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Požarna klasifikacija gradbenih proizvodov in elementov stavb - 6. del: Klasifikacija na podlagi podatkov iz preskusov odziva na ogenj na električnih kablih

Fire classification of construction products and building elements - Part 6: Classification using data from reaction to fire tests on electric cables

Klassifizierung von Bauprodukten und Bauarten zu ihrem Brandverhalten - Teil 6: Klassifizierung mit den Ergebnissen aus den Prüfungen zum Brandverhalten von elektrischen Kabeln

Classement au feu des produits et éléments de construction - Partie 6: Classement à partir des données d’essais de réaction au feu sur câbles électriques

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Klassifizierung von Bauprodukten und Bauarten zu ihrem Brandverhalten - Teil 6: Klassifizierung mit den Ergebnissen aus den Prüfungen zum Brandverhalten von elektrischen Kabeln

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Foreword

This document (EN 13501-6:2014) has been prepared by Technical Committee CEN/TC 127 “Fire safety in buildings”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2014, and conflicting national standards shall be withdrawn at the latest by September 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of (EU) N°305/2011.

CEN, CENELEC and EOTA committees preparing technical specifications, which contain performance requirements against reaction to fire tests, should make reference to the reaction to fire classification given in this European Standard and not refer directly to any specific fire test method.

This document has been prepared in cooperation with CLC/TC 20 “Electric cables”, CLC/TC 46X “Communication cables” and CLC/TC 86A “Optical fibre cables”.

EN 13501 *Fire classification of construction products and building elements* consists of the following parts:

— *Part 1: Classification using data from reaction to fire tests;*

— *Part 2: Classification using data from fire resistance tests, excluding ventilation services;*

— *Part 3: Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers;*

— *Part 4: Classification using data from fire resistance tests on components of smoke control systems;*

— *Part 5: Classification using data from external fire exposure to roofs tests;*

— *Part 6: Classification using data from reaction to fire tests on electric cables.*

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The aim of this European Standard is to define a harmonized procedure for the classification of reaction to fire of electric cables. This classification is based on the test procedures listed in Clause 5.

This European Standard has been prepared in support of the second essential requirement in the EC Construction Products Regulation (EU) N°305/2011 and as detailed in the Interpretative Document Number 2: Safety in case of fire (OJ C62 Vol. 37).

Background information on the Commission Decision regarding the classification of the reaction to fire performance of electric cables is given in Annex B.

There is a procedure by which certain products can be assigned a particular fire classification without the need for testing. Such products have well established reaction to fire performance and have been agreed by the Standing Committee on Construction. Agreements relating to such products which may be 'classified without further testing' (CWFT) are published in the Official Journal of the EC and are listed on the Nando-CPD database on the EC website (http://europa.eu.int/comm/enterprise/construction).

Part 1 of this European Standard covers classification resulting from reaction to fire tests for products other than electric cables.

Parts 2, 3 and 4 of this European Standard are concerned with classification resulting from fire resistance tests.

Part 5 covers classification resulting from tests for external fire exposure to roofs.

1 Scope

This European Standard provides the reaction to fire classification procedure for electric cables.

NOTE For the purpose of this European Standard the term “electric cables” covers all power, control and communication cables, including optical fibre cables.

2 Normative references

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

EN 50267-2-3, *Common test methods for cables under fire conditions — Tests on gases evolved during combustion of material from cables — Part 2-3: Procedures - Determination of degree of acidity of gases for cables by determination of the weighted average of pH and conductivity*

EN 50399, *Common test methods for cables under fire conditions — Heat release and smoke production measurement on cables during flame spread test — Test apparatus, procedures, results*

prEN 50575, *Power, control and communication cables — Cables for general applications in construction works subject to reaction to fire requirements*

CLC/FprTS 50576, *Electric cables, extended application of test results*

EN 60332-1-2:2004, *Tests on electric and optical fibre cables under fire conditions — Part 1-2: Test for vertical flame propagation for a single insulated wire or cable — Procedure for 1 kW pre-mixed flame (IEC 60332-1-2:2004)*

EN 61034-2, *Measurement of smoke density of cables burning under defined conditions — Part 2: Test procedure and requirements (IEC 61034-2)*

EN ISO 1716, *Reaction to fire tests for products — Determination of the gross heat of combustion (calorific value) (ISO 1716)*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE Where the definitions are identical to those in EN ISO 13943, this is indicated.

3.1.1
product
material, element or component about which information is required, in the context of this standard, the product is an electric cable about which information is required

3.1.2
material
single basic substance or uniformly dispersed mixture of substances

3.1.3
external component
external layer of the cable, i.e. the sheath

3.1.4
end use application
real application of a product, in relation to all aspects that influence the behaviour of that product under different fire situations

Note 1 to entry: It covers aspects such as its quantity, orientation, position in relation to other adjacent products, and its method of fixing.

3.1.5
fire performance
response of a test specimen when exposed to a specific fire

[SOURCE: EN ISO 13943]

3.1.6
reaction to fire
response of a test specimen when it is exposed to fire under specified conditions in a fire test

[SOURCE: EN ISO 13943]

3.1.7
fire scenario

qualitative description of the course of a fire with respect to time, identifying key events that characterize the studied fire and differentiate it from other possible fires

[SOURCE: EN ISO 13943]

3.1.8
reference scenario
hazard situation used as a reference for a given test method or classification system

3.1.9
fire situation
stage in the development of a fire, characterised by the nature, severity and size of the thermal attack on the products involved

3.1.10
combustion
exothermic reaction of a substance with an oxidizer

[SOURCE: EN ISO 13943]

Note 1 to entry: Combustion generally emits effluent accompanied by flames and/or visible light.

3.1.11
heat of combustion
thermal energy produced by combustion of unit of mass of a given substance

[SOURCE: EN ISO 13943]

Note 1 to entry: It is expressed in kilojoules per gram.

3.1.12
gross heat of combustion (PCS)
heat of combustion of a substance when the combustion is complete and any produced water is entirely condensed under specified conditions

[SOURCE: EN ISO 13943]

3.1.13
net heat of combustion (PCI)
heat of combustion of a substance when the combustion is complete and any produced water is in the vapour state under specified conditions

[SOURCE: EN ISO 13943]

3.1.14
contribution to fire
energy released by a product influencing the fire growth both in pre- and post-flashover situations

3.1.15
heat release
thermal energy produced by combustion

[SOURCE: EN ISO 13943]

3.1.16
vertical flame spread (FS)
damaged length of the sample, as measured in the EN 50399 test

3.1.17
vertical flame spread (H)
distance from the upper onset of charring (above the flame application point) to the lower onset of charring (below the flame application point) as measured in the EN 60332-1-2 test

3.1.18
fully developed fire
state of total involvement of combustible materials in a fire

[SOURCE: EN ISO 13943]

3.1.19
flashover
transition to a state of total surface involvement in a fire of combustible materials within an enclosure

[SOURCE: EN ISO 13943]

3.1.20
flaming droplets/particles
material separating from the specimen during the fire test and continuing to flame for a minimum period as described by the test method

[SOURCE: EN 50399]

3.1.21
FIGRA
fire growth rate index used for classification purposes for the classes $B1_{ca}$, $B2_{ca}$, C_{ca} and D_{ca}

Note 1 to entry: For the classification of cables, FIGRA means the maximum of the quotient of heat release rate from the specimen, excluding the contribution of ignition source, and the time of its occurrence using a THR threshold of 0,4 MJ and an HRR threshold of 3 kW.

Note 2 to entry: The *FIGRA* for cables is defined in more detail in EN 50399.

3.1.22
direct field of application
outcome of a process (involving the application of defined rules) whereby a test result is deemed to be equally valid for variations in one or more of the product properties and/or intended end use applications

3.1.23
extended field of application
outcome of a process (involving the application of defined rules that may incorporate calculation procedures) that, in the context of this standard, attributes for a cable family, a test result on the basis of one or more test results to the same test standard

3.1.24
extended application result
predicted result for performance parameter obtained following the process of extended field of application

3.1.25
extended application report
document reporting extended application results, including all details of the process leading to those results

3.2 Symbols and abbreviations

The symbols and notations correspond to those given in the appropriate test method.

FIGRA	fire growth rate index used for classification purposes [W/s]
PCS	gross heat of combustion [MJ/kg]
THR_{1200s}	total heat release (HRR_{sm30}) from test start until end of test, excluding contribution from ignition source [MJ]
TSP_{1200s}	total smoke production (SPR_{sm60}) from test start until end of test [m^2]
Peak HRR	= HRR = maximum value of heat release, excluding the burner output, determined during the whole burner application time, averaged over 30 s expressed in [kW]
Peak SPR	= SPR = maximum value of smoke production, determined during the whole burner application time, averaged over 60 s, expressed in [m^2/s]
FS	vertical flame spread [m] equals the damaged length of the sample
H	vertical flame spread [mm] as defined in 3.1.17
m'	mean value of the set of results of a continuous parameter determined in accordance with the relevant test method using the minimum number of tests as specified in the test method
m	mean value of the set of results of a continuous parameter determined in accordance with the procedure in 7.4 and used for classification

4 Classes of reaction to fire performance

The classes with their corresponding fire performance are given in Table 1.

Products classified in a given class are deemed to satisfy all the requirements of any lower class.

A classification can only be obtained by undertaking the tests for a particular product or product family.

5 Test methods

5.1 General

The following test methods are specified in relation to the envisaged reaction to fire classification. The relevant classification parameters are given in Table 1.

5.2 Heat of combustion test (EN ISO 1716)

This test determines the potential maximum total heat release of a product when completely burning, regardless of its end use.

The test is relevant for the class A_{ca}.

It allows the determination of both the gross heat of combustion (*PCS*) and the net heat of combustion (*PCI*).

5.3 Vertical flame spread of single cable (EN 60332-1-2)

This test evaluates the flame spread of a single cable under exposure to a small flame. The test is relevant for the classes $B1_{ca}$, $B2_{ca}$, C_{ca}, D_{ca} and E_{ca}.

5.4 Burning behaviour and smoke production of bunched cable – (EN 50399)

For smoke production, the test is relevant for $B1_{ca}$, $B2_{ca}$, C_{ca} and D_{ca} in association with the additional classification s.

This test evaluates the potential contribution of a cable, installed with other cables, to the development of a fire, under direct exposure to a flame source.

The test is relevant for the class $B1_{ca}$, using a 30 kW flame source and special mounting requirements.

The test is relevant for the classes $B2_{ca}$, C_{ca} and D_{ca}, using a 20,5 kW flame source.

5.5 Smoke production of burning cable (EN 61034-2)

This test evaluates the potential contribution of a cable to obscuration of vision when burning under static air conditions. The test is relevant for the classes $B1_{ca}$, $B2_{ca}$, C_{ca} and D_{ca}, in association with the additional classification s.

5.6 Acidity of gases produced by burning cables (EN 50267-2-3)

This test evaluates the potential contribution of burning cable materials to produce acidic gases. The test is relevant for the classes $B1_{ca}$, $B2_{ca}$, C_{ca} and D_{ca} in association with the additional classification a.

6 Principles for specimen preparation

Before testing, product specimens shall be prepared and conditioned and, where relevant, mounted in accordance with the relevant test methods.

Cables tested according to EN 50399 are mounted on a cable ladder. The number of cables, their spacing and other mounting details vary according to the cable diameter as described in EN 50399. It should be noted that cables applying for class D_{ca}, C_{ca} or $B2_{ca}$ are all mounted in a similar way while for cables applying for $B1_{ca}$ there is an additional requirement that a non-combustible calcium silicate board is mounted at the back of the cable ladder. Details are given in EN 50399.