

Methods of test for the

Determination of the flammability of solid electrical insulating materials when exposed to an igniting source

Cooperating organizations

The General Electrotechnical Engineering Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

- British Approvals Service for Electric Cables Ltd.
- Associated Offices Technical Committee
- British Electrical and Allied Manufacturers' Association (BEAMA)
- British Radio and Electronic Equipment Manufacturers' Association
- British Steel Corporation
- Department of Energy (Electricity)
- Department of Industry
- Electric Cable Makers' Confederation
- Electrical Contractors' Association
- Electrical Contractors' Association of Scotland
- Electricity Supply Industry in England and Wales*
- Electronic Components Industry Federation
- Electronic Engineering Association*
- Energy Industries Council
- Engineering Equipment Users' Association
- ERA Technology Ltd.*
- Health and Safety Executive
- Home Office
- Institution of Electrical Engineers
- Ministry of Defence*
- National Coal Board
- Oil Companies Materials Association
- Post Office
- Telecommunication Engineering and Manufacturing Association (TEMA)*
- Trades Union Congress

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

- Adhesive Tape Manufacturers' Association
- British Industrial Ceramic Manufacturers' Association
- British Paper and Board Industry Federation (PIF)
- British Plastics Federation
- British Telecom
- Department of Industry (British Calibration Service)
- Department of Industry (National Physical Laboratory)
- Electrical and Electronic Insulation Association (BEAMA)
- Electrical Installation Equipment Manufacturers' Association Limited (BEAMA)
- Glass Textile Association
- Rotating Electrical Machines Association (BEAMA)
- Transmission and Distribution Association (BEAMA)

Amendments issued since publication

Amd. No.	Date of issue	Comments
9207	December 1996	Indicated by a sideline in the margin

This British Standard, having been prepared under the direction of the General Electrotechnical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 June 1983

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ISBN 0 580 13154 8

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National foreword

This British Standard has been prepared under the direction of the General Electrotechnical Engineering Standards Committee and is identical with IEC Publication 707:1981 “Methods of test for the determination of the flammability of solid electrical insulating materials when exposed to an igniting source” published by the International Electrotechnical Commission (IEC).

Terminology and conventions. The text of the international standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards and attention is especially drawn to the following. References in the text to page numbers relate to IEC page numbers which are given in brackets at the bottom of each page.

Cross-references

International Standard	Corresponding British Standard
IEC 212:1971	BS 2844:1972 Memorandum on conditioning of solid electrical insulating materials prior to and during testing (Technically equivalent)
ISO/R 181-1961 ^a	BS 2782:1970 Methods of testing plastics (Method 508E) ^b (Technically equivalent)

^a Superseded by ISO 181:1981 which has not been approved by the UK Committee for implementation as a British Standard.
^b Method BH of IEC 707 may be designated separately as BS 2782:Method 140G:1983 as a revision of Method 508E in BS 2782:1970.

Additional information. In 7.1, reference is made to a method of checking the temperature of the incandescent bar “by depositing on the bar a strip of silver tinsel”. The incandescent bar is regarded as having reached the required temperature when, as the temperature is raised, the strip of silver tinsel melts. WARNING. If using an insulated holder of asbestos material as permitted by 7.2, attention is drawn to the need to take account of the provisions of the Asbestos Regulations 1969 and the Health and Safety at Work etc. Act, 1974. Asbestos dust is most likely to be a problem if an asbestos holder has been subjected to sufficient heat to cause it to become friable. Users should contact the Health and Safety Executive for further advice.

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 8, an inside back cover 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

These methods of test refer to solid electrical insulating materials and are intended to serve as a preliminary indication of their behaviour when exposed to an igniting source.

The results make it possible to check the constancy of the characteristics of a material and provide an indication of the progress in the development of insulating materials and a relative comparison and classification of various materials.

These methods are designed for quality control and product evaluation. They are not valid for determining the fire behaviour and the fire hazard of complete items of equipment, since the dimensions of the insulating systems, the design and heat transfer to adjacent metallic parts, etc., greatly influence the flammability of the electrical insulating materials used therein.

2 Significance of testing

The significant feature of these methods of test is the arrangement of the test specimens in either a horizontal or a vertical position. These testing arrangements make it possible to distinguish between the different degrees of flammability of materials.

The horizontal position of the test specimen (Methods BH and FH) is particularly suitable for evaluating the extent of burning and/or the velocity of the flame propagation, i.e. the burning rate.

The vertical position of the test specimen (Method FV) is particularly suitable for evaluating the extent of burning after extinction of the flame.

Method LF specifies a large flame as the ignition source and both horizontal and vertical positions of the test specimens. It is particularly suitable for evaluating the duration of burning after removal of the ignition source and allows evaluation of the resistance of the test specimen to penetration by the ignition source.

NOTE Different ignition sources are used for all the methods. Therefore the results obtained from these two methods are not equivalent.

3 Definition

The *flammability* is the ability of a material or product to burn with a flame (in accordance with the definitions currently under consideration by the ISO).

The tests are carried out on test specimens of fixed dimensions and under definite assessment criteria with a specified igniting source.

4 Test specimens

The tests are carried out on test specimens of fixed dimensions with recommended thicknesses as preferred values.

Method BH: length: 125 ± 5 mm;
 width: 10.0 ± 0.2 mm;
 thickness: 4.0 ± 0.2 mm.

Methods FH and FV: length: 125 ± 5 mm;
 width: 13.0 ± 0.3 mm;
 thickness: 3.0 ± 0.2 mm.

The test specimens can be manufactured, for example, by compression moulding, transfer moulding, injection moulding, casting, or be machined from sheets, tubes, rods or insulating parts. All edges and faces shall have a smooth finish.

For methods BH and FH, each test specimen is marked with two lines perpendicular to the longitudinal axis, 25 mm and 100 mm away from the end which is to be ignited. These marks may be lightly scratched on the surface of the test specimen. Sets of five test specimens shall be tested.

Method LF: Test LFV length: $125 \text{ mm} \pm 5 \text{ mm}$
 width: $13.0 \text{ mm} \pm 0.3 \text{ mm}$
 thickness: $3.0 \text{ mm} \pm 0.2 \text{ mm}$
 Test LFH length: $150 \text{ mm} \pm 5 \text{ mm}$
 width: $150 \text{ mm} \pm 5 \text{ mm}$
 thickness: $3.0 \text{ mm} \pm 0.2 \text{ mm}$

Sets of five test specimens shall be tested for test LFV.

Sets of three test specimens shall be tested for test LFH.

NOTE The flammability will usually vary depending on the thickness of the material. For all methods with the exception of method FHF, in addition to the thickness specified it may be helpful to obtain results in the minimum and maximum thicknesses covering the thickness range commonly encountered in practice.

5 Conditioning

Before testing the test specimens shall be conditioned for 48 h at standard atmosphere B (48 h/23 °C/50 %) in accordance with IEC Publication 212: Standard Conditions for Use Prior to and During the Testing of Solid Electrical Insulating Materials.