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Communication cables - Specifications for test methods - Part 4-12: Environmental test methods - Vertical flame spread test on bunched small communication cables

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English version

Communication cables – Specifications for test methods Part 4-12: Environmental test methods – Vertical flame spread test on bunched small communication cables

Câbles de communication –
Spécifications des méthodes d'essai
Partie 4-12: Méthodes d'essais d'environnement –
Essai de propagation verticale de la flamme pour petits câbles de communication en faisceaux

Kommunikationskabel –
Spezifikationen für Prüfverfahren
Teil 4-12: Umweltprüfverfahren –
Prüfung der vertikalen Ausbreitung von Flammen auf dünne Kommunikationskabelbündel

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

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CENELEC

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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 46X, Communication cables.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50289-4-12 on 2004-02-01.

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)	2005-02-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2007-02-01

Contents

1 Scope

This part 4-12 of EN 50289 concerns small communication cables with a diameter equal or less than 14 mm, mounted on a test scale in bundles in order to obtain a total normal volume of non-metallic material equal to 0,5 l/m of test sample.

The application time is 20 min.

The tests proposed are for communication cables that require the testing of cables for low density installation.

The tests must be stipulated in the cable specifications, where the requirements must also be given.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 60695-4 Fire hazard testing -- Part 4: Terminology concerning fire tests (IEC 60695-4)

EN 60811-1-3 Insulating and sheathing materials of electric and optical cables – Common test methods
Part 1-3: General application - Methods for determining the density - Water absorption tests - Shrinkage test (IEC 60811-1-3)

3 Definitions

For the purpose of the present EN 50289-4-12, the following definitions apply. These definitions are taken from EN 60695-4.

3.1
source of ignition
source of energy triggering combustion

3.2
charred residue
carbon residue, resulting from pyrolisis or from incomplete combustion

3.3
flame spread
spreading of a flame front

4 Test apparatus

4.1 General information

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

4.2 Source of ignition

The source of ignition should comprise a propane ribbon burner as specified in EN 50266-1.

5 Test procedure

5.1 Test sample

The sample must include a certain number of cable sections from the same production run, each with a minimum length of 2,5 m and assembled in bundles of approximately 30 mm, as indicated in 5.2.

The total number of cable sections making up the test sample must be equal to the number stipulated so as to provide a nominal total volume of non-metallic material equal to 0,5 l per metre of test sample falling between 0,4 l/m and 0,6 l/m.

The test sample has to be chosen within the limits given in 5.3.

The cable sections making up the test sample must be conditioned at a temperature of (20 + 10) °C for at least 16 h before beginning the test. The cable sections must be dry.

5.2 Determining the number of cable sections

In order to calculate the appropriate number of cable sections, the volume per metre of non-metallic material in a cable section must be determined.

A length of cable, which should not be less than 0,3 m, is carefully cut so that the cut surfaces are perpendicular to the cable's axis, thus making it possible to measure its length accurately.

The density of each non-metallic component (including cellular material) must be measured using an appropriate method, for example in compliance with Clause 8 of EN 60811-1-3, in order to give values expressed to two decimal places.

All Ci non-metallic material must be withdrawn from the sample and weighed. All non-metallic material counting for less than 5 % of the total non-metallic mass of the cable section should be considered as having a density of 1,0 kg/dm³.

Where the semi-conductor shields cannot be separated from the insulation materials, they may be considered as being part of the insulating material when measuring their mass and density.

The volume V_i (in litres per metre of cable) of each Ci non-metallic component can be measured or calculated as follows:

$$V_i = \frac{M_i}{P_i \times L}$$

where

M_i is the mass of the Ci component (kg)
P_i is the density of the Ci component (kg/dm³)
L is the length of the cable sample (m)

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

5.3 Installation for test

a) the diameter of the bundles is approximately 30 mm

b) the space between the bundles will be approximately 15 mm

c) the number of cables per bundle should be based on a circular geometric construction, for example 7-19-37…etc.

However possible number of cables per bundle are 3,7,12,19,27,37,61,91,127,169.

d) the number of bundles will be determined as follows:

i) the number of bundles must be as small as possible with a minimum of two;

ii) each bundle should have the same construction;

iii) the number of bundles must be determined if it is necessary to give a value of approximately 0,5 l/m object of (ii) above to the total volume of non-metallic material.

The cable to be tested must be selected so that the total of the non-metallic material in the bundles to be tested is over 0,4 l/m but does not exceed 0,6 l/m;

iv) the length of the bundles must be 3,5 m;

e) the bundle shall be tightly twisted with a lay length of approximately 15 time of the bundle diameter.

5.4 Length of time the flame should be applied

The test flame should be applied for 20 min, after which it will be extinguished. The airflow through the test chamber must be maintained until combustion or incandescence of the cable is over, or for a maximum time of one hour, after which any remaining combustion or incandescence of the cable must be extinguished.

6 Evaluation of the test results

Once combustion or incandescence of the cable is over or has been extinguished, the test sample must be wiped.

The results are not taken into account if, after wiping, the original surface has not been damaged. The melted or distorted parts of the non-metallic material are not taken into account either. The spreading of the flame must be measured to two decimal places, from the lower end of the burner up to the limit of the charred zone. This is defined as follows:

Using a sharp object, for example a knife blade, apply pressure to the surface of the cable. The limit of the charred zone is found at the point where the behaviour of the surface becomes brittle (crumbly) instead of elastic.

7 Performance requirements

The performance requirements for a particular type or a particular class of wire or cable should be given in that cable's individual standard. If no given requirement exists, it is considered that the maximum limit burnt is 2,50 m.

8 Procedure for cross-checking

In the event of conflict, two further tests as specified in Clause 5 must be carried out. The test is considered as satisfactory if the two tests meet the given requirements.