
**Železniške naprave - Kabli v železniških vozilih s posebno požarno odpornostjo -
Tanka stena - 1. del: Splošne zahteve**

Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 1: General requirements

Bahnanwendungen - Kabel und Leitungen für Schienenfahrzeuge mit verbessertem Verhalten im Brandfall - Reduzierte Isolierwanddicken - Teil 1: Allgemeine Anforderungen

Applications ferroviaires - Câbles pour matériel roulant ferroviaire ayant des performances particulières de comportement au feu - Isolation mince - Partie 1: Prescriptions générales

Ta slovenski standard je istoveten z: prEN 50306-1:2018

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

oSIST prEN 50306-1:2019**en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 50306-1

November 2018

ICS

Will supersede EN 50306-1:2002

English Version

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

Applications ferroviaires - Câbles pour matériel roulant
ferroviaire ayant des performances particulières de
comportement au feu - Isolation mince - Partie 1: Exigences
générales

Bahnanwendungen - Kabel und Leitungen für
Schienenfahrzeuge mit verbessertem Verhalten im
Brandfall - Reduzierte Isolierwanddicken - Teil 1:
Allgemeine Anforderungen

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2019-02-08.

It has been drawn up by CLC/TC 20.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CENELEC in three official versions (English, French, German).
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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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<https://standards.iteh.ai/catalog/standards/sist/1ff64e5e-d9c5-4f49-94d2-ef24d36fa300/sist-en-50306-1-2020>

prEN 50306-1:2018 (E)

European foreword

This document (prEN 50306-1:2018) has been 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".

This document is currently submitted to the Enquiry.

The following dates are proposed:

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|---|-------|--|
| • latest date by which the existence of this document has to be announced at national level | (doa) | dor + 6 months |
| • latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | dor + 12 months |
| • latest date by which the national standards conflicting with this document have to be withdrawn | (dow) | dor + 36 months
(to be confirmed or modified when voting) |

This document will supersede EN 50306-1:2002.

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

- a) The documents have been updated to reflect the changes in the test standard EN 50305 (revision starting in 2018);
- b) The range of the conductor cross sections has been extended.
- c) The reference to cited standards (e.g. 60811 series) has been updated.

Introduction

The railway industry is generally concerned with the movement of people as well as goods. It is therefore essential that a high level of safety is achieved, even when failures occur which may involve fire, howsoever caused, affecting railway rolling stock.

Hence it is necessary to provide cables for use in railway environments which minimize the hazard to people when a fire may damage the cable, irrespective of whether the fire is caused by an external source or from within the electrical system.

EN 50306 specifies cables which, in the event of fire will limit the risk to people and improve the safety on railways in general. It covers cables with thin wall thickness of both insulation and sheath, based on halogen free materials, for use in railway rolling stock. There is provision for screening in some of the parts and also for a standard wall thickness sheath. In the event of a fire affecting cables to EN 50306 they will have a limited flame spread and limited emission of toxic gases. In addition these cables when burnt, produce limited amounts of smoke. This last characteristic will minimize loss of visibility in the event of a fire and will aid reduced evacuation times.

The objects of this standard are

- to standardize cables that are safe and reliable when properly used,
- to state the characteristics, performance, and construction requirements directly or indirectly bearing on safety,
- to specify methods for checking conformity with these requirements.

EN 50306, which covers a range of cables of rated voltage $U_0 = 300V$ with conductor sizes 0,5 mm² up to 2,5 mm², is divided into 4 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 cables standard wall sheathed.

These cables are intended for a limited number of applications. Further information on these applications is given in EN 50355 and EN 50343.

Special test methods referred to in EN 50306 are given in EN 50305.

A separate European Standard, EN 50264 covers cables for similar applications up to 3,6/6 kV rating with a conductor temperature at 90°C, but with standard wall and medium wall thicknesses of both insulation and sheath, and provides for a maximum conductor size of 400 mm².

A separate European Standard, EN 50382 covers cables for similar applications up to 3,6/6 kV rating with a conductor temperature at 120°C and 150°C, and provides for a maximum conductor size of 400 mm².

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1 Scope

EN 50306-1 specifies the general requirements applicable to the cables given EN 50306-2, EN 50306-3 and EN 50306-4. It includes the detailed requirements for S2 sheathing materials and other components called up in the separate parts.

NOTE Detailed requirements for insulation systems are given in EN 50306-2.

In particular EN 50306-1 specifies those requirements relating to fire safety which enable the cables to satisfy Hazard Level3 of EN 45545-1 and -2.

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 (5000 h) thermal ageing indicating a 110 °C/20 000 h temperature index. Should the customer require lifetime predictions this should 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.

EN 50306-1 has to be used in conjunction with one or more of the other parts of EN 50306.

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

EN 50305:2002, *Railway applications - Railway rolling stock cables having special fire performance - Test methods*

prEN 50306-2:2018, *Railway applications — Railway rolling stock cables having special fire performance — Thin wall — Part 2: Single core cables*

prEN 50306-3:2018, *Railway applications — Railway rolling stock cables having special fire performance — Thin wall — Part 3: Single core and multicore cables screened and thin wall sheathed*

prEN 50306-4:2018, *Railway applications — Railway rolling stock cables having special fire performance — Thin wall — Part 4: Multicore and multipair sheathed cables*

EN 50355, *Railway applications - Railway rolling stock cables having special fire performance - Guide to use*

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 60332-3-25, *Tests on electric and optical fibre cables under fire conditions - Part 3-25: Test for vertical flame spread of vertically-mounted bunched wires or cables - Category D*

EN 60754-1, *Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content*

EN 60754-2, *Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity*

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

EN 60684-2, *Flexible insulating sleeving - Part 2: Methods of test*

EN 60811 (all parts), *Common test methods for insulating and sheathing materials of electric cables*

3 Terms and definitions

For the purposes of this document, the terms and definitions of EN 50306 (series) and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

insulation system

insulation

- polymers, copolymers or alloys which contain aromatic groups and heteroelements such as N, O or Si in the main chain of the polymer molecules;
- polymers, copolymers or alloys of olefinic type, crosslinked if necessary

3.2

sheathing system

sheath

- type S2 sheath materials are compounds which contain aromatic groups and hetero-elements such as N, O or Si in the main chain of the polymer molecules, or polymers or copolymers in which the characteristic constituent is a copolymer of ethylene, cross-linked if necessary;
- type EM 101, EM 102, EM 103 and EM 104 sheath materials as given in EN 50264-1 for standard wall sheathed cables

3.3

halogen-free material

combustible material which, when tested in accordance with the designated method, conforms to the requirements given in Annex F and Annex G of EN 50305

3.4

type tests (symbol T)

tests required to be made before supplying a type of cable covered by this standard on a general commercial basis in order to demonstrate satisfactory performance characteristics to meet the intended application

Note 1 to entry: These tests are of such a nature that, after they have been made, they need not be repeated unless changes are made in the cable materials, design or type of manufacturing process which might change the performance characteristics.

3.5

sample tests (symbol S)

tests made on samples of completed cable, or components taken from a completed cable adequate to verify that the finished product meets the design specification

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3.6

routine tests (symbol R)

tests made on all complete cable lengths to demonstrate their integrity

4 Rated voltage

The rated voltage of a cable is the reference voltage for which the cable is designed, and which serves to define the electrical tests.

The rated voltage is expressed by the combination of the following values (in volts):

$$U_0/U(U_m)$$

where

U_0 is the r.m.s. value between any insulated conductor and earth, i.e. metal covering of the cable or the surrounding medium, e.g. $U_0 = 300$ V;

U is the r.m.s. value between any two phase-conductors of a multicore cable or of a system of single-core cables, e.g. $U = 300$ V;

U_m is the maximum r.m.s. value of the "highest system voltage" for which the equipment may be used, e.g. $U_m = 320$ V;.

In an alternating current system, the rated voltage of a cable shall be at least equal to the nominal voltage of the system for which it is intended.

In a direct current system, the cables shall have a maximum voltage against earth (V_0) not exceeding 1,5 times the rated voltage (U_0) of the cable, where:

V_0 is the d.c. value between any insulated conductor and earth, i.e. metal covering of the cable or the surrounding medium, e.g. $V_0 = 410$ V.

The rated voltage recognized for the purposes of all parts of EN 50355 shall be as given in Table 1.

NOTE In the Railway Industry it is common practice to identify cables and systems by the value of U_0 , not the more usual normal practice of U .

Table 1 — Voltages

Rated Voltage [U_0/U]	max. permissible operating voltage			
	AC		DC	
	Conductor to earth	Conductor to conductor [U_m]	Conductor to earth [V_0]	Conductor to conductor
300/300 V	320 V	320 V	410 V	410 V
300/500 V	320 V	550 V	410 V	820 V

5 Marking

5.1 Indication of origin

Cables shall be provided with an indication of origin consisting of the continuous marking of the manufacturer's name, trademark, or registered identification number by one of the following methods:

- 1) printing on the insulation of at least one core;
- 2) printing, indenting or embossing on the outer surface of sheathed cable.