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**Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 3: Single core and multicore cables (pairs, triples and quads) screened and thin wall sheathed**

Railway applications - Railway rolling stock cables having special fire performance - Thin wall -- Part 3: Single core and multicore cables (pairs, triples and quads) screened and thin wall sheathed

Bahnanwendungen - Kabel und Leitungen für Schienenfahrzeuge mit verbessertem Verhalten im Brandfall - Reduzierte Isolierwanddicken -- Teil 3: Ein- und mehradrige Kabel und Leitungen (Paare, Dreier, Vierer) geschirmt mit reduzierten Mantelwanddicken

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Applications ferroviaires - Câbles pour matériel roulant ferroviaire ayant des performances particulières de comportement au feu - Isolation mince -- Partie 3: Conducteurs et câbles blindés (paires, tierces et quartes) avec gaine d'épaisseur mince

**Ta slovenski standard je istoveten z: EN 50306-3:2002**

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**ICS:**

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EUROPEAN STANDARD

**EN 50306-3**

NORME EUROPÉENNE

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October 2002

ICS 13.220.40; 45.060.01

English version

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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 by Working Group 12, Railway cables, of Technical Committee CENELEC TC 20, Electric 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 Unique Acceptance Procedure and was approved by CENELEC as EN 50306-3 on 2002-06-01.

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- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2008-07-01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, annexes A and B are informative.

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## Introduction

EN 50306 covers a range of sheathed and unsheathed cables with thin wall thickness insulation and 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 (pairs, triples and quads) screened and thin wall sheathed;

Part 4: Multicore and multipair cables standard wall sheathed.

Special test methods referred to in EN 50306 are given in EN 50305. A guide to use is given in EN 50355<sup>1)</sup>.

EN 50306-1, General requirements, contains a more extensive introduction to EN 50306, and should be read in conjunction with this European Standard.

## 1 Scope

EN 50306-3 specifies requirements for, and constructions and dimensions of, multicore cables, rated 300 V to earth, of the following type:

Screened (0,5 mm<sup>2</sup> to 2,5 mm<sup>2</sup>, number of cores from 1 to 4)

All cables have stranded tinned copper conductors and thin wall thickness, halogen-free, insulation and 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 operational life at temperatures of 90 °C or 105 °C dependent upon the sheath system type.

NOTE 1 For cables with type S2 sheath a temperature of 105 °C is only allowed when specifically tested for the higher rating (i.e. by long-term thermal endurance testing to demonstrate a lifetime of at least 20 000 h at 125 °C).

The maximum temperature for short-circuit conditions is 160 °C based on a 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 Levels 2, 3 or 4 of EN 45545-1<sup>1)</sup>.

NOTE 2 Requirements for the emission of smoke and gases are not specified for cables used for Hazard Level 1 of EN 45545-1.

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

EN 50306-3 should be used in conjunction with EN 50306-1, General Requirements, and EN 50306-2, Single core cables.

<sup>1)</sup> At draft stage.

## 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 (including amendments).

- |                          |   |
|--------------------------|---|
| EN 45545-1 <sup>2)</sup> | Railway applications - Fire protection of railway vehicles<br>Part 1: General   |
| 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 - 1 kW pre-mixed flame  |
| EN 50267-2-1             | Common test methods for cables under fire conditions - Tests on gases evolved during combustion of materials from cables<br>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<br>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<br>Part 2: Procedure   |
| EN 50305                 | Railway applications - Railway rolling stock cables having special fire performance - Test methods  |
| EN 50306-1               | Railway applications-Railway rolling stock cables having special fire performance - Thin wall - Part 1: General requirements  |
| EN 50306-2               | Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 2: Single core 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 (IEC 60811-1-1)   |
| EN 60811-1-3             | Insulating and sheathing materials of electric and optical cables - Common test methods - Part 1-3: General application - Methods for determining the density - Water absorption tests - Shrinkage test (IEC 60811-1-3)                       |
| EN 60811-1-4             | Insulating and sheathing materials of electric and optical cables - Common test methods - Part 1-4: General application - Test at low temperature (IEC 60811-1-4)   |

<sup>2)</sup> At draft stage.

- 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 (IEC 60811-2-1)

### 3 Single and multicore cables

#### 3.1 General

The completed cable shall conform to the applicable general requirements given in EN 50306-1 and to the specific requirements of this Part 3.

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

#### 3.2 Designation, marking and coding

##### 3.2.1 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 3.2.2);
- temperature rating.

For example:

EN 50306-3 4x1,5 MF 105

##### 3.2.2 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:

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

Hazard Level EN 45545-1	1	2 or 3	4
- 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

##### 3.2.3 Marking on the insulation of cores for pairs, triples and quads

The cores shall be marked 1, 2, etc. in accordance with the requirements given in 3.3.2 of EN 50306-2. However, the core number 1 may be marked as the relevant single core in accordance with the requirements of 3.3.1 of EN 50306-2.



### 3.2.4 Marking of cable

Cables shall be marked with the following:

- manufacturer's name;
- EN reference;
- voltage rating;
- number of cores and conductor size;
- identifier for the particular Hazard Level (see 3.2.2);
- screening (S);
- temperature rating.

For example:

XYZ EN 50306-3 300 V 1x1,5 MF S 105

The marking shall conform to the requirements of clause 5 of EN 50306-1.

### 3.3 Rated voltage

The rated voltage recognized for the purposes of this standard shall be 300 V to earth.

NOTE See EN 50355 for further information.

### 3.4 Construction

#### 3.4.1 Cores

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

#### 3.4.2 Laying-up of cores in multicore cables

The cores of multicore cables 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.

#### 3.4.3 Metallic braid screening

The braid shall consist of tinned, annealed copper wires. There shall be no more than one splice in any spindle of the braid over any 100 mm length of the braid. The braid shall be applied evenly, and it should neither slip nor leave an imprint on the insulation.

The filling factor  $K_r$  shall be according to the formula:

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