

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

| | |
|---|--|
| See Eesti standard EVS-EN 50576:2022 sisaldab Euroopa standardi EN 50576:2022 ingliskeelset teksti. | This Estonian standard EVS-EN 50576:2022 consists of the English text of the European standard EN 50576:2022. |
| Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas. | This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation. |
| Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 23.12.2022. | Date of Availability of the European standard is 23.12.2022. |
| Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest. | The standard is available from the Estonian Centre for Standardisation and Accreditation. |

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 13.220.40, 29.060.20

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis-ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis-ja Akrediteerimiskeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

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

Kabel und Leitungen - Erweiterte Anwendung von
Prüfergebnissen bezüglich Brandverhalten

This European Standard was approved by CENELEC on 2022-12-12. 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.

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

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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

| | |
|--|----|
| European foreword | 4 |
| Introduction | 5 |
| 1 Scope | 6 |
| 2 Normative references | 6 |
| 3 Terms and definitions | 7 |
| 4 Extended application of test results (EXAP) | 9 |
| 4.1 Product families for EXAP | 9 |
| 4.1.1 General | 9 |
| 4.1.2 Product families for power cables | 10 |
| 4.1.3 Product families for communication cable | 11 |
| 4.1.4 Product families for optical fibre cables | 11 |
| 5 Specific EXAP for EN 50399 test with safety margin | 12 |
| 5.1 Rules for power cables | 12 |
| 5.1.1 General | 12 |
| 5.1.2 Extension to cables larger than the tested range | 13 |
| 5.1.3 Single core unsheathed power cables with a diameter of less than or equal to 5,0 mm 13 | |
| 5.2 Rules for optical fibre cables | 14 |
| 5.3 Rules for communication cables | 15 |
| 6 General EXAP for EN 50399 test for electric cables | 16 |
| 6.1 General | 16 |
| 6.1.1 Introduction | 16 |
| 6.1.2 Selection of cable parameter, $n = 3$ cables | 17 |
| 6.1.3 Selection of cable parameters, $n > 3$ cables | 18 |
| 7 EXAP rule for EN 50399 test for flaming droplets/particles for electric cables | 18 |
| 8 EXAP rule for EN 60332-1-2 test for classes B _{2ca} , C _{ca} and D _{ca} for electric cables | 18 |
| 9 EXAP rule for EN 60332-1-2 test for class E _{ca} for electric cables | 19 |
| 10 Direct application rule for EN 60754-2 test for electric cables | 19 |
| 11 EXAP rule for EN 61034-2 test for electric cables | 19 |
| Annex A (informative) An example of flow chart and checklist for specific EXAP | 21 |
| A.1 Basic EXAP procedure flow chart | 21 |
| A.2 Checklist for specific EXAP | 22 |
| Annex B (normative) Rounding of numbers | 23 |
| Annex C (informative) Examples to specific and general EXAP | 24 |
| C.1 For specific EXAP for EN 50399 test | 24 |
| C.2 For general EXAP for EN 50399 test | 24 |
| Bibliography | 28 |

Tables

| | |
|---|----|
| Table 1 — Safety margins v_{sm} for power cables | 12 |
| Table 2 — Allowed range of cable diameters and cable parameters for using safety margins as specified in Table 1 | 13 |
| Table 3 — Allowed ranges of d_{max} for EXAP applied for larger cables | 13 |
| Table 4 — Safety margins v_{sm} for single core unsheathed power cables with a diameter of less than or equal to 5,0 mm | 14 |
| Table 5 — Safety margins v_{sm} for optical fibre cables | 15 |
| Table 6 — Safety margins v_{sm} for communication cables | 16 |

Figures

| | |
|---|----|
| Figure A.1 — Flow chart of the EXAP procedure | 21 |
| Figure C.1 — Assessment of v_{class} for the classification parameter TSP (theoretical example) | 24 |
| Figure C.2 — FIGRA results for cable family | 25 |
| Figure C.3 — TSP results for cable family | 26 |
| Figure C.4 — TSP results for cable family | 27 |

European foreword

This document (EN 50576:2022) has been prepared by CLC/TC 20 "Electric cables".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-12-12
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2025-12-12

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

EN 50576:2022 includes the following significant technical changes with respect to CLC/TS 50576:2016:

- Inclusion of EXAP rule for single core unsheathed power cables with a diameter of less than or equal to 5,0 mm [8];
- simplification of the choice of samples to the EXAP rule for EN 60332-1-2 for classes B_{2ca}, 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.

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

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

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

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.

In addition, this edition includes editorial improvements and re-arrangements.

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

1 Scope

This document describes 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 with a diameter of 5,0 mm or 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 any of the types of electric cable families as defined in this document. 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, multitruple 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 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)*