 300 mm straight edge
- b) 4 mm under a 600 mm straight edge and
- c) 6 mm under a 1000 mm straight edge.

5. TEST METHODS :

Unless otherwise specified, the tests shall be conducted in accordance with the relevant methods of Corporate Standard AA 085 17 01.

6. SAMPLE FOR TEST:**6.1 Type Approval :**

Three moulded sheets of size 300 x 300 x 6mm thick shall be submitted for type approval.

6.2 Acceptance of Consignments :**6.2.1 Sheets :**

Three sheets of ordered thickness & size 300 x 300 mm shall be supplied for testing.



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6.2.2 Components :

Two no components shall be supplied for all possible tests and requirements should be met.

7. COMPOSITION :**7.1 Resin :**

Brominated Epoxy resin, or Epoxy resin with suitable additives having excellent flame retardancy. Resin shall have an epoxy equivalent of 170 to 280.

7.2 Hardener : Any suitable anhydride hardener.**7.3 Diluents And Viscosity Reducers :** Not to be used.**7.4 Glass Mat :**

Silane treated, bonded with epoxy compatible binder of 450 GSM (0.8 mm thick) or 300 GSM (0.5 mm thick). Mats shall be thoroughly dried to remove moisture. This shall be checked by burning the bond at 600 deg.C for sufficient time Depending on thickness.

8. PHYSICAL PROPERTIES :**8.1 Finish :**

The surface of the sheets shall be even, smooth, free from visible defects like blisters, loose fibres, resin concentration, wrinkles, local deformation and dents. The sheet shall be supplied with trimmed edges.

8.2 Colour : Brick Red**8.3 Specific Gravity :** 1.8 ± 0.15 .**8.4 Water Absorption at 20 deg.C for 24 hours :**

Thickness (mm)		Water Absorption mg max.
Above	Upto & Incd.	
-	5	20
5	10	30
10	15	40
15	20	50
20	25	60
25	-	70

Note : Thickness above 25 mm shall be machined to 25 mm keeping one side intact.



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8.5 Fire Retardant Test : (IEC : 60695-11-10)

Shall meet requirement of "Flammability Category - VO"

When tested on 5 test specimens of size $125 \pm 5 \times 13 \pm 0.5 \times 6.0 \pm 0.2$ mm Size.
Thickness above 6mm shall be machined to 6mm keeping one side intact.

9. MECHANICAL PROPERTIES:**9.1 Tensile Strength : 230 N/mm^2 , Min.****9.2 Cross Breaking Strength : 320 N/mm^2 , Min.****9.3 Shear Strength : 100 N/mm^2 , Min.****9.4 Compression Strength-Proof : 360 N/mm^2** **9.5 Splitting Load - Edgewise (For sheet 10 mm and above) : 2.25 kN, Min.****9.6 Machineability :**

Shall be capable of being sawn, milled, drilled and tapped with a M 3.5 tap and being shaped in a shaping machine without showing any signs of splitting, cracking or chipping.

10. ELECTRICAL PROPERTIES :**10.1 Insulation resistance after 24 hours immersion in water at 20 deg.C :**

2500 Megohms, Min.

10.2 Electric Strength-Edgewise (Proof) in oil at 90 deg.C : 30 kV**10.3 Comparative Tracking Index : 200, Min.****11. TEST CERTIFICATE:**

Three copies of the test certificate, shall be supplied unless otherwise stated on the order.

In addition, supplier shall ensure to enclose one copy of the test certificate alongwith their despatch documents to facilitate quick clearance of the material.



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The test certificate shall bear the following information.

BP 22494 : Epoxy Glass Mat Laminated Sheets & Components- Fire Retardant
(Rev.07)

BHEL Order No.

Batch / Lot No.

Test values obtained/certificates for compliance for clauses 4 & 7 to 10.

In addition, the supplier shall ensure to enclose one copy of test certificate
alongwith their despatch documents to facilitate quick clearance of the material.

12. PACKING AND MARKING :

Identification slips shall be pasted suitably on all four corners of each board
giving the size of the board and manufacturer's code number / grade.

The boards shall be suitably packed in wooden cases lined with water proof
Paper from inside. Each sheet shall be separated from other sheet by a thick
paper or card-board.

Each package shall be marked with the following information :

BP 22494 : Epoxy Glass Mat Laminated - Sheets & Components Fire Retardant

BHEL Order No.

Manufacturer's and / or Supplier's Name and Grade :

Batch / Lot No.

Thickness, Width and Length:

No. of Sheets

Net Weight and Gross Weight:

Test Certificate reference :