SLOVENSKI STANDARD
oSIST prEN 50576:2021

01-september-2021

Električni kabli - Razširjena uporaba rezultatov preskusov odziva na ogenj

Electric cables - Extended application of test results for reaction to fire

Erweiterte Anwendung von Prüfergebnissen bezüglich Brandverhalten

Câbles électriques - Application étendue des résultats d'essai pour la réaction au feu

Ta slovenski standard je istoveten z: **prEN 50576**

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

oSIST prEN 50576:2021 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 50576

July 2021

ICS 13.220.40; 29.060.20

Will supersede CLC/TS 50576:2016 and all of its amendments and corrigenda (if any)

English Version

Electric cables - Extended application of test results for reaction to fire

Câbles électriques - Application étendue des résultats d'essai pour la réaction au feu

Erweiterte Anwendung von Prüfergebnissen bezüglich Brandverhalten

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2021-10-15.

It has been drawn up by CLC/TC 20.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CENELEC in three official versions (English, French, German).
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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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Project: 72460

Ref. No. prEN 50576 E

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European foreword

This document (prEN 50576:2021) has been prepared by CLC/TC 20 “Electric cables”.

This document is currently submitted to the Enquiry.

The following dates are proposed:

• latest date by which the existence of this document has to be announced at national level	(doa)	dor + 6 months
• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	dor + 12 months
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dor + 36 months (to be confirmed or modified when voting)

This document will supersede CLC/TS 50576:2016 and all of its amendments and corrigenda (if any).

This document is expected to be used in conjunction with EN 50575 in order to evaluate the reaction to fire performance of power, control and communication cables.

Introduction

The original project “CEMAC – CE marking of cables” was carried out over a three-year period. It brought together cable manufacturers, research and testing laboratories, and research establishments in creating the technical background and developing rules and procedures for extended application of test results (EXAP). More than 200 tests to EN 50399 on more than 100 cables were carried out as part of the project. The final report [1] was published in 2010 and the EXAP rules and procedures developed by the CEMAC project have been used as the basis for this document.

A specific EXAP procedure and rules based on the use of safety margins and a cable parameter derived from the extensive CEMAC tests was developed for the most common generic types of power cables used in the European market.

A general EXAP procedure and rules based upon a statistical treatment of the actual test results obtained from a cable family was also developed for any power cables. However, the use of this general procedure and rules will generally require more tests to be carried out than the use of the specific procedure and rules.

Since the CEMAC project report was completed in 2010, the project has been extended to further investigate the performance of optical fibre cables and rules and procedures developed for extended application of test results for these products. An additional report [2] was published in 2015 and the EXAP rules and procedures developed by the further CEMAC project work was used as the basis for CLC/TS 50576:2016.

Since 2016, the project has been extended to further investigate the performance of communication cables and rules and procedures developed for extended application of test results for these products. The work [7] was published in 2016 and has been included in this document.

EXAP rule for single core unsheathed power cables has been included [8].

In addition, this edition includes editorial improvements and re-arrangements as well as the following significant technical changes with respect to the previous edition:

— simplification of the choice of samples to the EXAP rule for EN 60332-1-2 for classes $B2_{ca}$, C_{ca} and D_{ca} for electric cables;

— simplification of the choice of samples due to the changes in the test standard to the EXAP rule for EN 61034-2;

— implementation of a direct application rule for EN 60754-2;

— improvement of d_{min} to the Table 2.

General guidance on direct and extended application can be found in CEN/TS 15117 [3].

1 Scope

This document gives the procedure and rules for extended application of results of tests carried out according to the test methods described in EN 50399, EN 60332-1-2 and EN 61034-2.

The EXAP rules described apply to EN 50399 test results used for classification according to EN 13501-6 in classes $B2_{ca}$, C_{ca} and D_{ca}, additional smoke production classes s1, s2 and s3 and flaming droplets/particles, to EN 60332-1-2 test results used for classification in classes $B2_{ca}$, C_{ca}, D_{ca} and E_{ca} and to EN 61034-2 test results used for classification in classes s1a and s1b.

No EXAP procedure and rules have been developed in respect to the results of tests carried out according to the test method described in EN 60754-2. As the parameters (pH and conductivity) for each cable in a family are determined based upon calculation using material test results, this is considered as a matter of direct application. Material test results taken from any one sample of finished cable from a family are sufficient to calculate the parameters for each cable in the family.

Cables of diameter 5,0 mm and less are expected to be tested as bundles according to EN 50399. Cables with a diameter of less than or equal to 5,0 mm are included in the specific and general EXAP rules for single core unsheathed power cables only. The rules apply to circular and non-circular cables provided that they fall within the scope of the relevant test method.

A specific EXAP rule has been developed for the most common generic power cable families, optical fibre cables and communication cables. A general EXAP rule has been developed for all electric cable families unless otherwise stated elsewhere in this document.

NOTE 1 Multicore power cables are sometimes referred to as control cables with a rated voltage but for the purposes of this document are considered as power cables. For multipair, multitriple and multiquad control cables, either the general EXAP rule or the specific EXAP rule for power cables or the specific EXAP rule for communication cables can be applied.

The use of the specific EXAP rule gives benefit in the lower number of cables to be tested for a range of cable constructions (product family).

An EXAP is only possible when cables belong to a defined family as defined in this document.

NOTE 2 For the purposes of this document, the term “electric cables” also covers optical fibre cables.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 13501-6, *Fire classification of construction products and building elements - Part 6: Classification using data from reaction to fire tests on power, control and communication cables*

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*

EN 60332-1-2, *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)*

EN 60754-2, *Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity (IEC 60754-2)*

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

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
classification
process defined in EN 13501-6, whereby the fire performance parameters obtained from the results of one test, or a set of tests, or from a process of extended application, are compared with limiting values for those parameters that are set as criteria for achieving a certain classification

[SOURCE: EN 50575]

3.2
electric cable
all power, control and communication cables, including optical fibre cables and hybrid cables which are a combination of two or more of these cable types

[SOURCE: EN 50575]

3.3
power cable
assembly comprising one or more insulated conductor(s), together with any coverings and protective layers, used for the transmission or supply of electrical energy

[SOURCE: EN 50575]

3.4
control cable
assembly comprising insulated conductors, together with any coverings and protective layers, used for the transmission of control, measuring and indication signals in electric installations

[SOURCE: EN 50575]

3.5
communication cable
assembly of suitably insulated coaxial conductors or twisted pairs of insulated conductors fabricated to meet transmission, mechanical and environmental requirements, and sufficient to allow conveyance of information between two points with the minimum of radiation

Note 1 to entry: For this document, only communication cables with copper conductors are considered.

[SOURCE: EN 50575]

3.6
optical fibre cable
assembly comprising one or more optical fibres or fibre bundles inside a common covering designed to protect them against mechanical stresses and other environmental influences while retaining the transmission quality of the fibres

[SOURCE: IEV 731-04-01]

3.7
product family
group of products produced by one manufacturer for which the test results for one or more characteristics from one product within the family are considered to be representative for that same characteristic for all other products within this family

[SOURCE: EN 50575]

3.8
extended application of test results
EXAP
outcome of a process (involving the application of defined rules that may incorporate calculation procedures) that attributes, for a cable family, a test result on the basis of one or more test results to the same test standard

3.9
heat release rate
HRR
thermal energy released per unit time by an item during combustion under specified conditions

[SOURCE: EN 50399]

3.10
total heat release
THR
integrated value of the heat release rate over a defined period

[SOURCE: EN 50399]

3.11
smoke production rate
SPR
smoke production per unit time

[SOURCE: EN 50399]

3.12
total smoke production
TSP
integrated value of the smoke production rate over a defined period

[SOURCE: EN 50399]

3.13
flame spread
FS
propagation of a flame front

[SOURCE: EN 50399]

3.14
fire growth rate index
FIGRA
highest value of the quotient between HRR and time

[SOURCE: EN 50399]

3.15
armour
covering consisting of a metal tape(s) or wires, generally used to protect the cable from external mechanical defects

Note 1 to entry: For the purpose of this document, metallic tape thicker than 0,10 mm thickness is considered an armour.

Note 2 to entry: Examples for wire coverings are concentric conductors or braids.

[SOURCE: IEV 461-05-06]

3.16
non-circular cable
cable where the measured difference between any two values of the overall diameter of the cable at the same cross-section exceeds 15 % of the largest overall diameter

Note 1 to entry: So-called figure of 8 cables, consisting of two single cables connected together (by for instance an extruded bridge) are considered non-circular cables.

[SOURCE: EN 50399]

4 Extended application of test results (EXAP)

4.1 Product families for EXAP

4.1.1 General

4.1.1.1 Introduction

An EXAP is only possible when cables belong to a defined family.

The cable family shall be produced by the same manufacturer using the same materials and the same design rules (for instance International standard, National standard, Company standard based on National or International standard), subject to the provisions of 4.1.2 to 4.1.4.

NOTE A common design rule is that the thickness of the design elements (for instance insulation and/or sheath thickness) increase with conductor size and cable diameter. These cables, using this common design rule, belong to the same cable family.

The full constructional and material details for the family shall be submitted to the certification body prior to the EXAP being applied.

4.1.1.2 Colour and marking of design elements

A change to the colour of design elements (for instance insulation, fibre and/or sheath) or to the marking on insulation and/or sheath does not constitute a different cable family.

4.1.1.3 Centre filler and interstitial fillers

It is common that part of the cables in a product range have a centre filler (depending on number of cores and/or cross section) and part of the cables in that product range are without centre filler.

In case the volume of the centre filler is equal or less than 10 % of the total non-metallic volume, then the same cable with the centre filler belongs to the family of cable's without a centre filler (on the condition that all other requirements of this document are fulfilled).

In case the volume of the centre filler is greater than 10 % of the total non-metallic volume constitutes a different family from the cables without centre filler.