
**Railway applications - Railway rolling stock cables having special fire performance
- Standard wall - Part 3: Multicore cables**

Railway applications - Railway rolling stock cables having special fire performance -
Standard wall -- Part 3: Multicore cables

Bahnanwendungen - Kabel und Leitungen für Schienenfahrzeuge mit verbessertem
Verhalten im Brandfall - Standard Isolierwanddicken - Teil 3: Mehr- und vieladrige
Leitungen

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Applications ferroviaires - Câbles pour matériel roulant ferroviaire ayant des
performances particulières de comportement au feu - Câbles à isolation d'épaisseur
normale -- Partie 3: Câbles multicoucheurs

Ta slovenski standard je istoveten z: EN 50264-3:2002

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Câbles pour matériel roulant ferroviaire
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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 Central Secretariat has the same status as the official versions.

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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard was prepared for Technical Committee CENELEC TC 20 “Electric cables” by Working Group 12 “ Railway cables” as part of the overall programme of work in CENELEC TC 9X “Electrical and electronic applications for railways”.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50264-3 on 2002-03-01.

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) 2003-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2008-07-01

Annexes designated “informative” are given for information only.
In this standard annex A is informative.

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Introduction

EN 50264 covers cables with standard wall thickness of insulation , both sheathed and un-sheathed, based upon halogen free materials, for use in railway rolling stock. It is divided into 3 parts:

Part 1: General requirements;

Part 2: Single core cables;

Part 3: Multicore cables.

Special test methods referred to in EN 50264 are given in EN 50305. A Guide to use is given in (EN 50355 – under development).

Part 1, General requirements, contains a more extensive introduction to EN 50264, and should be read in conjunction with this Part 3.

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1 Scope

Part 3 of EN 50264 specifies requirements for, and constructions and dimensions of, multicore cables of the following types and voltage ratings:

- 300 V/500 V Screened or unscreened (1 mm², 1,5 mm² and 2,5 mm², number of cores from 2 to 40)
- 0,6 kV/1 kV Screened or unscreened, (1 mm² to 50 mm², 2, 3 and 4 core)

NOTE 1 Not all conductor sizes or number of cores are specified for every type.

All cables have class 5 tin coated annealed copper conductors to HD 383, halogen-free insulation and halogen-free sheath. They are for use in railway rolling stock as fixed wiring, or wiring where limited flexing in operation is encountered. The requirements provide for a continuous conductor temperature not exceeding 90 °C and a maximum temperature for short circuit conditions of 200 °C based on a duration of 5 seconds.

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 Levels 2, 3 or 4 of EN 45545-1.

NOTE 2 Requirements for the emission of smoke and gases are not specified for hazard level 1 of EN 45545-1.

NOTE 3 EN 45545-1 is still under development and should be consulted.

Part 3 of EN 50264 should be used in conjunction with Part 1, General requirements.

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2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of these references apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 10002-1	Tensile testing of metallic materials - method of test at ambient temperature
EN 45545-1 ¹⁾	Railway applications - Fire protection of railway vehicles - Part 1: General
EN 50264-1	Railway applications - Railway rolling stock cables having special fire performance - Standard wall - Part 1: General Requirements
EN 50264-2	Railway rolling stock cables having special fire performance - Standard wall - Part 2: Single core cables
EN 50265-2-1	Common test methods for cables under fire conditions - Test for resistance to vertical flame propagation for single insulated conductor or cable - Part 2-1: Procedures – 1 kW pre-mixed flame

¹⁾ At draft stage.

EN 50266-2-4	Common test methods for cables under fire conditions - Test for vertical flame spread of vertically-mounted bunched wires or cables - Part 2-4: Procedures - Category C
EN 50267-2-1	Common test methods for cables under fire conditions - Tests on gasses evolved during combustion of materials from cables - Part 2-1: Procedures - Determination of the amount of halogen acid gas
EN 50267-2-2	Common test methods for cables under fire conditions - Tests on gases evolved during combustion of materials from cables - Part 2-2: Procedures - Determination of degree of acidity of gases for materials by measuring pH and conductivity
EN 50268-2	Common test methods for cables under fire conditions - Measurement of smoke density of electric cables burning under defined conditions - Part 2: Procedure
EN 50305	Railway applications - Railway rolling stock cables having special fire performance – Test methods
EN 50334	Marking by inscription for the identification of cores of electric cables
EN 60684-2	Specification for flexible insulating sleeving - Part 2: Methods of test
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
EN 60811-1-2	Insulating and sheathing materials of electric cables - Common test methods - Part 1-2: General application - Thermal ageing methods
EN 60811-1-3	Insulating and sheathing materials of electric cables – Common test methods - Part 1-3: General application - Methods for determining the density Water absorption tests - Shrinkage test
EN 60811-1-4	Insulating and sheathing materials of electric cables - Common test methods - Part 1-4: General application – Tests at low temperature
EN 60811-2-1	Insulating and sheathing materials of electric and optical cables – Common test methods - Part 2-1: Method specific to elastomeric compounds – Ozone resistance, hot set and mineral oil immersion tests
HD 383	Conductors of insulated cables - First supplement: Guide to the dimensional limits of circular conductors

3 Definitions

For the purposes of this standard the definitions given in EN 50264-1 apply.

4 Rated voltage

The rated voltage for multicore cables shall be as follows:

- a) 300 V/500 V (1 mm² to 2,5 mm²) control cables
- b) 0,6 kV/1 kV (1,5 mm² to 50 mm²) power cables

5 Designation, marking and coding

5.1 Code designation

For the purpose of supplying cables to this standard, the following code designation shall be used:

EN reference, number of cores and conductor size, identifier for the particular hazard level (see 5.2)

For example:

EN 50264 37 x 1,5 F

5.2 Code identities for cables suitable for use in particular hazard levels

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	HL1	HL2 or HL3	HL4
Low temperature/Oil resistance	A	B	C
Extra low temperature/ Oil resistance	D	E	F
Low temperature/ Extra oil and fuel resistance	G	H	J
Extra low temperature/ Extra oil and fuel resistance	K	L	M

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5.3 Marking of cable

Cables shall be marked with the following:

- manufacturer's name;
- EN reference;
- metallic screen (S);
- voltage rating (U_0);
- number of cores and conductor size;
- identifier for the particular hazard level (see 5.2).

For example:

XYZ EN 50264-3 S 300 V 37 x 1,5 F

The marking shall conform to the requirements of clause 5 of EN 50264-1.

5.4 Core identification

The cores of all cables, except the earthing conductor, shall be black unless otherwise specified.

Cores complying with this part or EN 50264-2 may be used as components of multicore cables. The identification of the individual core in a cable, except the earthing conductor, shall be by printed number or colour.

The number shall be printed in a colour which contrasts with the core colour.

The marking by numbers shall conform to EN 50334, unless otherwise specified, and conformity shall be checked by visual examination and measurement.

5.5 Sheath

The sheath shall be black unless otherwise specified.

6 Construction of cables

6.1 General

The control cable dimensions shall be as given in Tables 1 or 2.

The power cable core dimensions shall be as given in table 3 and the other cable dimensions as given in Tables 4 to 9.

If agreed between the purchaser and manufacturer, cables may be made with the number of cores not specified in Table 1 and 2. In such cases the thickness of the sheath and diameter of the braid wire (if any) shall be those specified in the relevant table for the cable containing the next higher number of cores.

6.2 Conductor

Conductors shall be tin-coated annealed copper, class 5, according to HD 383.

When tested in accordance with EN 10002-1 the minimum average elongation of the wires from the conductor shall be 15 %, with a minimum value of 10 % for any individual wire.

NOTE It is not necessary to test all individual wires. 5 % of wires or 10 wires, whichever is the fewer, should be selected at random.

6.3 Insulation

Insulation shall be one or more extruded materials as defined in EN 50264-1 applied so as to meet the requirements of EI 101 to EI 105.

The insulation shall be applied to meet the requirements of 6.2 of EN 50264-1.

The insulation thickness shall conform to the specified value given in Tables 1 to 3.

6.4 Laying up of cores and fillers

For control cables the cores shall be twisted together with either a continuous right or left-hand direction of lay.

For power cables the cores shall be twisted together with either a continuous right or left-hand direction of lay.

The pitch or lay for primary cores shall not be greater than 20 times the diameter of the bunch of cores in the cable.

NOTE Non-hygroscopic fillers may be applied as given in 6.3 of EN 50264-1. A synthetic binder tape may be used over the laid-up assembly at the manufacturers discretion.

6.5 Metallic screen

Where screens are applied over cores a tape shall be used.

6.5.1 Metallic screening braid

The braid shall consist of tin coated annealed copper wires. There shall be no more than one splice in any spindle of the braid over any 10 cm length of the braid. The braid shall be applied evenly; it should neither slip nor leave a permanent imprint in the insulation.

The filling factor K_r shall be according to the formula:

$$K_r = \frac{m \cdot n \cdot d}{2\pi\phi} \times \left[1 + \frac{\pi^2 \phi^2}{L^2} \right]^{0,5}$$

The lay angle (the angle of a braid wire and the centreline of the cable) shall be between 15° and 35°.

$$1,072 < \left[1 + \frac{\pi^2 \phi^2}{L^2} \right] \leq 1,490$$

ϕ	=	diameter of the core under the braid + 2d
d	=	nominal diameter of a wire
m	=	total number of bundles
n	=	number of wires per bundle
L	=	braiding pitch

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The diameters of the wires of the braid shall be a minimum of 0,15 mm diameter such that the filling factor is 0,55 minimum.

6.6 Sheath

Sheaths shall be either of compound types EM 101, EM 102, EM 103 or EM 104 for cables of all types.

The sheath shall be applied to meet the requirements of 6.6 of EN 50264-1.

The sheath thickness shall conform to the specified value given in Tables 1, 2 or 4 to 9 as appropriate.

6.7 Construction

Power and control cables of all types shall be composed of the following components in the order given:

- | | |
|------------------------------------|--|
| - conductor | flexible tin coated annealed copper, class 5 |
| - separator (optional) | at the manufacturers discretion |
| - insulation | a compound or compounds given in 6.3 |
| - laying up and fillers | as given in 6.4 |
| - metallic screen (where required) | as given in 6.5 and specified in the table |
| - separator | at the manufacturer's discretion |
| - sheath | compound as given in 6.6. |