Tests on electric cables under fire conditions —

Part 1: Method of test on a single vertical insulated wire or cable —

(Implementation of CENELEC HD 405.1 S1)
Cooperating organizations

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

Associated Offices Technical Committee
British Approvals Service for Electric Cables Ltd.
British Electrical and Allied Manufacturers' Association (BEAMA)
British Radio Equipment Manufacturers' Association
British Steel Corporation
Chmpe
Department of Energy (Electricity)*
Electric Cable Makers' Confederation
Electrical Contractors' Association*
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Electronic Engineering Association
Engineering Equipment Users' Association*
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Ministry of Defence*
National Coal Board*
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Post Office*
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Association of Consulting Engineers
Association of Manufacturers of Domestic Electrical Appliances
Association of Supervisory and Executive Engineers
British Association of Synthetic Rubber Manufacturers
British Plastics Federation
British Railways Board
British Rubber Manufacturers' Association
British Shipbuilders
British Steel Industry (Wire Section)
Department of the Environment (PSA)
Department of Trade
Home Telephone Cable Makers' Association (1960)
London Transport Executive

This British Standard, having been prepared under the direction of the General Electrotechnical Standards Committee, was published under the authority of the Executive Board and comes into effect on 28 November 1980

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First published, as BS 4066, November 1969
First revision, as BS 4066-1, November 1980

The following BSI references relate to the work on this standard:
Committee reference GEL/3
Draft for comment 77/29561 DC

Amendments issued since publication

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ISBN 0 580 11669 7
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National foreword

This revision of BS 4066 has been prepared under the direction of the General Electrotechnical Engineering Standards Committee. It is identical with Publication 332-1 “Tests on electric cables under fire conditions. Part 1: Test on a single vertical insulated wire or cable” published by the International Electrotechnical Commission (IEC). BS 4066-1 implements CENELEC Harmonization Document HD 405.1. including amendment A1. BS 4066:1969, published with the title “Flame-retardant characteristics of electric cables”, is now withdrawn.

This Part of BS 4066 specifies a method of test on a single vertical insulated wire or cable and the requirement for compliance.

Amendment No. 1 to this Part of BS 4066 specifies an ignition source complying with IEC Publication 695 Part 2-4 Sheet 1, which has been implemented as BS EN 60695-2.4/0 Sheet 1. Reference is also made to IEC 695-2-4/0, which has been implemented as BS EN 60695-2.4/0 Sheet 0. In view of this, Figure 2 in this Part of BS 4066 is no longer relevant and should be disregarded.

BS 4066-2:1989 specifies a method of testing small insulated wire under fire conditions when the method specified in BS 4066-1 is not suitable.

BS 4066-3:1994 gives details of a test for flame propagation where a number of cables are bunched together to form various test sample installations.

Where page numbers are quoted in connection with references to figures in this British Standard, they are IEC page numbers, shown in square brackets at the foot of the page.

Terminology and conventions. The text of the international standard has been approved as suitable for publication, without deviation, as a British Standard. Some terminology and certain conventions are not identical with those used in British Standards.

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.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the HD title page, pages 2 to 4 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.
Tests on electric cables under fire conditions
Part 1: Test on a single vertical insulated wire or cable

(IEC 332-1:1979, modified)
Foreword

Following a decision taken by CENELEC Technical Committee TC 20, a draft for an amendment to HD 405.1 S1:1983 was submitted to the CENELEC Unique Acceptance Procedure (UAP) in May 1991. The text prepared by CLC/TC 20 was approved by CENELEC as amendment A1 to HD 405.1 S1 on 10 December 1991.

The following dates were fixed:

— latest date of announcement of the amendment at national level (doa) 1992-06-01
— latest date of publication of an amendment to the harmonized national standard (dop) 1992-12-01
— latest date of withdrawal of conflicting national standards (dow) 1993-12-01

For products which have complied with HD 405.1 S1:1983 before 1993-12-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1994-12-01.
1 Scope

This standard specifies a method of test on a single vertical insulated wire or cable and the requirement for compliance.

NOTE 1 Since the use of insulated wire or cable that complies with the requirement is not sufficient by itself to prevent propagation of fire under all conditions of installation, it is recommended that wherever the risk of propagation is high, for example in long vertical runs of bunches of cables, special installation precautions should also be taken. It cannot be assumed that because the sample of cable complies with the performance required in this standard that a bunch of cables will behave in a similar manner.

NOTE 2 The method specified is not suitable for the testing of some small wires due to the melting of the conductors during the time of application of the flame.

2 Performance requirement

The test is intended for type approval testing, and may be referred to in cable standards. One sample of insulated wire or cable, after having been tested in accordance with Clauses 3 to 7, shall comply with the following requirement:

After all burning has ceased, the surface of the sample shall be wiped clean and the charred or affected portion shall not have reached within 50 mm of the lower edge of the top clamp.

3 Sample

The test sample shall be a piece of the finished wire or cable 600 ± 25 mm long.

4 Conditioning before test

If the insulated wire or cable has a paint or lacquer finish, the sample shall be kept at a temperature of 60 ± 2 °C for 4 h before the test.

5 Test conditions

The sample shall be clamped at each end to position it vertically in the middle of a three-sided metallic screen, 1 200 ± 25 mm high, 300 ± 25 mm wide and 450 ± 25 mm deep, with open front and closed top and bottom: the base shall be non-metallic.

The clamps shall be approximately 25 mm wide and positioned so that the distance between the top of the bottom clamp and the bottom of the top clamp is 550 ± 25 mm.

The test shall be made in an area substantially free from draughts. The sample shall be adjusted so that the bottom of the specimen is approximately 50 mm from the base of the screen.

The arrangement is illustrated in Figure 1, page 8.

6 Source of heat

a) The ignition source shall be a gas burner complying with IEC Publication 695 Part 2-4 Sheet 1. The IEC Publication includes a method of confirmation of the test flame.

NOTE IEC 695-2-4/1 specifically refers to the need to study also IEC 695-2-4/0.

b) Wire and cable of diameter up to and including 50 mm

The source of heat for a sample having an overall diameter up to and including 50 mm shall be one gas burner, constructed and operated as described above, and positioned as shown in Figure 3, page 10.

c) Wire and cable of diameter greater than 50 mm

The source of heat for a sample having an overall diameter greater than 50 mm shall be two gas burners constructed and operated as described above, and arranged round the sample as shown in Figure 3.

7 Test procedure

For the test, the axis of the burner tube shall be at an angle of 45° to the axis of the sample.

When the burner is in use the distance of the burner from the sample shall be such that the inner blue cone of the flame is at a distance of approximately 10 mm, measured along the axis of the flame, from the surface of the cable and 475 mm below the lower edge of the top clamp.

The flame shall be applied for a continuous period of \( T \) seconds derived from the formula:

\[
T = 60 + \frac{m}{25}
\]

where \( m \) is the weight in grams of the wire or cable sample corrected to a 600 mm length.
Figure 1 — Arrangement of sample within three-sided screen.
Figure 2 — Standard propane gaz burner (sectional view).
Figure 3 — Arrangement of burners for cable test.
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