
Električni kabli - Nizkonapetostni energetski kabli z naznačeno napetostjo do vključno 450/750 V (U_o/U) - 2-21. del: Kabli za splošno uporabo - Zvijavi kabli z zamreženo elastomerno izolacijo

Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U_o/U) - Part 2-21: Cables for general applications - Flexible cables with crosslinked elastomeric insulation

Kabel und Leitungen - Starkstromleitungen mit Nennspannungen bis 450/750 V (U_o/U) - Teil 2-21: Starkstromleitungen für allgemeine Anwendungen - Flexible Leitungen mit vernetzter Elastomer- Isolierung

Câbles électriques - Câbles d'énergie basse tension de tension assignée au plus égale à 450/750 V (U_o/U) - Partie 2-21: Câbles pour applications générales - Câbles souples isolés en matériau élastomère réticulé

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English version

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(U_0/U) -
Part 2-21: Cables for general applications -
Flexible cables with crosslinked elastomeric insulation**

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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 20, Electric cables.

The text of the draft was submitted to the formal vote and was accepted by CENELEC as EN 50525-2-21 on 2011-01-17.

This document, which is one of a multipart series, supersedes HD 22.4 S4:2004, HD 22 10 S2:2007, HD 22.11 S2:2007, HD 22.12 S2:2007, HD 22.16 S2:2007.

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

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) 2012-01-17
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2014-01-17

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Contents

	Page
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 General purpose cables	6
4.1 Ordinary duty cables – H05RR-F	6
4.2 Ordinary duty cables – H05RN-F	7
4.3 Heavy duty cables – H07RN-F	8
4.4 Heavy duty multicore cables – H07RN-F	9
5 Water resistant cables	10
5.1 Heavy duty cables – H07RN8-F	10
5.2 Heavy duty multicore cables – H07RN8-F	12
6 Heat resistant cables (90 °C)	13
6.1 Ordinary duty cables – H05BB-F	13
6.2 Heavy duty cables – H07BB-F	14
6.3 Ordinary duty cables – H05BN4-F	16
6.4 Heavy duty cables – H07BN4-F	16
6.5 Heavy duty multicore cables – H07BN4-F	18
7 Heat resistant cables – TPU sheathed (90 °C)	19
7.1 Ordinary duty cables – H05BQ-F	19
7.2 Heavy duty cables – H07BQ-F	20
8 Heat resistant EVA cables (110 °C) - Ordinary duty cables – H05GG-F and H05GGH2-F	21
8.1 Construction	21
8.2 Requirements	22
Annex A (normative) Tests for cables to EN 50525-2-21	23
Annex B (normative) General data	27
Annex C (normative) Requirements for compatibility test	33
C.1 Cables with a 60 °C temperature rating	33
C.2 Cables with a 90 °C temperature rating	33
C.3 Cables with a 110 °C temperature rating	34
Annex D (normative) Water resistance test for H07RN8-F flexible cables – Electrical test	35
D.1 Voltage pre-test on completed cables	35
D.2 Voltage test on completed cable at 50 °C	35
D.3 Insulation resistance test after pre-voltage test	35
Annex E (normative) Water resistance test for H07RN8-F flexible cables – Mechanical properties of sheath after water immersion	37
E.1 General	37
E.2 Procedure	37
E.3 Requirements	37
Annex F (normative) Special national conditions	39
Bibliography	40

Tables

Table A.1 – 60 °C cables	23
Table A.1 – 60 °C cables (<i>concluded</i>).....	24
Table A.2 – 90 °C and 110 °C cables	25
Table B.1.....	27
Table B.2.....	28
Table B.3.....	31
Table B.4.....	32
Table C.1	33
Table C.2	33
Table C.3	34
Table E.1 – Requirements for tensile strength and elongation at break	38

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1 Scope

EN 50525-2-21 applies to flexible cables, insulated with crosslinked elastomeric compound, and sheathed with either crosslinked elastomeric compound or thermoplastic polyurethane (TPU).

The cables are of rated voltages U_0/U up to and including 450/750 V.

The cables are intended for a variety of applications where appliances or equipment, including heavy industrial equipment, require a flexible connection to the power supply.

The maximum conductor operating temperatures for the cables in this standard are 60 °C (R types), 90 °C (B types) and 110 °C (G types).

The following particular cable types are included:

- General purpose cables (RR and RN types);
- Water-resistant cables (RN8 types);
- General purpose cables (BB and BN4 types);
- TPU sheathed cables (BQ types);
- Heat resistant cables (GG types)

NOTE HD 516 contains extensive guidance on the safe use of cables in this standard.

This EN 50525-2-21 should be read in conjunction with EN 50525-1, which specifies general requirements.

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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.

NOTE One or more references to the standards below are in respect of a specific sub-division of that standard, for instance a clause, a table, a class or a type. Cross-references to these standards are undated and, at all times, the latest version applies.

EN 50363-1	Insulating, sheathing and covering materials for low voltage energy cables - Part 1: Cross-linked elastomeric insulating compounds
EN 50363-2-1	Insulating, sheathing and covering materials for low voltage energy cables - Part 2-1: Cross-linked elastomeric sheathing compounds
EN 50363-10-2	Insulating, sheathing and covering materials for low voltage energy cables - Part 10-2: Miscellaneous sheathing compounds - Thermoplastic polyurethane
EN 50395	Electrical test methods for low voltage energy cables
EN 50396	Non electrical test methods for low voltage energy cables
EN 50525-1	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) - Part 1: General requirements
EN 60228	Conductors of insulated cables (IEC 60228)

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 60811-1-1	Insulating and sheathing materials of electric and optical cables - Common test methods - Part 1-1: General application - Measurement of thickness and overall dimensions - Tests for determining the mechanical properties (IEC 60811-1-1)
EN 60811-1-2	Insulating and sheathing materials of electric and optical cables - Common test methods - Part 1-2: General application - Thermal ageing methods (IEC 60811-1-2)
EN 60811-1-4	Insulating and sheathing materials of electric and optical cables - Common test methods - Part 1-4: General application - Tests at low temperature (IEC 60811-1-4)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in Clause 3 of EN 50525-1 apply.

4 General purpose cables

4.1 Ordinary duty cables – H05RR-F

4.1.1 Construction

4.1.1.1 Conductor

The conductor shall be class 5, according to EN 60228.

4.1.1.2 Sizes of cable

The sizes of cable shall be:

- 2 and 5 core – 0,75 mm² to 4 mm²;
- 3 and 4 core – 0,75 mm² to 6 mm².

4.1.1.3 Insulation

The insulation shall be a cross-linked elastomeric compound, Type EI 4 to EN 50363-1, applied around each conductor.

4.1.1.4 Assembly

The cores shall be twisted together.

NOTE 1 A centre filler may be used.

NOTE 2 A tape may be applied around the core assembly before application of the sheath.

4.1.1.5 Sheath

The sheath shall be a cross-linked elastomeric compound of Type EM 3 to EN 50363-2-1.

The sheath shall fill the spaces between the cores.

The colour of sheath is not specified.

NOTE If black is used, the requirement in EN 50363-2-1 for EM 3 to have a minimum level of carbon black will apply.

4.1.1.6 Marking

The cable shall be marked with the CENELEC code H05RR-F. The marking shall comply with Clause 6 of EN 50525-1.

4.1.2 Requirements

Each cable shall comply with the appropriate requirements given in EN 50525-1, and the particular requirements of this Part.

Testing shall be in accordance with Table A.1, column 6.

The dimensions of the cables shall conform to Table B.1 for the relevant size.

The requirements to be met for the compatibility test shall be as given in Table C.1.

4.2 Ordinary duty cables – H05RN-F

4.2.1 Construction

4.2.1.1 Conductor

The conductor shall be class 5, according to EN 60228.

4.2.1.2 Sizes of cable

The sizes of cable shall be:

- 2, 3 and 4 core – 0,75 mm² and 1 mm².

4.2.1.3 Insulation

The insulation shall be a cross-linked elastomeric compound, Type EI 4 to EN 50363-1, applied around each conductor.

4.2.1.4 Assembly

The cores shall be twisted together.

NOTE 1 A centre filler may be used.

NOTE 2 A tape may be applied around the core assembly before application of the sheath.

4.2.1.5 Sheath

The sheath shall be a cross-linked elastomeric compound of Type EM 2 to EN 50363-2-1.

The sheath shall fill the spaces between the cores.

4.2.1.6 Marking

The cable shall be marked with the CENELEC code H05RN-F. The marking shall comply with Clause 6 of EN 50525-1.

4.2.2 Requirements

Each cable shall comply with the appropriate requirements given in EN 50525-1, and the particular requirements of this Part.

Testing shall be in accordance with Table A.1, column 7.

The dimensions of the cables shall conform to Table B.1 for the relevant size.

The requirements to be met for the compatibility test shall be as given in Table C.1.

4.3 Heavy duty cables – H07RN-F

4.3.1 Construction

4.3.1.1 Conductor

The conductor shall be class 5, according to EN 60228.

4.3.1.2 Sizes of cable

The sizes of cable shall be:

- Single core – 1,5 mm² to 630 mm²,
- 2 and 5 core – 1,0 mm² to 95 mm²,
- 3 and 4 core – 1,0 mm² to 300 mm².

4.3.1.3 Insulation

The insulation shall be a cross-linked elastomeric compound, Type EI 4 to EN 50363-1, applied around each conductor.

NOTE It is permitted to apply a tape on each core.

Where the insulation is covered with a tape, it shall be applied in such a manner that it can be removed without damage to the insulation.

4.3.1.4 Assembly

The cores of cables having two to five cores shall be twisted together.

NOTE 1 A centre filler may be used.

NOTE 2 A tape may be applied around the core assembly before application of the sheath.

4.3.1.5 Sheath

The cores shall be covered with a sheath.

- a) For cables with a specified sheath thickness up to and including 2,4 mm:

- 1) sheath in a single layer, cross-linked elastomeric compound of type EM 2 to EN 50363-2-1.
- b) For cables with a specified sheath thickness greater than 2,4 mm:
 - 1) sheath either in a single layer, cross-linked elastomeric compound of type EM 2 to EN 50363-2-1;
 - 2) or in two layers, with the inner layer made of one of the cross-linked elastomeric compounds type EM 2 or EM 3 to EN 50363-2-1 and the outer layer of the cross-linked elastomeric compound type EM 2 to EN 50363-2-1.

The sheath applied in a single layer or the inner layer of the sheath in two layers shall, for cables with two to five cores, fill the spaces between the cores. Where a tape of suitable material is applied around the core assembly (see NOTE 2 to 4.3.1.4) this requirement shall not apply, provided that the finished cables shall not have any substantial cavity in the outer interstices between the cores.

4.3.1.6 Marking

The cable shall be marked with the CENELEC code H07RN-F. The marking shall comply with Clause 6 of EN 50525-1.

4.3.2 Requirements

Each cable shall comply with the appropriate requirements given in EN 50525-1, and the particular requirements of this Part.

Testing shall be in accordance with Table A.1, column 8.

NOTE For non-electrical tests on sheaths in two layers see EN 50525-1, 5.7.2.3, c).

The dimensions of the cables shall conform to Table B.2 for the relevant size.

The requirements to be met for the compatibility test shall be as given in Table C.1.

4.4 Heavy duty multicore cables – H07RN-F

4.4.1 Construction

4.4.1.1 Conductor

The conductor shall be class 5, according to EN 60228.

4.4.1.2 Sizes of cable

The sizes of cable shall be:

- 6, 7, 12, 18, 24 and 36 core – 1,5 mm² and 2,5 mm²;
- 6, 7, 12 and 18 core – 4 mm².

NOTE The number of cores given here is preferred. Other numbers of cores are permitted up to the maximum number stated in the table for the given size of conductor, subject to agreement between the purchaser and manufacturer. See also footnote c to Table B.3.

4.4.1.3 Insulation

The insulation shall be a cross-linked elastomeric compound, Type EI 4 to EN 50363-1 applied around each conductor.

The identification of each core shall be in accordance with Annex D of EN 50525-1.

4.4.1.4 Assembly

The cores shall be twisted together. A single core in the centre is not permitted. A protective conductor, if any, shall be applied in the outer layer. A centre filler shall be used for cables having 6, 7, 18, and 36 cores, and also for 19 cores when this non-preferred size is used.

NOTE 1 A centre filler may be used for other sizes.

NOTE 2 A tape may be applied around the core assembly before application of the sheath.

4.4.1.5 Sheath

The core assembly shall be covered with a sheath. The sheath shall be applied either in a single layer, cross-linked elastomeric compound EM 2 to EN 50363-2-1, or in two layers, with the inner layer made of one of the cross-linked elastomeric compounds EM 2 or EM 3 to EN 50363-2-1 and the outer layer of cross-linked elastomeric compound EM 2 to EN 50363-2-1.

The sheath in a single layer or the inner layer of the sheath in two layers shall fill the spaces between the cores. Where a tape of suitable material is applied around the core assembly (see NOTE 2 to 4.4.1.4) this requirement shall not apply, provided that the finished cables shall not have any substantial cavity in the outer interstices between the cores.

4.4.1.6 Marking

The cable shall be marked with the CENELEC code H07RN-F. The marking shall comply with Clause 6 of EN 50525-1.

4.4.2 Requirements

Each cable shall comply with the appropriate requirements given in EN 50525-1, and the particular requirements of this Part.

Testing shall be in accordance with Table A.1, column 9.

NOTE For non-electrical tests on sheaths in two layers see EN 50525-1, 5.7.2.3, c).

The dimensions of the cables shall conform to Table B.3 for the relevant size.

The requirements to be met for the compatibility test shall be as given in Table C.1.

5 Water resistant cables

5.1 Heavy duty cables – H07RN8-F

5.1.1 Construction

5.1.1.1 Conductor

The conductor shall be class 5, according to EN 60228.

Where an optional separator is applied around each conductor it shall be non-hygroscopic.

5.1.1.2 Sizes of cable

The sizes of cable shall be:

- Single core – 1,5 mm² to 630 mm²;
- 2 and 5 core – 1,0 mm² to 25 mm²;

- 3 and 4 core – 1,0 mm² to 300 mm².

5.1.1.3 Insulation

The insulation shall be a cross-linked elastomeric compound, Type EI 4 to EN 50363-1 applied around each conductor.

NOTE It is permitted to apply a tape on each core.

Where the insulation is covered with a tape, it shall be non-hygroscopic and shall be applied in such a manner that it can be removed without damage to the insulation.

5.1.1.4 Assembly

The cores of cables having two to five cores shall be twisted together.

NOTE 1 A centre filler may be used.

NOTE 2 A non-hygroscopic tape may be applied around the core assembly before application of the sheath.

5.1.1.5 Sheath

The cores shall be covered with a sheath.

- a) For cables with a specified sheath thickness up to and including 2,4 mm:
- 1) sheath in a single layer, cross-linked elastomeric compound of type EM 2 to EN 50363-2-1.
- b) For cables with a specified sheath thickness greater than 2,4 mm:
- 1) sheath either in a single layer, cross-linked elastomeric compound of type EM 2 to EN 50363-2-1;
 - 2) or in two layers, with the inner layer made of one of the cross-linked elastomeric compounds type EM 2 or EM 3 to EN 50363-2-1 and the outer layer of the cross-linked compound type EM 2 to EN 50363-2-1.

The sheath applied in a single layer or the inner layer of the sheath in two layers shall, for cables with two to five cores, fill the spaces between the cores. Where a non-hygroscopic tape of suitable material is applied around the core assembly (see NOTE 2 to 5.1.1.4) this requirement shall not apply, provided that the finished cables shall not have any substantial cavity in the outer interstices between the cores.

5.1.1.6 Marking

The cable shall be marked with the CENELEC code H07RN8-F. The marking shall comply with Clause 6 of EN 50525-1.

5.1.2 Requirements

Each cable shall comply with the appropriate requirements given in EN 50525-1, and the particular requirements of this Part.

Testing shall be in accordance with Table A.1, column 10.

NOTE For non-electrical tests on sheaths in two layers see EN 50525-1, 5.6.2.3, c).

The dimensions of the cables shall conform to Table B.2 for the relevant size.

The requirements to be met for the compatibility test shall be as given in Table C.1.