# SLOVENSKI STANDARD
# oSIST prEN 50290-2-27:2020

**01-september-2020**

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**Komunikacijski kabli - 2-27. del: Skupna pravila za načrtovanje in konstrukcijo - Brezhalogenske zmesi za oplaščenje kablov na osnovi poliolefinov z izboljšanimi lastnostmi zadrževanja ognja (HFFR)**

Communication cables - Part 2-27: Common design rules and construction - Halogen free polyolefin based sheathing compounds for cables having improved flame and fire properties (HFFR)



**Ta slovenski standard je istoveten z:** **prEN 50290-2-27**

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**ICS:**

| | | |
|---|---|---|
| 29.035.20 | Plastični in gumeni izolacijski materiali | Plastics and rubber insulating materials |
| 33.120.10 | Koaksialni kabli. Valovodi | Coaxial cables. Waveguides |

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Will supersede EN 50290-2-27:2002 and all of its amendments and corrigenda (if any)

English Version

# Communication cables - Part 2-27: Common design rules and construction - Halogen free polyolefin based sheathing compounds for cables having improved flame and fire properties (HFFR)

To be completed

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This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2020-10-09.

It has been drawn up by CLC/TC 46X.



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).
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, Turkey and the United Kingdom.

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

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

# Contents

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# European foreword

This document (prEN 50290-2-27:2020) has been prepared by CLC/TC 46X “Communication 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 EN 50290-2-27:2002 and all of its amendments and corrigenda (if any).

# 1 Scope

This document gives specific requirements for halogen free polyolefin based sheathing compounds used for halogen free communication cables with improved characteristics in the case of fire.

Compounds, described by this document, are commonly also named HFFR or HFFR-LS (halogen free, flame/fire retardant, low smoke), see also EN 50290-2-20.

It is expected to be read in conjunction with EN 50290-2-20, the product standards EN 50288 series, EN 60794 series and other applicable product standards.

Improved characteristics in the case of fire are demonstrated by specific fire tests on cables for flame/fire retardant applications (e.g. single or bunched cable fire test). Additional tests to prove the characteristics in case of fire, e.g. such as smoke emission test, might also be part of the dedicated product standard or specification.

This document describes the compound types as given in Table 1

**Table 1 — Sheathing compounds**

| Compound grades | Max. operating temperature | Comment |
|---|---|---|
| Type 1 | 70°C | thermoplastic standard |
| Type 2 | 90°C | thermoplastic, higher temperature |
| Type 3 | 90°C | crosslinked, higher temperature |

# 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 50290-2-20, *Communication cables - Part 2-20: Common design rules and construction - General*

EN 60754-1, *Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content (IEC 60754-1)*

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 60684-2:2011, *Flexible insulating sleeving - Part 2: Methods of test (IEC 60684-2:2011)*

EN 60811-402, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 402: Miscellaneous tests - Water absorption tests (IEC 60811-402)*

EN 60811-606, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 606: Physical tests - Methods for determining the density (IEC 60811-606)*

EN ISO 4589-2, *Plastics - Determination of burning behaviour by oxygen index - Part 2: Ambient-temperature test (ISO 4589-2)*

# 3 Terms and definitions

No terms and definitions are listed in this document.

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 http://www.electropedia.org/

## 4 Compound test requirements

The tests are to be carried out on granules or moulded plaques (or other suitable test pieces) produced from granules of the supplied compound.

This data shall describe the general performance of halogen free polyolefin based sheathing compounds. The data shall be provided by the compound supplier and therefore can be included in any supply specification of the raw material.

Test methods, relevant requirements and limits are shown in Table 2.

In the case of special applications, additional requirements could be specified.

## 5 Cable test requirements

The anticipated performance assumes standard cable design and conventional process technology and is specified in Table 3.

In case of specific applications, additional requirements should be included in the detailed specification of the cable. This includes relevant test methods and requirements, especially referring to any cable fire performance, but also additional sheathing properties for indoor or outdoor applications.

## 6 Health, safety and environmental (HSE) requirements

The materials are subject to health, safety and environmental (HSE) requirements as defined in EN 50290-2-20. Any deviations or compliance failures shall be identified by the raw material supplier and necessary corrective actions to be undertaken agreed with the cable maker.



**Table 2 — Sheathing compound — properties [a]**

| | Characteristics | Test method | Unit | Values |
|---|---|---|---|---|
| **1** | **Density** | **EN 60811-606** | **g/cm$^3$** | **to be reported by supplier [c]** |
| **2** | **Corrosivity of gases** | **EN 60754-2** | | |
| | **pH-value** | | **[-]** | **≥ 4,3** |
| | **conductivity** | | **µS/mm** | **≤ 10** |
| **3** | Halogen acid content | EN 60754-1<br>EN 60684-2:2011, 45.2 | | |
| | **HCl/HBr** | | **%** | ≤ 0,5 |
| | HF | | **%** | ≤ 0,1 |
| **4** | OI - Oxygen Index [b] | **EN ISO 4589-2** | **%** | **to be reported by supplier [c]** |
| **5** | Smoke emission [d] | | | **for further study** |
| **6** | Water absorption (7d/70°C) [e] | EN 60811-402 | **mg/cm²** | **≤ 5** |
| Compounds described in EN 50290-2-27 may be hygroscopic and the values defined are to be measured on material typically containing less than 400 ppm of water. Precautions should be taken to minimize the ingress of water to these compounds during storage and processing. | | | | |

| Characteristics | Test method | Unit | Values |
|---|---|---|---|
| a All values of Table 2 shall be provided by the compound supplier, see Clause 4<br>b Or any other suitable test method which gives indication about flame and fire behaviour of the material (e.g. by cone calorimeter as ISO 5660 measurements)<br>c Informative: to be given values are only to characterize the material in order to give a perception whether the material is suitable to meet the cable requirements requested in the relevant product standard/specification<br>d To give an indication of the smoke performance of the material, smoke emission can be observed during any suitable material fire test. However, a correlation to a full cable fire test, e.g. EN 61034 series Measurement of Smoke Density of Cables, cannot be deviated.<br>e To be use for sheathing compounds intended to be used in external or internal/external applications | | | |

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**Table 3 — Sheathing compound — cable jacket properties**

| Ref N° | Characteristics | Test method | Unit | Grade Type 1 | Grade Type 2 | Grade Type 3 |
|---|---|---|---|---|---|---|
| 1 | Mechanical characteristics [a] | EN 60811-501 | | | | |
| 1.1 | In state of delivery | | | | | |
| 1.1.1 | Tensile strength<br>- median, min. | | MPa | 9,0 | 9,0 | 10,0 |
| 1.1.2 | Elongation at break<br>- median, min. | | % | 125 | 125 | 125 |
| 1.2 | After ageing | EN 60811-401 | | | | |
| | Ageing conditions<br>- temperature<br>- duration | | °C<br>h | 100 ± 2<br>7 × 24 | 110 ± 2<br>7 × 24 | 135 ± 2<br>7 × 24 |
| 1.2.1 | Tensile strength<br>- median, min<br>- variation, max. | | MPa<br>% | 9,0<br>−30/+40 | 9,0<br>−30/+40 | 10,0<br>−30/+40 |
| 1.2.2 | Elongation at break<br>- median, min<br>- variation, max<br>for thickness | | %<br>%<br>mm | 100 ± 30<br>/ ± 40 > 0,6<br>/ ≤ 0,6 | 100 ± 30<br>/ ± 40 > 0,6<br>/ ≤ 0,6 | 100 ± 30<br>/ ± 40 > 0,6<br>/ ≤ 0,6 |
| 2 | Low temperature characteristics | | | | | |
| 2.1 | Bending test at low temperature [b] | EN 60811-504 | | | | |
| | Test conditions<br>- temperature | | °C | - 15 ± 2 | - 15 ± 2 | - 15 ± 2 |
| 2.2 | Result to be obtained | | | No crack | No crack | No crack |
| | Cold elongation [c] | EN 60811-505 | | | | |
| | Test conditions<br>- temperature | | °C | - 15 ± 2 | - 15 ± 2 | - 15 ± 2 |
| | Result to be obtained, min. | | % | 20 | 20 | 20 |

| Ref N° | Characteristics | Test method | Unit | Grade Type 1 | Grade Type 2 | Grade Type 3 |
|---|---|---|---|---|---|---|
| 3 | Pressure test at high temperature | EN 60811-508 | | | | |
| | Test conditions<br>- temperature<br>- duration (for all cable diameters) | | °C<br>h | 80 ± 2<br>4 | 90 ± 2<br>4 | Not applicable |
| | Result to be obtained<br>- depth of indentation median, max. | | % | 50 | 50 | |
| 4 | Heat Shock test | EN 60811-509 | | | | |
| | Test conditions<br>- temperature<br>- duration | | °C<br>h | 90<br>1 | 90<br>1 | 90<br>1 |
| | Result to be obtained | | | no crack | no crack | no crack |
| 5 | Hot set test | EN 60811-507 | | Not applicable | Not applicable | |
| | Test conditions<br>- temperature<br>- duration<br>- tensile force | | °C<br>min<br>N/cm² | | | 200 ± 3<br>15<br>20 ± 0,5 |
| | Result to be obtained<br>- elongation under load, max.<br>– residual elongation, max | | %<br>% | | | 175<br>25 |

a Guidance for the preparation of samples for tensile and elongation tests before and after ageing. If the samples under test have ridges on the inside caused by the inner components of the cable (cores or wire braid) then these ridges should be removed by buffing, cutting or milling

b For outer diameter ≤ 12,5 mm

c For outer diameter > 12,5 mm

# Bibliography

EN 60811-401, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 401: Miscellaneous tests - Thermal ageing methods - Ageing in an air oven (IEC 60811-401)*

EN 60811-501, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 501: Mechanical tests - Tests for determining the mechanical properties of insulating and sheathing compounds (IEC 60811-501)*

EN 60811-504, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 504: Mechanical tests - Bending tests at low temperature for insulation and sheaths(IEC 60811-504)*

EN 60811-505, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 505: Mechanical tests - Elongation at low temperature for insulations and sheaths (IEC 60811-505)*

EN 60811-507, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 507: Mechanical tests - Hot set test for cross-linked materials (IEC 60811-507)*

EN 60811-508, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 508: Mechanical tests - Pressure test at high temperature for insulation and sheaths (IEC 60811-508)*

EN 60811-509, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 509: Mechanical tests - Test for resistance of insulations and sheaths to cracking (heat shock test) (IEC 60811-509)*