

Specification for

Glass mica boards for electrical purposes

Co-operating organizations

The Electrical Industry Standards Committee under whose supervision this British Standard was prepared consists of representatives from the following Government departments and scientific and industrial organizations:

- Associated Offices' Technical Committee
- Association of Consulting Engineers
- Association of Mining Electrical and Mechanical Engineers
- Association of Supervising Electrical Engineers
- British Electrical and Allied Manufacturers' Association*
- British Railways Board
- Crown Agents for Oversea Governments and Administrations
- Electric Cable Makers' Confederation
- Electric Lamp Industry Council
- Electric Light Fittings Association
- Electrical Contractors' Association (Incorporated)
- Electrical Contractors' Association of Scotland
- Electrical Research Association*
- Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales*
- Electronic Engineering Association*
- Engineering Equipment Users' Association
- Institution of Electrical Engineers
- Ministry of Aviation*
- Ministry of Defence, Army Department*
- Ministry of Defence, Navy Department*
- Ministry of Labour (H.M. Factory Inspectorate)
- Ministry of Power
- Ministry of Public Building and Works
- Municipal Passenger Transport Association (Incorporated)
- National Inspection Council for Electrical Installation Contracting
- National Physical Laboratory (Ministry of Technology)
- Oil Companies Materials Association
- Post Office*
- Public Transport Association (Incorporated)
- South of Scotland Electricity Board

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

- British Electro-Ceramic Manufacturers' Association
- British Plastics Federation
- Glass Textile Association
- London Transport Board
- Radio & Electronic Component Manufacturers' Federation
- Telephone Manufacturers' Technical Development Committee
- Manufacturers of Composite Boards

This British Standard, having been approved by the Electrical Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 31 March 1967

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Committee references ELE/16 and ELE/16/53/13
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Foreword

This standard makes reference to the following British Standards:

BS 46, *Keys and keyways and taper pins*.

BS 46-3, *Solid and split taper pins*.

BS 148, *Insulating oil for transformers and switchgear*.

BS 871, *Abrasive papers and cloths for general purposes*.

BS 3591, *Industrial methylated spirits*.

BS 3718, *Laboratory humidity ovens (non-injection type)*.

This British Standard is the third in the series covering incombustible and self-extinguishing boards for electrical purposes. BS 3497, "*Asbestos cement board (incombustible) for electrical purposes*" and BS 3503, "*Impregnated asbestos cement board (self-extinguishing) for electrical purposes*" are the other two standards.

NOTE 1 Where metric equivalents have been given the figures in British units are to be regarded as the standard. The metric conversions are approximate. More accurate conversions should be based on the tables in BS 350, "*Conversion factors and tables*".

NOTE 2 In place of the customary, but incorrect, use of the pound and kilogramme as units of force, the units called pound-force (abbreviation lbf) and kilogramme-force (abbreviation kgf) have been used in this standard. These are the forces which, when acting on a body of mass one pound or one kilogramme respectively, give it an acceleration equal to that of standard gravity.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 17 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies requirements for boards for electrical purposes, made from glass bonded mica powder, from $\frac{1}{8}$ in (3.2 mm) up to $\frac{1}{2}$ in (12.7 mm) in thickness.

NOTE Although limits are given only for boards up to $\frac{1}{2}$ in (12.7 mm) thick, boards are made in greater thicknesses up to $1\frac{1}{2}$ in (38.1 mm). For boards over $\frac{1}{2}$ in (12.7 mm) thick, limits and test methods should be agreed between the purchaser and the supplier.

Two types of board are covered, both of which are incombustible.

The boards have good resistance to arcing, good mechanical properties and can be machined provided suitable techniques are employed. The boards are suitable for use as arc shields, terminal boards and high temperature panels.

The density of the boards covered by this standard may be taken as approximately 0.09 lb/in³ (2.5 g/cm³). Density is not, however, a guide to the quality of the board.

2 Definitions

For the purposes of this British Standard the following definitions apply:

glass mica boards

boards manufactured from finely ground leadless borate glass and mica powder pre-mixed, heated and compression-moulded into homogeneous form

incombustible

an incombustible material is one which, when heated as described in Appendix F, neither burns nor gives off flammable vapours

3 Classification

Two types of incombustible board are covered by this specification.

Type 1 has a ground surface on each face and has better electrical and mechanical properties and lower water absorption than Type 2.

Type 2 has an unground natural finish on each face.

4 Finish

Type 1 boards shall have a smooth ground finish on both faces, free from local defects and surface imperfections.

Type 2 boards shall have a smooth unground natural finish.

5 Flatness

The flatness of the boards shall be such that when placed concave side up, without restraint upon a flat surface, the departure at any point of the surface from a lightweight straight edge 12 in (300 mm) long laid in any direction upon it shall not exceed the following limits:

Type 1 boards: 0.010 in (0.25 mm)

Type 2 boards: 0.030 in (0.76 mm)

6 Thickness

Boards shall have nominal thicknesses of $\frac{1}{8}$ in (3.2 mm), $\frac{3}{16}$ in (4.8 mm), $\frac{1}{4}$ in (6.35 mm), $\frac{5}{16}$ in (8.0 mm), $\frac{3}{8}$ in (9.5 mm) and $\frac{1}{2}$ in (12.7 mm). The thickness of the board at any point shall not differ from the nominal thickness by more than ± 0.010 in (0.25 mm) for Type 1 or ± 0.016 in (0.40 mm) for Type 2.

7 Electric strength proof test in oil

When tested as described in Appendix B, the board shall withstand, for one minute without failure, the appropriate proof voltage shown in Table 1.

Table 1 — Proof electric strength in oil

Nominal thickness		Proof voltage	
		Type 1	Type 2
in	mm	kV	kV
$\frac{1}{8}$	3.2	40	10
$\frac{3}{16}$	4.8	60	40
$\frac{1}{4}$	6.35	80	80
$\frac{5}{16}$	8.0	90	90
$\frac{3}{8}$	9.5	100	100
$\frac{1}{2}$	12.7	120	120

8 Surface electric strength proof test in air

When tested as described in Appendix C, any board shall withstand a proof voltage of 14 kV for one minute without breakdown over the surface.

9 Insulation resistance

When determined as described in Appendix D, the insulation resistance shall be not less than:

Type 1 boards: 1 000 megohms

Type 2 boards: 10 000 ohms

10 Carbon arc test

When tested as described in Appendix E, the time before cracking or penetration occurs shall be not less than the time given in Table 2.

Table 2 — Carbon arc test

Nominal thickness	Time before cracking or penetration	
	Type 1	Type 2
in (mm)	s	s
Up to and including $\frac{3}{16}$ (4.8)	20	15
$\frac{1}{4}$ (6.35)	35	20
Above $\frac{1}{4}$ (6.35) [machined to $\frac{1}{4}$ (6.35) for test]	35	25

11 Spirit burner test

When tested as described in Appendix F, the test piece shall show no sign of burning at any time during one minute of exposure to the flame.

12 Water absorption

When determined as described in Appendix G, the weight of water absorbed shall not exceed the appropriate value given in Table 3.

Table 3 — Water absorption

Nominal thickness		Water absorption	
		Type 1	Type 2
in	mm	mg	mg
$\frac{1}{8}$	3.2	20	1 000
$\frac{3}{16}$	4.8	30	750
$\frac{1}{4}$	6.35	40	750
$\frac{5}{16}$	8.0	50	750
$\frac{3}{8}$	9.5	60	750
$\frac{1}{2}$	12.7	80	750

13 Deformation under compression

When tested as described in Appendix H, the reduction in thickness of the test piece shall not exceed the following limits nor shall failure occur.

Type 1 boards: 1 %

Type 2 boards: 2 %

14 Shear strength

When determined as described in Appendix J, the shear strength shall be not less than the appropriate value given in Table 4.

Table 4 — Shear strength

Nominal thickness		Minimum shear stress			
		Type 1		Type 2	
in	mm	lbf/in ²	kgf/cm ²	lbf/in ²	kgf/cm ²
$\frac{1}{8}$	3.2	6 500	460	5 500	390
Above $\frac{1}{8}$ and up to and including $\frac{1}{2}$	Above 3.2 and up to and including 12.7	7 000	490	6 000	420

15 Cross-breaking strength

When determined as described in Appendix K, the cross-breaking strength shall be not less than the appropriate value given in Table 5.