SLOVENSKI STANDARD
SIST EN 50306-4:2020

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Nadomešča:
SIST EN 50306-4:2003

Železniške naprave - Kabli v železniških vozilih s posebno požarno odpornostjo - Tanka stena - 4. del: Večžilni in večparni zaslonjeni in nezaslonjeni oplaščeni kabli

Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 4: Multicore and multipair screened or not screened sheathed cables

Bahnanwendungen - Kabel und Leitungen für Schienenfahrzeuge mit verbessertem Verhalten im Brandfall - Reduzierte Isolierwanddicken - Teil 4: Mehradrige und mehrpaarige Leitungen

Applications ferroviaires - Câbles pour matériel roulant ferroviaire ayant des performances particulières de comportement au feu - Isolation mince - Partie 4: Câbles multiconducteurs et multipaires gainés blindés ou non blindés

Ta slovenski standard je istoveten z: **EN 50306-4:2020**

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
45.060.01	Železniška vozila na splošno	Railway rolling stock in general

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EUROPEAN STANDARD

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EN 50306-4

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Supersedes EN 50306-4:2002 and all of its amendments and corrigenda (if any)

English Version

Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 4: Multicore and multipair screened or not screened sheathed cables

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European foreword

This document (EN 50306-4:2020) 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)	2020-12-30
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2022-12-30

This document supersedes EN 50306-4:2002 and all of its amendments and corrigenda (if any).

This edition includes the following significant technical changes with respect to the previous edition:

— The documents have been updated to reflect the changes in the test standard EN 50305;

— The range of the conductor cross sections has been extended;

— The reference to cited standards (e.g. EN 60811 series) has been updated.

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.

Introduction

The EN 50306 series covers a range of sheathed and unsheathed cables with thin wall thickness insulation, based on halogen-free materials, for use in railway rolling stock. It is divided into four parts:

Part 1: General requirements;

Part 2: Single core cables;

Part 3: Single core and multicore cables screened and thin wall sheathed;

Part 4: Multicore and multipair screened or not screened sheathed cables.

Special test methods referred to in the EN 50306 series are given in EN 50305. A guide to use is given in EN 50355 and rules for installation are given in EN 50343.

EN 50306-1:2020, General requirements, contains a more extensive introduction to the EN 50306 series and should be read in conjunction with this document.

1 Scope

This document specifies requirements for, and constructions and dimensions of, multicore and multipair cables rated voltage U_0/U: 300/500 V, of the following types:

— unscreened, sheathed for either exposed or protected wiring (0,5 mm² to 2,5 mm², number of cores from 2 to 48);

— screened, sheathed for either exposed or protected wiring (0,5 mm² to 2,5 mm², number of cores from 2 to 8);

— unscreened, sheathed for either exposed or protected wiring (0,5 mm² to 1,5 mm², number of screened pairs of cores from 2 to 7).

— screened, sheathed for either exposed or protected wiring (0,5 mm² to 1,5 mm², number of unscreened pairs of cores from 2 to 7).

All cables have stranded tinned copper conductors, halogen-free, thin wall thickness insulation and standard wall thickness sheath. Cable types are specified for use in exposed situations (Class E), and for protected situations (Class P). They are for use in railway rolling stock as fixed wiring or wiring where limited flexing in operation is encountered.

These cables are rated for occasional thermal stresses causing ageing equivalent to continuous operational life at a temperature of 90 °C. For standard cables this is determined by the acceptance test defined in EN 50305, using accelerated long-term (5 000 h) thermal ageing indicating a 110 °C/20 000 h temperature index. If the customer were to require lifetime predictions this would be demonstrated based on the temperature index of the product as supplied by the manufacturer.

The maximum temperature for short circuit conditions is 160 °C based on duration of 5 s.

Under fire conditions the cables exhibit special performance characteristics in respect of maximum permissible flame propagation (flame spread) and maximum permissible emission of smoke and toxic gases. These requirements are specified to permit the cables to satisfy Hazard Level 3 of EN 45545-1 and EN 45545-2.

EN 50306-4:2020 is expected to be used in conjunction with EN 50306-1:2020, General requirements, EN 50306-2:2020, Single core cables, and EN 50306-3:2020, Single core and multicore 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 45545-1, *Railway applications - Fire protection on railway vehicles - Part 1: General*

EN 50264-1:2008, *Railway applications - Railway rolling stock power and control cables having special fire performance - Part 1: General requirements*

EN 50305:2020, *Railway applications - Railway rolling stock cables having special fire performance - Test methods*

EN 50306-1:2020, *Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 1: General requirements*

EN 50306-2:2020, *Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 2: Single core cables*

EN 50306-3:2020, *Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 3: Single core and multicore cables screened and thin wall sheathed*

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*

EN 60332-3-24, *Tests on electric and optical fibre cables under fire conditions - Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables - Category C*

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

EN 60811 (all parts), *Electric and optical fibre cables - Test methods for non-metallic materials*

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:

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

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

4 Multicore cables - sheathed

4.1 General

The completed cables shall conform to the applicable general requirements given in EN 50306-1:2020 and to the specific requirements of Clause 4 and Clause 5.

Conformity with the requirements shall be checked by inspection and by the tests given in Table 2.

4.2 Marking and code designation

4.2.1 Marking of cable

Cables shall be marked with the following:

— Manufacturer's name;

— EN reference;

— table number;

— cable class (P or E);

— Voltage rating (U_0);

— No. of cores and conductor size;

— A code designation according for use of the cable (see 4.2.2);

— Conductor temperature rating

For example:

XYZ EN 50306-4 1E 300 V 2x1,5 MM 90

The marking shall conform to the requirements of EN 50306-1:2020, Clause 5.

4.2.2 Code Designation

The following letters shall be used as a code to identify the suitability of a particular cable for use under one of the Hazard Levels of EN 45545-1, and to indicate performance levels relating to low temperature and to oil and fuel resistance:

Hazard Level EN 45545-1 HL3

— low temperature / oil resistance C

— extra low temperature / oil resistance F

— low temperature / extra oil and fuel resistance J

— extra low temperature / extra oil and fuel resistance M

For sheathed cables two letters are required, one for the insulation and one for the sheath

4.2.3 Marking on the insulation of cores

The cores shall be marked 1, 2, etc., in accordance with the requirements, given in EN 50306-2:2020, 4.3.2.

However, the core number one may be marked as the relevant single core in accordance with the requirements of EN 50306-2:2020, 4.3.2.

Durability of marking shall be in accordance with EN 50305:2020, 10.1.

4.3 Rated voltage

The rated voltage recognized for the purposes of this standard shall be U_0/U = 300V / 500V

NOTE See EN 50355 and 50343 for further information.

4.4 Construction

4.4.1 Cores

Each insulated single core shall conform to the requirements given in EN 50306-2:2020.

4.4.2 Laying-up of cores

The cores shall be twisted together.

The pitch of lay for the cores shall not be greater than 20 times the diameter of the laid-up cores in the cable.

4.4.3 Sheath

The sheath shall be a compound of type EM 101 to EM 104, and shall be applied by extrusion. Compounds type EM 101 to EM 104 together with their requirements are defined in EN 50264-1.

The sheath material from the finished cable shall be tested in accordance with the requirements given in EN 50264-1:2008, Table 4.

The sheath shall be smooth and uniformly applied; the application shall ensure that cables with a class E sheath are substantially circular. The thickness of sheath shall conform to the specified value given in Table 1 according to the class.

The sheath colour shall be black, unless otherwise specified.

Table 1 — Requirements for construction of multicore cables - sheathed

1	2	3	4	5	6	7
Number of cores and nominal cross-section of the conductor	Cables class E			Cables class P		
	Average minimum thickness of sheath	Overall diameter		Minimum thickness of sheath at any point	Overall diameter	
		min.	max.		min.	max.
mm²	mm	mm	mm	mm	mm	mm
2 × 0,5	1,0	4,9	5,9	0,42	3,5	4,5
3 × 0,5	1,0	5,1	6,1	0,42	3,8	4,8
4 × 0,5	1,0	5,5	6,5	0,42	4,1	5,3
7 × 0,5	1,0	6,3	7,3	0,42	4,9	6,1
13 × 0,5	1,0	8,3	9,3	0,56	7,3	8,5
19 × 0,5	1,0	9,0	10,2	0,56	8,1	9,3
37 × 0,5	1,0	12,3	13,5	0,56	10,8	12,2
2 × 0,75	1,0	5,3	6,3	0,42	4,0	5,0
3 × 0,75	1,0	5,5	6,5	0,42	4,2	5,2
4 × 0,75	1,0	6,0	7,0	0,42	4,6	5,8
7 × 0,75	1,0	6,9	7,9	0,42	5,5	6,6
13 × 0,75	1,0	9,1	10,3	0,56	8,2	9,4
19 × 0,75	1,0	10,0	11,2	0,56	9,0	10,4
37 × 0,75	1,0	13,2	14,4	0,56	12,2	13,6
48 × 0,75	1,0	14,8	16,4	0,56	13,9	15,7
2 × 1,0	1,0	5,6	6,6	0,42	4,3	5,3
3 × 1,0	1,0	5,9	6,9	0,42	4,6	5,6
4 × 1,0	1,0	6,3	7,3	0,42	4,9	6,1
7 × 1,0	1,0	7,3	8,3	0,42	6,0	7,2
13 × 1,0	1,0	9,7	10,9	0,56	8,7	10,1
19 × 1,0	1,0	10,7	11,9	0,56	9,8	11,2
37 × 1,0	1,0	14,0	15,6	0,56	13,3	14,7
2 × 1,5	1,0	6,3	7,3	0,42	5,0	6,0
3 × 1,5	1,0	6,6	7,6	0,42	5,3	6,3
4 × 1,5	1,0	7,4	8,4	0,42	6,0	7,2
7 × 1,5	1,0	8,6	9,8	0,56	7,7	8,9
13 × 1,5	1,0	11,7	12,9	0,56	10,7	12,1
19 × 1,5	1,0	13,0	14,2	0,56	12,	13,4
37 × 1,5	1,0	17,2	18,8	0,56	16,2	18,

1	2	3	4	5	6	7
Number of cores and nominal cross-section of the conductor	Cables class E			Cables class P		
	Average minimum thickness of sheath	Overall diameter		Minimum thickness of sheath at any point	Overall diameter	
		min.	max.		min.	max.
mm^2	mm	mm	mm	mm	mm	mm
2 × 2,5	1,0	7,7	8,7	0,56	6,7	7,9
3 × 2,5	1,0	8,1	9,1	0,56	7,1	8,3
4 × 2,5	1,0	8,8	10,0	0,56	7,9	9,1

For other compositions (number of cores), sheath thicknesses shall follow in principle the value mentioned in the Table 1 or ask the manufacturer for adequate technical design depending on the application requirements. The cable marking shall keep the standard name as EN 50306-4:2020.

5 Tests

5.1 Definitions relating to tests

The definition of Type (T), Sample (S) and Routine (R) tests is as given in EN 50306-1:2020, Clause 3.

NOTE 1 Tests classified as Sample (S) or Routine (R) could be required as part of any approval schemes.

NOTE 2 Annex A gives guidance on the selection of cables for type approval.

5.2 Voltage test on cable

The test shall be carried out in accordance with EN 50305:2020, 6.2.1, using an AC or DC voltage and the following conditions:

— sample length 20 m

— voltage (AC) 2 kV

— voltage (DC) 4,8 kV

— duration of application 5 min

— test temperature (20 ± 5) °C

At the conclusion of the test there shall be no breakdown of the insulation.

5.3 Tests at low temperature

a) Bending test for cable diameter ≤ 12,5mm

The test shall be carried out at (- 40 ± 2) °C in accordance with EN 60811-504.

At the conclusion of the test there shall be no cracks in the sheath.