SLOVENSKI STANDARD
SIST EN 50382-1:2008

01-julij-2008

Železniške naprave - Visokotemperaturni močnostni kabli za železniška vozna sredstva, ki imajo posebne požarne lastnosti - 1. del: Splošne zahteve

Railway applications - High temperature power cables for railway rolling stock and having special fire performance - Part 1: General requirements

Bahnanwendungen - Hochtemperaturkabel und -leitungen für Schienenfahrzeuge mit verbessertem Verhalten im Brandfall - Teil 1: Allgemeine Anforderungen

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

Ta slovenski standard je istoveten z: **EN 50382-1:2008**

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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English version

Railway applications - Railway rolling stock high temperature power cables having special fire performance - Part 1: General requirements

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

Bahnanwendungen -
Hochtemperaturkabel und -leitungen
für Schienenfahrzeuge mit verbessertem
Verhalten im Brandfall -
Teil 1: Allgemeine Anforderungen

This European Standard was approved by CENELEC on 2008-02-01. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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

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Foreword

This European Standard was prepared for the Technical Committee CENELEC TC 20, Electric cables, by Working Group 12, Railway Cables, as part of the overall programme of work in the Technical Committee 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 50382-1 on 2008-02-01.

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)	2009-02-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2011-02-01

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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 minimise 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 50382 specifies cables for power and associated circuits which, in the event of fire, will limit the risk to people and improve the safety on railways in general. It covers cables, for use in railway rolling stock, and having standard wall thickness of insulation, based on materials that allow them to operate at high temperature and which are also halogen free. In the event of a fire affecting cables to EN 50382 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 minimise loss of visibility in the event of a fire and will aid reduced evacuation times.

The objects of this standard are

– to standardise 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 50382, which covers a range of cables rated at up to 3,6/6 kV with conductor sizes 1,5 mm² up to 400 mm², is divided into 2 parts:

– Part 1: General requirements;

– Part 2: Single core silicone rubber insulated cables for 120 °C or 150 °C.

These cables are intended for a limited number of applications.

Information regarding selection and installation of cables including current ratings can be found in EN 50355 and EN 50343. The procedure for selection of cable cross-sectional area, including reduction factors for ambient temperature and installation type, are described in EN 50343.

NOTE Current ratings for inclusion in EN 50355 are under development for the next amendment.

Special test methods referred to in EN 50382 are given in EN 50305.

1 Scope

This Part 1 of EN 50382 specifies the general requirements applicable to the cables given in EN 50382-2. It includes the detailed requirements for the insulating and sheathing materials and other components called up in EN 50382-2. In particular EN 50382-1 specifies those requirements relating to fire safety.

Based on proven experience and reliability over many years these cables are rated for occasional thermal stresses causing ageing equivalent to continuous operational life at a conductor temperature of either 120 °C or 150 °C.

NOTE This rating is based upon the polymer defined in 3.1. Before this polymer had gained widespread acceptance in the cable industry, ageing performance had been assessed via long term thermal endurance testing and had been extrapolated to 20 000 h using techniques equivalent to those in EN 60216. Subsequent experience in service has demonstrated that the predicted performance levels were correct.

Where extrapolated data is used to predict lifetime in service it should be confirmed with the cable manufacturer, and should be based on a failure mode appropriate to the type of material or cable.

The maximum temperature for short circuit conditions for silicone rubber is 350 °C based on a duration of 5 s.

Although both of the insulating and one of the sheathing compounds specified in this standard are thermally capable of operating at 150 °C, where tinned conductors are used the maximum operating temperature is limited to 120 °C and for the same technical reason the maximum short circuit temperature, for tinned copper conductors, is limited to 250 °C. The choice of sheath may also limit the operating temperature to 120 °C.

This Part 1 should be used in conjunction with EN 50382-2.

2 Normative references

The following referenced documents are indispensable for the application 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 10002-1	Metallic materials – Tensile testing – Part 1: Method of test (at ambient temperature)
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 50266-2-5	Common test methods for cables under fire conditions – Test for vertical flame spread of vertically-mounted bunched wires or cables – Part 2-5: Procedures – Small cables – Category D
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 50305:2002	Railway applications – Railway rolling stock cables having special fire performance – Test methods
EN 50382-2	Railway applications – Railway rolling stock high temperature power cables having special fire performance – Part 2: Single core silicone rubber insulated cables for 120 °C or 150 °C

EN 60228	Conductors of insulated cables (IEC 60228)
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 (IEC 60332-1-2)
EN 60684-2	Flexible insulating sleeving – Part 2: Methods of test (IEC 60684-2)
EN 60811-1-1:1995	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 60811-1-1:1993)
EN 60811-1-2:1995	Insulating and sheathing materials of electric cables – Common test methods – Part 1–2: General application – Thermal ageing methods (IEC 60811-1-2:1985 + A1:1989 + corr. May 1986)
EN 60811-1-3:1995	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 60811-1-3:1993)
EN 60811-1-4:1995	Insulating and sheathing materials of electric and optical cables – Common test methods – Part 1–4: General application – Tests at low temperature (IEC 60811-1-4:1985 + A1:1993 + corr. May 1986)
EN 60811-2-1:1998	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 60811-2-1:1998)
EN 61034-2	Measurement of smoke density of cables burning under defined conditions – Part 2: Procedure and requirements (IEC 61034-2)

3 Definitions

For the purposes of all parts of EN 50382, the following terms and definitions apply. The types or combination of insulating and sheathing compounds covered in this EN are listed below.

3.1
cross-linked silicone rubber (SiR)
compound based on a poly-siloxane polymer which, when cross-linked, meets with the requirements given in the particular specification

3.2
cross-linked ethylene copolymers
compound in which the characteristic constituent is a copolymer of ethylene such as EVA or other, which, when cross-linked, complies with the requirements given in the particular specifications

3.3
type of compound
category, designated by one or several characteristics, in which a compound is placed according to its properties, as determined by specific tests

NOTE The type designation is not directly related to the composition of the compound. See also 6.2.1 and 6.4.1.

3.4
halogen-free material
combustible material which complies with the requirements of Annexes A and B

3.5
variation
difference between the median value after treatment and the median value without treatment, expressed as a percentage of the latter

3.6
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 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.

3.7
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

3.8
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 V is expressed by the combination of the following values (in volts):

U_o/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 = 1 800 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 = 3 000 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 = 3 600 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 = 2 700 V.

The rated voltage recognized for the purposes of all parts of EN 50382 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_o, not the more usual practice of U.

Table 1 – Rated voltages

Rated voltage *V*			
U_o	U	U_m	V_o
1 800	3 000	3 600	2 700
3 600	6 000	7 200	5 400
NOTE See Guide to use (EN 50355) for further information.			

5 Marking

5.1 Indication of origin

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

1) a printed tape within the cable;

2) printing, indenting or embossing on the outer surface of sheathed cable;

3) printing on the outer surface of the cable.

NOTE Additional markings may be specified in EN 50382-2.

5.2 Continuity of marks

Each specified mark shall be regarded as continuous if the distance between the end of the mark and the beginning of the next identical mark does not exceed

a) 550 mm if the marking is on the outer surface of the cable;

b) 275 mm if the marking is on the insulation or on a tape.

NOTE 1 A "specified mark" is any mandatory mark covered by this Part of EN 50382 or by the particular requirements of Part 2.

NOTE 2 An example of marking on the outer surface of the cable is given in Figure 1.

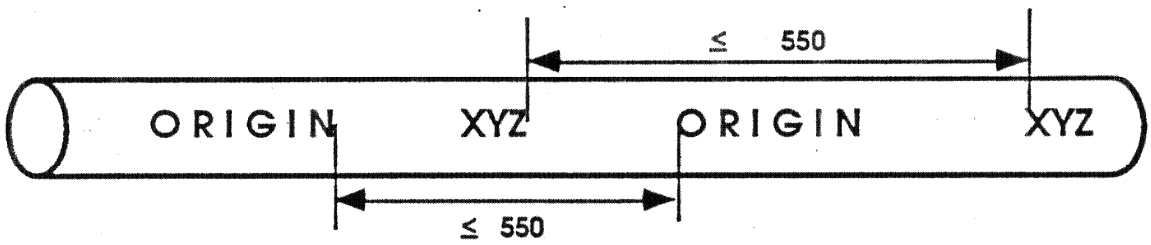

Figure 1 – Example of marking

Compliance shall be checked by visual examination and measurement.

5.3 Durability

Printed markings shall be durable.

Compliance shall be checked by the test given in EN 50305, 10.1.

5.4 Legibility

All markings shall be legible.

Printed markings shall be in contrasting colours.

5.5 Additional marking

Additional marking, specific to the individual cable type, shall be given in EN 50382-2.

5.6 Use of the name CENELEC

The name CENELEC, in full or abbreviated, shall not be directly marked on, or in, the cables.

6 General requirements for the construction of cables

6.1 Conductors

6.1.1 Material

The conductors shall be tin coated or plain annealed copper.

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

6.1.2 Construction

Conductors shall be in accordance with EN 60228.

NOTE The classes of the conductors relevant to the various types of cables are given in EN 50382-2.

6.1.3 Check of construction

Conformity with the requirements of 6.1.1 and 6.1.2 shall be checked by inspection and by measurement.

6.1.4 Electrical resistance

The resistance of each conductor at 20 °C shall be in accordance with the requirements of EN 60228 for the given class of conductor.

Compliance shall be checked by the test given in EN 50305, 6.1.

6.1.5 Separator tape

It is permitted to place a non-hygroscopic separator tape of coloured material between the conductor and insulation. If used, the separator tape shall be easily removable from the conductor.

6.1.6 Conductor screening

Where specified in EN 50382-2 the conductor screening shall consist of a semiconducting tape, a layer of extruded semi-conducting compound, or a combination of both.

It shall be easily removable from the conductor.