



# SLOVENSKI STANDARD

## SIST EN 50143:2009

01-julij-2009

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**Kabli za znake in svetilne naprave, ki delujejo na neobremenjeni nazivni napetosti nad 1000 V, vendar ne preko 10 000 V**

Cables for signs and luminous-discharge-tube installations operating from a no-load rated output voltage exceeding 1 000 V but not exceeding 10 000 V

Leitungen für Leuchtröhrengeräte und Leuchtröhren-Anlagen mit einer Leerlaufspannung von über 1 000 V, aber nicht über 10 000 V

Câbles pour installations d'enseignes et de tubes à décharges lumineuses fonctionnant avec une tension à vide supérieure à 1 000 V mais ne dépassant pas 10 000 V

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**Ta slovenski standard je istoveten z: EN 50143:2009**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 50143**

March 2009

ICS 29.060.20

Supersedes EN 50143:1997 + A1:2003

English version

**Cables for signs and luminous-discharge-tube installations  
operating from a no-load rated output voltage  
exceeding 1 000 V but not exceeding 10 000 V**

Câbles pour installations d'enseignes  
et de tubes à décharges lumineuses  
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supérieure à 1 000 V  
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über 1 000 V, aber nicht über 10 000 V

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This European Standard was approved by CENELEC on 2009-02-01. 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.

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**CENELEC**

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

**Central Secretariat: avenue Marnix 17, B - 1000 Brussels**

## Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 20, Electric cables.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50143 on 2009-02-01.

This European Standard supersedes EN 50143:1997 + A1:2003.

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) 2010-02-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2012-02-01

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## Introduction

This revision of EN 50143 is made at the request of the European Sign Federation (ESF). It supports EN 50107.

By comparison with EN 50143:1997 the number of cable types has been rationalised. One new type (type L) has been introduced, and four types (types A, C1, D1 and H) withdrawn.

The object of the European Standard remains unchanged, namely:

- to standardise cables and cords that are safe and reliable when properly used in relation to the technical requirements of the installation of which they form a part;
- to state the characteristics and manufacturing requirements directly or indirectly bearing on safety; and
- to specify methods for checking conformity with those requirements.

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## 1 Scope

EN 50143 applies to single core cables of rated voltages up to and including 5/10 kV ( $U_0/U$ ) used with electric signs and high-voltage luminous-discharge-tube installations. These cables are for use in installations complying with EN 50107.

The particular types of cables are specified in Clauses 7 to 10 of this standard.

## 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 50107 (series)		Signs and luminous-discharge-tube installations operating from a no-load rated output voltage exceeding 1 kV but not exceeding 10 kV
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	1998	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 50363-1	2005	Insulating, sheathing and covering materials for low voltage energy cables - Part 1: Cross-linked elastomeric insulating compounds
EN 50363-3	2005	Insulating, sheathing and covering materials for low voltage energy cables - Part 3: PVC insulating compounds
EN 50363-4-1	2005	Insulating, sheathing and covering materials for low voltage energy cables - Part 4-1: PVC sheathing compounds
EN 50395	2005	Electrical test methods for low voltage energy cables
EN 50396	2005	Non electrical test methods for low voltage energy cables
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 (series)		Insulating and sheathing materials of electric and optical cables - Common test methods (IEC 60811 series)
EN 61034-2		Measurement of smoke density of cables burning under defined conditions - Part 2: Test procedure and requirements (IEC 61034-2)



### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### **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.

#### 3.2

##### **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 specifications

#### 3.3

##### **routine tests (symbol R)**

tests made on all production 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 two values  $U_0/U$ , expressed in volts:

- $U_0$  being the r.m.s. value between any insulated conductor and "earth" (metal covering of the cable or the surrounding medium);
- $U$  being the r.m.s. value between any two phase-conductors of a system of single-core cables.

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.

This condition applies both to the value  $U_0$  and to the value  $U$ .

In a direct current system, the maximum permanent operating voltage of the system is stated in Table 1.

**Table 1 - Maximum permitted voltages against rated voltage of cable in an a.c. system**

Rated voltage of cable ( $U_0/U$ )	Maximum permanent permitted operating voltage (a.c.) of the system (Conductor-earth)
kV	kV max.
2,5/5	2,75
3/6	3,3
5/10	5,5

## 5 General requirements for the construction of cables

### 5.1 Conductors

#### 5.1.1 Construction

The classes of the conductors relevant to the various types of cables are given in Clauses 7 to 10.

#### 5.1.2 Check of construction

Compliance with the requirements of 5.1.1, including the requirements of EN 60228, shall be checked by inspection and by measurement.

#### 5.1.3 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 Clause 5 of EN 50395.

### 5.2 Insulation

#### 5.2.1 Material

The insulation shall be a compound as specified for each type of cable in Clauses 7 to 10.

The test requirements for these compounds are specified for the particular cable.

Maximum material operating temperatures are stated in the relevant part of EN 50363.

#### 5.2.2 Application to the conductor

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The insulation may consist of one or more bonded layers. The insulation shall be so applied that it fits closely on the conductor and it shall be possible to remove the insulation without damage to the remaining insulation, to the conductor, or to the tin coating. If required, compliance shall be checked by inspection and by manual test. The insulation shall be applied by an extrusion process, cross-linked where required, and shall form a compact and homogeneous body.

#### 5.2.3 Thickness

The mean value of the thickness of insulation shall not be less than the specified value for each type and size of cable.

However, the thickness at any one place may be less than the specified value provided that the difference does not exceed 0,1 mm + 10 % of the specified value.

Compliance shall be checked by the test given in 4.1 of EN 50396.

### 5.3 Oversheath

#### 5.3.1 Material

The oversheath shall be a compound of the type specified for each type of cable in Clauses 7 to 10.

The test requirements for these compounds are specified for the particular cable.

#### 5.3.2 Application

The oversheath shall be extruded.

### 5.3.3 Thickness

The mean value of the thickness of the oversheath shall not be less than the specified value for each type and size of cable.

However, the thickness at any place may be less than the specified value provided that the difference does not exceed  $0,1 \text{ mm} + 15 \%$  of the specified value.

Compliance shall be checked by the test given in 4.2 of EN 50396.

### 5.3.4 Overall dimensions

The mean overall dimensions of the cable shall be within the limits specified in the tables for each type and size of cable in Clauses 7 to 10.

The difference between any two values of the overall diameter of sheathed circular cables at the same cross-section (ovality) shall not exceed  $15 \%$  of the upper limit specified for the mean overall diameter.

Compliance shall be checked by the test given in 4.4 of EN 50396.

## 5.4 Non-metallic components of halogen free cables

All non-metallic components of cable types C2 and D2 shall be halogen free. This shall be checked by the procedure given in Annex A, unless otherwise specified for the particular cable.

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## 6 Cable types

### 6.1 General

Cables to this European Standard shall be one of the following types.

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#### a) Cables with a rated voltage 5 kV/10 kV

- |    |   |
|----|---|
| B  | Silicone rubber insulated cable, unscreened, unsheathed   |
| C2 | Silicone rubber insulated cable, unscreened and halogen-free sheathed   |
| D2 | Silicone rubber insulated cable, screened and halogen-free sheathed   |
| E  | PVC insulated cable, screened with drain wire and with PVC sheath   |
| F  | PVC insulated cable, PVC sheathed, or PVC insulated cable with flexible protective conductor and PVC sheathed |
| G  | PVC insulated cable, unscreened, unsheathed   |

#### b) Cables with a rated voltage 2,5 kV/5 kV

- |   |   |
|---|---|
| K | Cable with a reduced thickness composite insulation of polyethylene and PVC |
|---|---|

#### c) Cables with a rated voltage 3 kV/6 kV

- |   |   |
|---|---|
| L | Silicone rubber insulated cable, unscreened, unsheathed |
|---|---|

## 6.2 Requirements

The cables shall meet the general requirements of Clause 5 and the requirements given in Clauses 7 to 10 for the particular cable.

## 7 Silicone rubber insulated cables (types B, C2 and D2)

### 7.1 Construction

#### 7.1.1 Conductor

Number of conductors: 1

The conductors shall comply with the requirements of EN 60228, for class 5 conductors.

The wires shall be tinned annealed copper.

#### 7.1.2 Insulation

The insulation shall be silicone rubber compound of type EI 2 to EN 50363-1 applied around the conductor by extrusion.

The thickness of the insulation shall comply with the specified value given in Table 2, column 2.

#### 7.1.3 Braided screen

When a braided screen is required (cable type D2) it shall consist of tinned annealed copper wires of 0,2 mm nominal diameter.

The braid shall cover at least 84% of the surface area of the core.

NOTE A separator tape of suitable material may be used under and/or over the braid.

#### 7.1.4 Sheath

The sheath of type C2 and D2 cables shall be a halogen-free compound type ZM 1, complying with the requirements given in Annex C, applied around the core by extrusion in a single layer.

The thickness of sheath shall comply with the specified value given in Table 2, column 5.

The sheath shall be capable of being removed without damage to the core insulation or metallic screen.

#### 7.1.5 Overall diameter

The mean overall diameter shall be within the limits given in Table 2, columns 6 and 7.

## 7.2 Tests

### 7.2.1 General

Compliance with the requirements of 7.1 shall be checked by inspection and by the tests given in Tables 3 and 4.

The requirements to be met for the compatibility test shall be as given in Annex D.