
**Railway applications - Railway rolling stock cables having special fire performance
- Standard wall - Part 2: Single core cables**

Railway applications - Railway rolling stock cables having special fire performance -
Standard wall -- Part 2: Single core cables

Bahnanwendungen - Kabel und Leitungen für Schienenfahrzeuge mit verbessertem
Verhalten im Brandfall - Standard Isolierwanddicken - Teil 2: Einadrige Leitungen

Applications ferroviaires - Câbles pour matériel roulant ferroviaire ayant des
performances particulières de comportement au feu - Câbles à isolation d'épaisseur
normale -- Partie 2: Câbles à un conducteur

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EUROPEAN STANDARD

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Câbles pour matériel roulant ferroviaire
ayant des performances particulières
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im Brandfall -
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Teil 2: Einadrige Leitungen

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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 50264-2 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with the EN have to be withdrawn (dow) 2008-07-01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 "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A and B are normative and annex C is informative.

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Introduction

EN 50264 covers a range of cables with standard wall thickness of insulation, both sheathed and unsheathed, 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).

The cables in part 2 may also be used in part 3 of this series of standards to build up multicore sheathed cables.

Part 1, General requirements, contains a more extensive introduction to EN 50264, and should be read in conjunction with this part 2.

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1 Scope

Part 2 of EN 50264 specifies requirements for, and constructions and dimensions of, single core cables of the following types and voltage ratings:

- 0,6/1 kV unscreened, unsheathed (1 mm² to 400 mm²);
- 1,8/3 kV unscreened, unsheathed (1,5 mm² to 400 mm²);
- 1,8/3 kV unscreened, sheathed (1,5 mm² to 400 mm²);
- 3,6/6 kV unscreened, sheathed (2,5 mm² to 400 mm²).

All cables have class 5 tinned copper conductors to HD 383, halogen-free insulation and, where applicable, 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 1 Requirements for the emission of smoke, fumes and gases are not specified for Hazard Level 1 of EN 45545-1.

NOTE 2 EN 45545-1 is still under development and should be consulted.

Part 2 of EN 50264 should be used in conjunction with part 1 "General requirements".

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 on 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 50264-3	Railway applications - Railway rolling stock cables having special fire performance - Standard wall - Part 3: Multicore cables

¹⁾ at draft stage.

EN 50265-2-1	Common test methods for cables under fire conditions - Test for resistance to vertical flame propagation for a single insulated conductor or cable - Part 2-1: Procedures - 1kW pre-mixed flame
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 gases 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 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	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: Methods specific to elastomeric compounds - Ozone resistance, hot set and mineral oil immersion tests
HD 308	Identification of cores in cables and flexible cords
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 single-core insulated cables shall be as follows:

- a) unsheathed: 0,6/1 kV; 1,8/3 kV;
- b) sheathed: 1,8/3 kV; 3,6/6 kV.

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 1 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

5.3 Marking of cable

Cables shall be marked with the following:

- manufacturer's name;
- EN reference;
- voltage rating (U_0);
- conductor size;
- identifier for the particular hazard level (see 5.2).

For example:

XYZ EN 50264-2 3 600 V 400 F

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

5.4 Core identification

5.4.1 Single core cables

The core insulation of all cables shall be black unless otherwise specified. If a colour other than black is specified it shall be a colour in accordance with HD 308.

The colour shall be clearly identifiable and durable. Durability shall be checked by the test given in 10.1 of EN 50305.

Conformity with these requirements shall be verified by visual examination.

5.4.2 Multicore cables

Cores complying with EN 50264-2 may be used as components of multicore cables, e.g. in EN 50264-3. In such cases, 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 by visual examination and measurement.

5.5 Sheath

The sheath shall be black unless otherwise specified.

6 Construction of cables

6.1 General

The cable shall conform to the applicable general requirements given in EN 50264-1, and to the specific requirements of this part.

Conformity with the requirements shall be checked by inspection and by the tests given in Table 5.

The cable dimensions shall be as given in Tables 1 to 4 as appropriate to the cable type.

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 Conductor screening

For cables in Table 4, conductor screening shall be as given in 6.1.6 of EN 50264-1.

6.4 Separator

6.4.1 A separator may be used over the conductor if the cable construction does not include a conductor screen.

6.4.2 A separator may be included by the manufacturer between the insulation and sheath.

6.5 Insulation system

The 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.

Type EI 101 to 104 for single-core unsheathed, sheathed and also multicore cable:

- EI 101 low temperature resistant, oil resistant;
- EI 102 extra low temperature resistant, oil resistant;
- EI 103 low temperature resistant, extra oil and fuel resistant;
- EI 104 extra low temperature resistant, extra oil and fuel resistant.

Type EI 105 only for sheathed cables.

NOTE 1 Category EI 105 material is not oil or fuel resistant.

NOTE 2 To claim extra low temperature performance both insulation and sheath shall be extra low temperature resistant.

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 4.

6.6 Sheath

The sheath shall be an extruded material as defined in EN 50264-1 applied so as to meet the requirements of compound type EM 101, EM 102, EM 103 or EM 104:

- EM 101 low temperature resistant, oil resistant;
- EM 102 extra low temperature resistant, oil resistant;
- EM 103 low temperature resistant, extra oil and fuel resistant;
- EM 104 extra low temperature resistant, extra oil and fuel resistant.

The sheath shall consist of one extruded layer.

The sheath shall be applied to meet the requirements of 6.6.2 of EN 50264-1.

The sheath thickness shall conform to the specified value given in Tables 3 and 4.

6.7 Metallic screening braid

NOTE At present the use of metallic braid screen is not specified for cables to EN 50264-2.

Where a metallic screening braid is specified it 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.