BRITISH STANDARD

BS 4066-2: 1989
IEC 332-2: 1989
Incorporating Amendment No. 1

Tests on electric cables under fire conditions —

Part 2: Method of test on a single small vertical insulated wire or cable —

(Implementation of CENELEC HD 405.2 S1)

UDC 621.315.2.001.4:614.841.41:536.468

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the General Electrotechnical Standards Policy Committee (GEL/-) to Technical Committee GEL/3, upon which the following bodies were represented:

Aluminium Federation
Association of Consulting Engineers
Association of Manufacturers of Domestic Electrical Appliances
British Approvals Service for Electric Cables
British Cable Makers' Confederation
British Plastics Federation
British Railways Board
British Steel Industry
British Telecommunications Plc.
Department of the Environment (Property Services Agency)
Department of Trade and Industry (Consumer Safety Unit, CA Division)
ERA Technology Ltd.
Electricity Supply Industry in England and Wales
Engineering Equipment and Materials Users' Association
Institution of Electrical Engineers
London Regional Transport

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Association of Supervisory and Executive Engineers
British Rubber Manufacturers' Association
GAMBICA (BEAMA Ltd.)
Home Telephone Cable Makers' Association (1960)
Ministry of Defence
Queen Mary College Industrial Research

This British Standard, having been prepared under the direction of the General Electrotechnical Engineering Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 October 1989

The following BSI references relate to the work on this standard:
Committee reference GEL/3
Draft for comment 86/32291 DC

ISBN 0 580 17848 X

Amendments issued since publication

Amd. No.	Date of issue	Comments
8112	April 1994	Indicated by a sideline in the margin

Contents

National foreword

This Part of BS 4066 has been prepared under the direction of the General Electrotechnical Engineering Standards Policy Committee as a Part of BS 4066 which deals with flame propagation tests for cables. It is identical with IEC Publication 332-2:1989 "Tests on electric cables under fire conditions", Part 2 "Tests on a single small vertical insulated copper wire or cable" published by the International Electrotechnical Commission (IEC) and implements [1)]CENELEC Harmonization Document HD 405.2 S1.

BS 4066 closely follows the contents of IEC Publication 332.

BS 4066-1:1980 gives a method of test for flame propagation characteristics for a single vertical insulated wire or cable. It is identical with IEC Publication 332-1 and implements [1)] CENELEC Harmonization Document HD 405.1.

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

BS 4066-3:1986 gives a method for classification of flame propagation characteristics of bunched cables and is related to IEC Publication 332-3.

It is assumed in the drafting of this British Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people.

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, the HD title page, pages 2 to 6, 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)] CENELEC = European Committee for Electrotechnical Standardization.

HARMONIZATION DOCUMENT
DOCUMENT D'HARMONISATION
HARMONISIERUNGSDOKUMENT

HD 405.2 S1

May 1991

UDC 621.315.33:620.1:536.468

Descriptors: Insulated cables, single insulated wire, conductor, copper, test under fire conditions

English version

Tests on electric cables under fire conditions
Part 2: Test on a single small vertical insulated copper wire or cable

(IEC 332-2:1989)

Essais des câbles électriques soumis au feu
Deuxième partie: Essai sur un petit conducteur ou câble isolé à âme en cuivre, en position verticale
(CEI 332-2:1989)

Prüfungen an Kabeln und isolierten Leitungen unter Brandeinwirkungen
Teil 2: Prüfung an einer einzelnen dünnen senkrecht angeordneten Aderleitung mit Kupferleiter oder Kabel oder isolierter Leitung
(IEC 332-2:1989)

This Harmonization Document was approved by CENELEC on 1991-03-15. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

Up-to-date lists and bibliographical references concerning national implementation may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

The CENELEC questionnaire procedure, performed for finding out whether or not the international standard IEC 332-2:1989 could be accepted without textual changes, has shown that no CENELEC common modifications were necessary for the acceptance as Harmonization Document.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as HD 405.2 S1 on 15 March 1991.

The following dates were fixed:

- latest date of announcement of the HD at national level (doa) 1991-12-01
- latest date of publication of a harmonized national standard (dop) 1992-06-01
- latest date of withdrawal of conflicting national standards (dow) 1992-06-01

For products which have complied with the relevant national standard before 1992-06-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1997-06-01.

Annexes designated “normative” are part of the body of the standard. Annexes designated “informative” are given only for information. In this standard, Annex ZA is normative and Annex ZB is informative.

1 Scope

This standard specifies a method of testing a small insulated wire under fire conditions when the method specified in IEC Publication 332-1 is not suitable because some small conductors may melt during the application of the flame. The range of application recommended is for solid copper conductors from 0.4 mm to 0.8 mm diameter and for stranded conductors from 0.1 mm^2 to 0.5 mm^2 cross-section. This standard includes the requirement for compliance.

NOTE The use of insulated wire which complies with this standard is not sufficient to prevent flame propagation under all conditions of installation. When the risk of propagation is high, such as with long vertical runs of bunches of wires, it cannot be assumed that because a sample complies with this standard the bunch will behave in a similar manner.

2 Performance requirement

The test is intended for type approval testing or may be referred to in cable standards.

One sample of insulated wire or cable, after having been tested in accordance with Clauses **6**, **7** and **8**, shall comply with the following requirement:

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

3 Test equipment

a) Propane burner complying with the requirements of Figure 1.

It is allowable to fit an adaptor to burners not exactly complying with the figure in order to obtain the 8 mm bore shown.

b) Propane bottle with pressure device and pressure gauge.

c) Metal screen 1 200 ± 25 mm high; 300 ± 25 mm wide and 450 ± 25 mm deep, with open front and closed top and bottom (see Figure 3).

d) Stop watch.

e) Electrically heated oven.

4 Sample

Each test sample shall be taken from the end of the test cable and shall measure 600 ± 25 mm. Two such samples shall be available, designated 1 and 2.

5 Conditioning before test

If the insulated wire has a paint or lacquer finish the samples shall be maintained in an oven [Clause **3**, Item e)] at a temperature of 60 ± 2 °C for 4 h and shall be cooled to ambient temperature prior to the test.

6 Test conditions

The sample shall be straightened and clamped in a vertical position in the centre of the metal screen [Clause **3**, Item c)]. A load of 5 N/mm^2 of conductor area shall be attached to the lower part of the sample so that the distance between the upper and lower attachments measures 550 ± 25 mm. It is essential to exclude all draughts and it is recommended that the test is undertaken within a suitable small draught-free enclosure.

7 Source of heat

The burner [Clause **3**, Item a) and Figure 1)] is fed with propane so as to produce a luminous flame when in a vertical position with the air inlet closed. The gas flow shall be adjusted so that the total length of the luminous flame is 125 ± 25 mm (see Figure 2). A pressure of 1 bar as indicated by the pressure reducing device [Clause **3**, Item b)] is recommended to meet this requirement.

The burner shall be arranged as follows (see Figure 3). The centre-line of the burner to be at an angle of 45° to the centre-line of the sample. The gap between the burner orifice and the surface of the sample measured along the centre-line of the burner shall be 10 ± 1 mm. The distance between the point at which the burner centre-line and sample centre-line intersect and the point where the load of 5 N/mm^2 is applied shall be 100 ± 10 mm. The distance between the point at which the burner and sample centre-lines intersect and the lower edge of the top clamp shall not exceed 465 mm.

8 Test procedure

The flame shall be applied so that it envelops the sample. The flame shall be applied to sample No. 1 for a maximum duration of 20 ± 1 s. If the sample is intact, i.e. no melting of conductor, the test shall be evaluated in accordance with Clause **2**. Should the conductor prematurely melt, at a time T less than 20 ± 1 s, the test shall be repeated on sample No. 2 for a duration of $(T - 2)$ s. The assessment shall then be based only on sample No. 2.

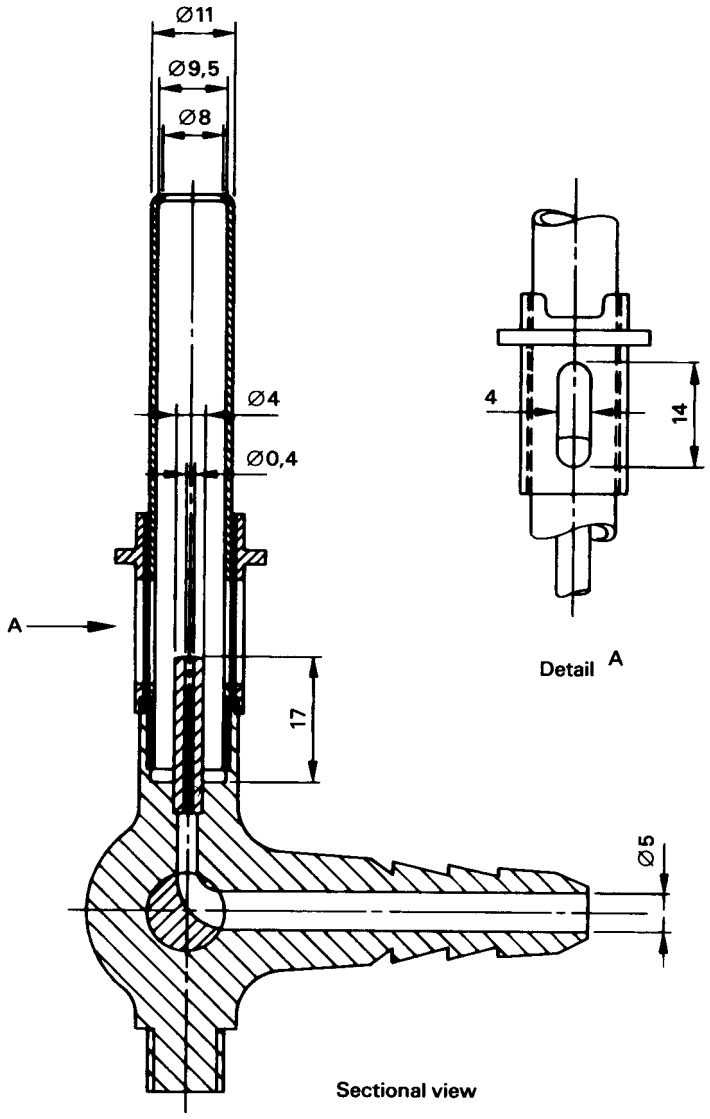
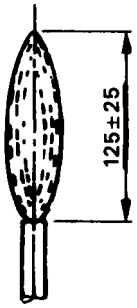


Figure 1



Dimensions in millimetres

Figure 2

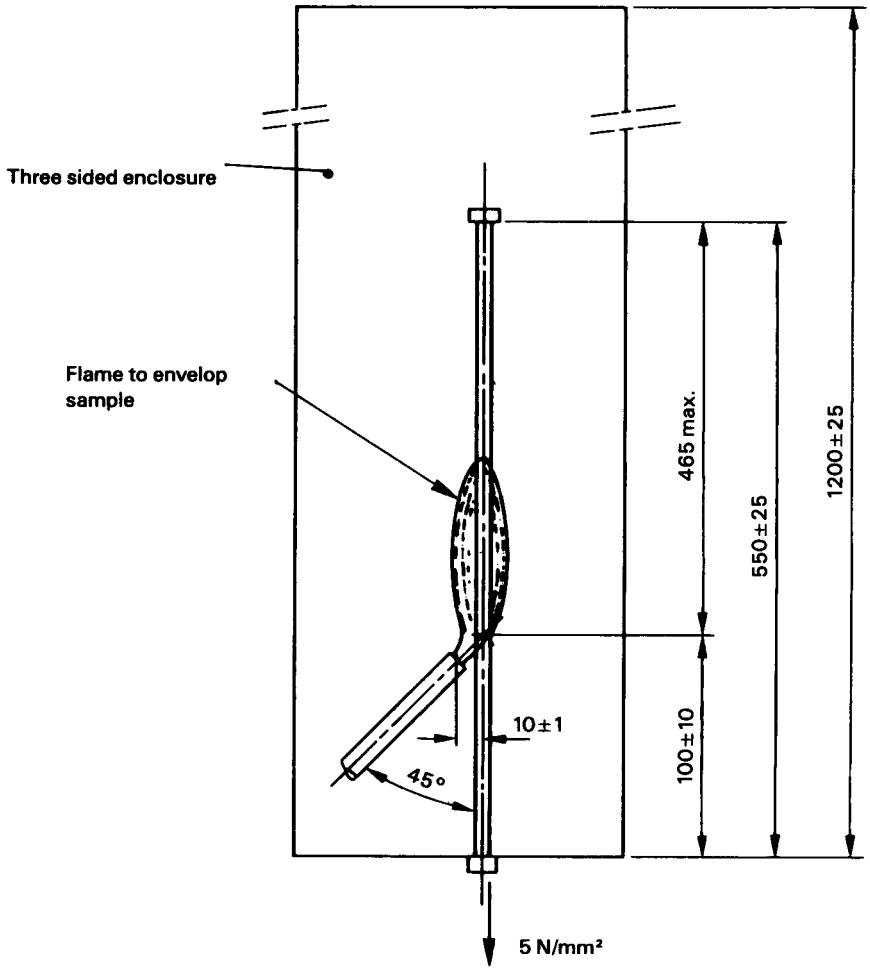


Figure 3

Annex ZA (normative)
Other international publications quoted in this standard with the references of the relevant European publications

IEC Publication	Date	Title	EN/HD	Date
332-1	1979	*Tests on electric cables under fire conditions — Part 1: Test on a single vertical insulated wire or cable*	HD 405.1 S1	1983

Annex ZB (informative)
National A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CENELEC member.

Clause in HD 405.2 S1	National deviation
1	France: "Arrêté dated 4 June 1972, amended by "Arrêté" dated 19 December 1975 of Home Secretary. To settle C2 category on small insulated wire the standard UTE 32-071 — September 1985 is applicable.

Publications referred to

See national foreword.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL