

26643 72024/HEP-TX/20500



PLANT PURCHASING SPECIFICATION BHOPAL

BP 22491

REV NO. 09

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EPOXY GLASS CLOTH LAMINATED SLOT WEDGES SUPERIOR QUALITY

SUPERSEDES

BP 22491 Rev 08

1. GENERAL :

This specification governs the quality of slot wedges machined from epoxy resin bonded woven glass cloth laminated sheet having very high mechanical strength and good electrical properties, low absorption of moisture and suitable for operation in tropical conditions. The material has temperature index of at least 155.

2. APPLICATION :

The slot wedges are used for retaining windings of traction motors in rotor slots. The slot wedges are subjected to the centrifugal force exerted by the windings and should withstand temperature upto 155°C without distorting. The slot wedges shall not delaminate when inserted in the slots by hitting at the ends.

3. COMPLIANCE WITH NATIONAL STANDARDS:

There is no Indian Standard covering this type of material.

4. DIMENSIONS & TOLERANCES:

Dimensions shall be stated on the drawing accompanying the order.

5. FINISH:

The surface of the slot wedges shall be smooth, free from flaws, cracks, folds, loose fibres, resin concentration, wrinkles, local deformation, dents, tool marks, grinding defects etc.

6. TEST METHODS:

As stated against each clause.

7. SAMPLES FOR TEST:

One sheet of 250 x 250 mm of 3-5 mm thickness shall be supplied with each consignment for mechanical testing.

Revision : Reviewed & No technical change

Issued by :

STANDARDS AND MATERIALS GROUP
TECHNICAL SERVICES DEPTMENT

Rev. 09

Date : 05.10.2020

Date of first Issue: July . 1987



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8. COMPOSITION REQUIRMENTS

Resin -

Bisphenol - A liquid epoxy resin having epoxy equivalent of 180 to 200,
OR
Novalak epoxy resin of low molecular weight having epoxy equivalent of 175 to 180.

Curing Agent:

4 -4' Diamino Diphenyl Sulphone (DOS).

Accelerator :

Boron Trifluoride Mon ethyl Amine Complex or Tertiary Amine Base.

Diluent & Viscosity Reducers : Not to be used

Glass Cloth :

Plain weave of 0.18 mm thickness as per our corporate Purchasing specification AA 25601 "Glass Fibre Woven Cloth" except that it shall be with silane / volan treatment. The glass cloth shall be suitably dried to remove moisture.

9 PROPERTIES :

9.1 Cross Breaking Strength: (BS EN ISO 178)

9.1.1 At room temperature after 100 hours of ageing at, 200 to 208°C,

390 N/mm², Min.

9.1.2 At 150 to 154°C after one hour of ageing at 150 to 154°C (Type Test)

200 N/mm², Min.

9.1.3 At 150 to 154°C, after 100 hours of ageing at 200 to 208°C (Type Test)

200 N/mm², Min.

9.1.4 At 150 to 154°C, after 1000 hours of ageing at 200 to 208°C (Type Test)

Not less than 75% of the measured value as per cl. 9.1.3.



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9.2 Shear Strength at room temperature :**(As per Annexure-I)**

After ageing at 200 to 208°C, for 100 hours and then cooled to room temperature.

100 N/mm², Min.

9.3 Heat Deflection Temperature (BS EN ISO 75-2)

170°C, Min at bending stress of 25 N/mm².

Texture of glass cloth shall be checked by burning the bond for sufficient time at temperature 550 ± 50°C and shall meet requirements of Cl.8.

Same type of glass cloth shall be used for full thickness of slot wedges.

9.5 Shrinkage After Heat Ageing: (Type Test) (Annexure I) :

0.1 mm Max.

10. TEST CERTIFICATE :

Three copies of test certificate shall be supplied with each consignment. In addition, the supplier shall ensure to enclose one copy of test certificate along with their dispatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information :

BP 22491: Epoxy Glass Cloth Laminated Slot Wedges - Superior Quality.

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Our Order No.

Supplier's Reference

Batch/Lot No.

Test values obtained/certificate for compliance for clause 4, 5 & 9.

11. PACKING AND MARKING:

BP 22491 : Epoxy Glass Cloth Laminated Slot Wedges - Superior Quality. Our Order No.

Supplier's Name & Grade.

Batch / Lot No.

Date & Year of manufacture.

No. of Slot Wedges and Drawing No.

Net weight and gross weight.

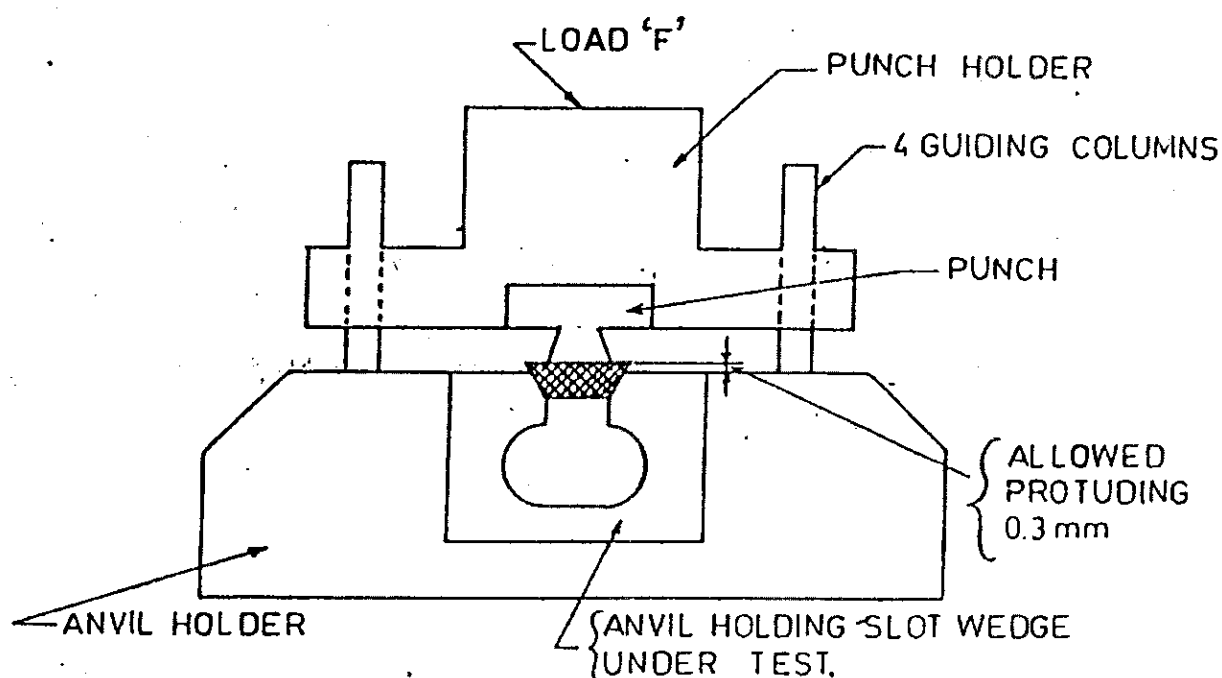


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ANNEXURE — ITEST METHOD FOR DETERMINATION OF SHEAR STRENGTH

The test specimen shall be a piece of 50 ± 0.3 mm length cut from slot wedge. The cut face must be clean & free from loose fibers etc. and at right angles to the face of slot wedges.

The test fixture shall be as shown in the figure below:



The specimen shall perfectly rest on the profile surfaces of the fixture when inserted in the anvil. The load shall be applied to the specimen gradually at such a rate that the final value at which the specimen shears is reached in 15 to 45 seconds from the time of initial application of load.

Shear strength shall be calculated from the following formula.

$$\text{Shear Strength (N/mm}^2\text{)} = \frac{F}{50 \times 2 \times t}$$

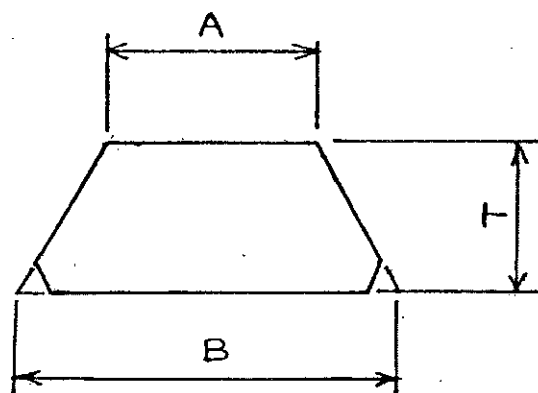
Where F is the load at failure in Newton

t is thickness in mm.

ANNEXURE-II

DETERMINATION OF SHRINKAGE AFTER HEAT AGEING

The test specimen for the purpose of this test shall be complete slot wedges to the relevant drawing. Before subjecting to heat ageing, thickness and the working face dimensions as shown below in figure shall be measured and recorded.



The test specimen shall then be subjected to heat ageing at $200 \pm 3^{\circ}\text{C}$ for 100 hrs. Measurements for thickness and working faces as above shall be measured and recorded after completion of heat ageing.

Shrinkage, the difference between the above two corresponding readings shall not be more than 0.1 mm.