SLOVENSKI STANDARD
SIST EN 50266-2-4:2002

01-april-2002

Nadomešča:
SIST HD 405.3 S1:1999

Splošne metode za preskušanje kablov v požarnih razmerah - Preskus pri navpičnem širjenju ognja po navpično nameščenih žičnih kitah ali kablih - 2-4. del: Postopki - Kategorija C

Common test methods for cables under fire conditions - Test for vertical flame spread of vertically-mounted bunched wires or cables - Part 2-4: Procedures - Category C

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Allgemeine Prüfverfahren für Kabel und isolierte Leitungen im Brandfall - Prüfung der senkrechten Flammenausbreitung von senkrecht angeordneten Bündeln von Kabeln und isolierten Leitungen - Teil 2-4: Prüfverfahren - Prüfart C

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Méthodes d'essai communes aux câbles soumis au feu - Essai de propagation verticale de la flamme des fils ou câbles en nappes en position verticale - Partie 2-4: Procédures - Catégorie C

Ta slovenski standard je istoveten z: **EN 50266-2-4:2001**

ICS:

13.220.40	Sposobnost vžiga in obnašanje materialov in proizvodov pri gorenju	Ignitability and burning behaviour of materials and products
29.060.20	Kabli	Cables

SIST EN 50266-2-4:2002 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD **EN 50266-2-4**

NORME EUROPÉENNE

EUROPÄISCHE NORM February 2001

ICS 13.220.40; 29.020; 29.060.20 Supersedes HD 405.3 S1:1993

English version

Common test methods for cables under fire conditions - Test for vertical flame spread of vertically-mounted bunched wires or cables Part 2-4: Procedures - Category C

Méthodes d'essai communes aux câbles soumis au feu - Essai de propagation verticale de la flamme des fils ou câbles en nappes en position verticale Partie 2-4: Procédures - Catégorie C

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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

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Ref. No. EN 50266-2-4:2001 E

Foreword

This European Standard was prepared by Working Group 10 of the Technical Committee CENELEC TC 20, Electric cables.

When used in conjunction with EN 50266-1 this European Standard supersedes HD 405.3 S1 in respect of test category C.

All pre-existing categories of test from HD 405.3 S1 have been retained and updated in the different parts 2. A new category (Category D) has been added to cater for testing at very low non-metallic volumes.

The description of the apparatus given in EN 50266-1 updates that in HD 405.3 S1.

The text of the draft was submitted to the Unique Acceptance procedure and was approved by CENELEC as EN 50266-2-4 on 2000-08-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2001-08-01

- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-08-01

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Annexes designated 'normative' are part of the body of the standard.
Annexes designated 'informative' are given for information only.
In this standard, annex A is normative and annex B is informative.

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Introduction

Methods of test for flame spread characteristics for a single vertical insulated wire or cable are given in EN 50265, but it cannot be assumed that, because a cable or wire meets the requirements of that standard, a vertical bunch of similar cables or wires will behave in a similar manner. This is because flame spread along a vertical bunch of cables depends on a number of features, such as:

a) the volume of combustible material exposed to the fire and to any flame which may be produced by the combustion of the cables;
b) the geometrical configuration of the cables and their relationship to an enclosure;
c) the temperature at which it is possible to ignite the gases emitted from the cables;
d) the quantity of combustible gas released from the cables for a given temperature rise;
e) the volume of air passing through the cable installation;
f) the construction of the cable, e.g. armoured or unarmoured, multi or single core.

All of the foregoing assume that the cables are able to be ignited when involved in an external fire.

EN 50266 gives details, in various parts, of a test where a number of cables are bunched together to form various test sample installations. For easier use and differentiation of the apparatus and the various test categories, the parts are designated as follows:

Part 1	Apparatus
Part 2-1	Category A F/R
Part 2-2	Category A
Part 2-3	Category B
Part 2-4	Category C
Part 2-5	Category D

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Parts from 2-1 onwards define the various categories and the relevant procedures. The categories are distinguished by test duration, the volume of non-metallic material of the test sample and the method of mounting the sample for the test. In all categories, cables having at least one conductor of cross-sectional area greater than 35 mm² are tested in a spaced configuration, whereas cables of conductor cross-sectional area of 35 mm² or smaller are tested in a touching configuration.

The categories are not necessarily related to different safety levels in actual cable installations. The actual installed configuration of the cables may be a major determinant in the level of flame spread occurring in an actual fire.

The method of mounting described as Category A F/R (part 2-1) is intended for special cable designs used in particular installations.

Categories A, B, C and D (parts 2-2 to 2-5 respectively) are for general use where different non-metallic volumes are applicable.

Additional categories, especially to cover the use of small diameter communication cables in closely bunched configurations, will be further considered when more data is available.

1 Scope

EN 50266 specifies methods of test for the assessment of vertical flame spread of vertically-mounted bunched wires or cables, electrical or optical, under defined conditions.

NOTE For the purpose of this standard the term 'electric wire or cable' covers all insulated metallic conductor cables used for the conveyance of energy or signals.

The test is intended for type approval testing. The requirements for the selection of cables for testing are given in annex A. The flame spread is measured as the extent of damage of the cable sample. This procedure may be used to demonstrate the cable's ability to limit flame spread.

This Part 2-4 covers Category C and relates to cables installed on the test ladder to achieve a nominal total volume of non-metallic material of 1,5 litres per metre of test sample. The flame application time is 20 min. The method of mounting uses the front of the standard ladder. The category is intended for general use where low volumes of non-metallic material are required to be evaluated.

A recommended performance requirement is given in annex B.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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EN 50266-1	Common test methods for cables under fire conditions - Test for vertical flame spread of vertically-mounted bunched wires or cables - Part 1 : Apparatus

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EN 60695-4	Fire hazard testing - Part 4: Terminology concerning fire tests
EN 60811-1-3	Insulating and sheathing materials of electric cables - Common test methods Part 1-3: General application - Methods for determining the density - Water absorption tests - Shrinkage test

3 Definitions

For the purpose of this EN 50266-2-4 the following definitions apply. Definitions are taken from EN 60695-4.

3.1
ignition source
a source of energy that initiates combustion

3.2
char
carbonaceous residue resulting from pyrolysis or incomplete combustion

3.3
flame spread
propagation of a flame front

4 Test apparatus

4.1 General

The apparatus specified in EN 50266-1 shall be used.

4.2 Ignition source

The ignition source shall be one ribbon-type propane gas burner as specified in EN 50266-1.

5. Test procedure

5.1 Test sample

The test sample shall comprise a number of test pieces of cable from the same production length, each having a minimum length of 3,5 m.

The total number of test pieces in the test sample shall be that number required to provide a nominal total volume of non-metallic material of 1,5 litres per metre of test sample.

The test sample shall be chosen within the limitations given in annex A.

The test pieces forming the test sample shall be conditioned at a temperature of (20 ± 10) ºC for at least 16 h before commencing the test. The test pieces shall be dry.

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5.2 Determination of the number of test pieces

In order to calculate the appropriate number of test pieces, it is necessary to determine the volume per metre of non-metallic material of one test piece.

A length of cable which shall not be less than 0,3 m long is carefully cut to ensure that the surfaces are at right angles to the cable axis, thus enabling precise measurements of its length.

The density of each non-metallic component (including cellular material) shall be measured in an appropriate way, e.g. clause 8 of EN 60811-1-3, in order to obtain values expressed to the second decimal place.

Each non-metallic material C_i shall be removed from the test piece and weighed. Any non-metallic material making up less than 5% of the total non-metallic mass of the test piece shall be assumed to have a density of 1,0 kg/dm³.

Where semi-conducting screens cannot be removed from the insulating material, the components may be considered as one for the purpose of measuring their mass and density.

The volume V_i (litres per metre of cable) of each non-metallic material C_i is calculated as follows:

$$V_i = \frac{M_i}{\rho_i \times l}$$

where

M_i is the mass of the component C_i (kg)
ρ_i is the density of the component C_i (kg/dm³)
l is the length of the test piece of cable (m)

The total volume, V, of the non-metallic materials contained in one metre of cable is equal to the sum of the individual volumes V_1, V_2, etc.

The closest integer (0,5 and above corresponding to 1) of the number of test pieces to be mounted is obtained by dividing the volume per metre specified in 5.1 of this part by the total volume, V, of non-metallic material per metre of cable.

5.3 Mounting of the test sample

5.3.1 Cables having at least one conductor above 35 mm²

For cables having at least one conductor with a cross-section exceeding 35 mm², each test piece shall be attached individually to each rung of the ladder by means of metal wire (steel or copper). For cables up to and including 50 mm diameter use wire between 0,5 mm and 1,0 mm in diameter. For cables above 50 mm diameter use wire between 1,0 mm and 1,5 mm in diameter.

Test pieces shall be attached to the front of the standard ladder in a single layer up to a total maximum width of 300 mm with a space between each test piece of 0,5 x the cable diameter but not exceeding 20 mm (see Figure 1). There shall be a minimum distance of 50 mm between the edge of the test sample and the inside of the ladder uprights.

When mounting the test pieces, the first test piece shall be positioned approximately in the centre of the ladder and further test pieces added on either side so that the whole array of test pieces is approximately centred on the ladder.

5.3.2 Cables having conductors of 35 mm² and below

For cables having all conductors with cross-sections of 35 mm² or smaller, each test piece shall be attached, either individually or as part of an array, to each rung of the ladder by means of metal wire (steel or copper) between 0,5 mm and 1,0 mm in diameter.

Test pieces shall be attached to the front of the standard ladder in touching formation in one or more layers up to a maximum total width of 300mm. There shall be a minimum distance of 50 mm between the edge of the test sample and the inside of the ladder uprights.

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When mounting the test pieces, the first test piece or array of test pieces shall be positioned approximately in the centre of the ladder and further test pieces or arrays added on either side so the test sample is approximately centred on the ladder.

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If a second (or more) layer of test pieces is required after the full width of the ladder has been utilised for the first (or following) layer, then the first test piece or array of tests pieces in the second (or following) layer shall be positioned approximately in the centre of the ladder and further test pieces or arrays added on either side so that the second (or following) layer is approximately centred on the ladder.

If a large number of test pieces are required to make up a test sample, the test pieces may be attached to each rung of the ladder in flat arrays of cables of a maximum width of five test pieces using the specified metal wire. For consistency it is recommended that adjacent arrays of cables are secured together at every rung to ensure that they are in touching formation (see Figure 2).

5.4 Flame application time

The test flame shall be applied for 20 min, after which it shall be extinguished. The air flow through the test chamber shall be maintained until cable burning or glowing has ceased or until a maximum duration of one hour, after which any remaining cable burning or glowing shall be extinguished.

6 Evaluation of test results

After all cable burning or glowing has ceased or been extinguished, the test sample shall be wiped clean.

All soot is to be ignored if, when wiped off, the original surface is undamaged. Softening or any deformation of the non-metallic material is also to be ignored. The flame spread shall be measured as the extent of the damage. It shall be measured in metres to two decimal places from the bottom edge of the burner to the onset of char. The onset of char is determined as follows:

> Press against the cable surface with a sharp object, e.g. a knife blade. Where the surface changes from a resilient to a brittle (crumbling) surface, this indicates the onset of char.