bsi.

...making excellence a habit.™

Please be aware that this PDF has been created from the original hardcopy document, which might not be in good condition and so the PDF might reflect this.

BSI Group
389 Chiswick High Road
London, W4 4AL
United Kingdom

T: +44 20 845 086 9001
F: +44 20 8996 7400
cservices@bsigroup.com
bsigroup.com

British Standards Limited
Registered in England no: 07864997
Registered address: 389 Chiswick High Road
London, W4 4AL, United Kingdom

AVA Documents
INVESTORS IN PEOPLE
Document Sharing Hub

Full document details: BS 2966:1958

BRITISH STANDARD 2966 : 1958

UDC 621.315.614.7–415.5

Phenolic Resin-bonded Cotton Fabric Sheets

For Electrical Purposes

BRITISH STANDARDS HOUSE
2 PARK STREET
LONDON, W.1

BRITISH STANDARDS INSTITUTION

AVA Documents
Document Sharing Hub

BRITISH STANDARD SPECIFICATION

PHENOLIC RESIN-BONDED COTTON FABRIC SHEETS

FOR ELECTRICAL PURPOSES

B.S. 2966 : 1958

Price 6/– net

BRITISH STANDARDS INSTITUTION

INCORPORATED BY ROYAL CHARTER

BRITISH STANDARDS HOUSE, 2 PARK ST., LONDON, W.1

TELEGRAMS: STANDARDS, AUDLEY, LONDON TELEPHONE: MAYFAIR 9000

AVA Documents
Document Sharing Hub

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 28th February, 1958.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 3000, indexed and cross-indexed for reference, together with an abstract of each standard, will be found in the Institution's Yearbook, price 15s.

This standard makes reference to the following British Standards :

B.S. 148. Insulating oil (low viscosity type) for transformers and switchgear.
B.S. 358. Rules for the measurement of voltage with sphere-gaps.
B.S. 871. Abrasive papers and cloths.
B.S. 2572. Phenolic laminated sheet.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following B.S.I. references relate to the work of this standard :—
Committee reference ELE/16, ELE/16/15.
Draft for comment CX(ELE) 8307.

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 :

*Admiralty
Air Ministry
Associated Offices' Technical Committee
Association of Consulting Engineers (Incorporated)
Association of Supervising Electrical Engineers
*British Electrical and Allied Industries Research Association
*British Electrical and Allied Manufacturers' Association
British Electrical Development Association
British Railways, The British Transport Commission
Cable Makers' Association
Central Electricity Authority and Area Boards
Crown Agents for Oversea Governments and Administrations
Electric Lamp Industry Council
Electric Light Fittings Association
Electrical Contractors' Association (Incorporated)
Electrical Contractors' Association of Scotland
Engineering Equipment Users' Association
Independent Cable Makers' Association
Institution of Electrical Engineers
Ministry of Labour and National Service (Factory Inspectorate)
Ministry of Power
*Ministry of Supply
Ministry of Works
National Inspection Council for Electrical Installation Contracting
*National Physical Laboratory (D.S.I.R.)
Oil Companies Materials Committee
*Post Office
Public Transport Association (Incorporated)
*Radio Industry Council
South of Scotland Electricity Board
War Office

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 the standard.

Accumulator Makers' Association
British Plastics Federation
Glass Textile Association Ltd.
Radio and Electronic Component Manufacturers' Federation
Research Association of British Rubber Manufacturers
Society of Motor Manufacturers and Traders Ltd.
Telephone Manufacturers' Technical Development Committee

AVA Documents
Document Sharing Hub

CONTENTS

	Page
Co-operating organizations	3
Foreword	5
SPECIFICATION	
SECTION ONE : GENERAL	
1. Scope	5
2. Classification	5
3. Definitions	6
SECTION TWO : MANDATORY REQUIREMENTS	
4. General	6
5. Uniformity	6
6. Finish	6
7. Flatness	7
8. Thickness	7
9. Machining	9
10. Physical and electrical properties	9
SECTION THREE : OPTIONAL REQUIREMENTS	
11. General	9
12. Punching	9
13. Power factor (tan δ) at 10^6 c/s	9
14. Power factor (tan δ) at 50 c/s or 1000 c/s	11
15. Resistance to hot oil	11
APPENDICES	
A. Conditioning of test pieces for test	12
B. Determination of insulation resistance	13
C. Proof test for electric strength (flatwise)	14
D. Proof test for electric strength (edgewise)	15
E. Determination of water absorption	15
F. Determination of impact strength	16
G. Determination of cross-breaking strength	17
H. Method for determination of power factor at 50 c/s and 1000 c/s	18
J. Method of test for resistance to hot oil	19

BRITISH STANDARD SPECIFICATION FOR

PHENOLIC RESIN-BONDED COTTON FABRIC SHEETS

FOR ELECTRICAL PURPOSES

FOREWORD

This British Standard, published under the authority of the Electrical Industry Standards Committee, is based on information supplied by the Electrical Research Association.

The standard is concerned with the performance of the material under conditions of use and has been prepared for application to material for electrical purposes. Type 3 materials are those which were originally covered by B.S. 972 for electrical purposes. It is intended that the standard should supersede B.S. 972, 'Synthetic resin-bonded fabric sheet for electrical and mechanical purposes', which was a War Emergency Standard and is now withdrawn.

For a wider range of similar materials to Type 3 of this standard reference should be made to B.S. 2572, 'Phenolic laminated sheet', which is intended primarily for assessing quality and differentiating between types of material and does not give consideration to any particular use to which the materials may be put.

NOTE. 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 B.S. 350, 'Conversion factors and tables'.

SPECIFICATION

SECTION ONE : GENERAL

SCOPE

1. This standard covers a range of phenolic resin-bonded laminated cotton fabric sheets of natural colour made from layers of cotton fabric bonded with thermosetting resin of phenolic type. The materials are intended for electrical applications.

CLASSIFICATION

2. The materials covered by this standard are classified as follows :

Type 1A : Made from acetylated cotton fabric, usually either a fine or medium fabric*.

Type 1B : Made from acetylated cotton fabric having a lower acetyl value than that in Type 1A and usually made with either a fine or medium fabric*.

* As a generalization a fine weave fabric may be regarded as one having more than about 100 threads per inch in both the warp and the weft. A coarse fabric is one having fewer than about 45 threads per inch in both the warp and the weft.

AVA Documents
Document Sharing Hub

Type 2A : Made from cotton fabric.

Type 2B : Made from cotton fabric and having electrical properties inferior to those of Type 2A.

Type 3A : Made from a fine cotton fabric*, and having inferior electrical properties to those of Type 2B.

Type 3B : Made from a medium cotton fabric*, and having inferior electrical properties to those of Type 2B.

Type 3C : Made from a coarse cotton fabric*, and having inferior electrical properties to those of Type 2B.

NOTE. Types 3A, 3B and 3C were previously covered by B.S. 972, 'Synthetic resin bonded fabric sheet for electrical and mechanical purposes'.

DEFINITIONS

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

(1) *Acetylated cotton.* Cotton which has been acetylated without loss of fibrous structure.

(2) *Flatwise* : Perpendicular to the plane of lamination ; a direction in which a load or electric stress may be applied in testing a laminated sheet.

(3) *Edgewise* : Parallel with the plane of lamination ; a direction in which a load or electric stress may be applied in testing a laminated sheet.

(4) *Direction 'A' and direction 'B'* : Two directions in the plane of the sheet mutually at right angles, one of which is parallel with one of the sets of threads (either warp or weft) in a surface layer.

SECTION TWO : MANDATORY REQUIREMENTS

GENERAL

4. Materials shall fulfil the requirements of this Section in order to be deemed to comply with the standard.

UNIFORMITY

5. Similar fabric shall be used for every layer in a sheet.

FINISH

6. Sheets shall be free from local deformation and splitting and shall be supplied with trimmed edges.

NOTE. It is desirable that, after machining, component parts intended for use for electrical purposes in air, be dried and the machined surfaces sealed with a suitable moisture-resisting insulating varnish.

* As a generalization a fine weave fabric may be regarded as one having more than about 100 threads per inch in both the warp and the weft. A coarse fabric is one having fewer than about 45 threads per inch in both the warp and the weft.

FLATNESS

7. The flatness of sheets of nominal thickness ⅛ in. and above shall be such that when a sheet is placed, concave side up, without restraint on a flat surface, the departure at any point of the surface from a light-weight straight-edge laid in any direction upon it does not exceed the following :

0·250 in. (6·35 mm) under a 36 in. (91·5 cm) straight-edge.
0·110 in. (2·79 mm) under a 24 in. (60·1 cm) straight-edge.
0·028 in. (0·70 mm) under a 12 in. (30·5 cm) straight-edge.

THICKNESS

8. *a.* The ranges of thickness covered by this standard are set out in Table 1.

b. The thickness of a sheet at any point shall not differ from the nominal thickness by more than the appropriate value given in Table 2.

TABLE 1. RANGE OF THICKNESSES IN EACH CLASS OF SHEET

Type	Base fabric	Range of thickness
~~1A~~ ~~1B~~	~~Acetylated cotton~~	~~1/32 in. (0·79 mm) to 1 in. (25·4 mm) inclusive.~~
2A	Cotton	1/32 in. (0·79 mm) to 1 in. (25·4 mm) inclusive.
2B	Cotton	1/32 in. (0·79 mm) to 1 in. (25·4 mm) inclusive.
3A	Cotton	1/64 in. (0·40 mm) to 4 in. (101·6 mm) inclusive.
3B	Cotton	1/32 in. (0·79 mm) to 4 in. (101·6 mm) inclusive.
3C	Cotton	1/16 in. (1·59 mm) to 4 in. (101·6 mm) inclusive.

AVA Documents
Document Sharing Hub