

Inštalacije znakov in svetlečih razelektritvenih cevnih sijalk, ki delujejo na neobremenjenem izhodu z napetostjo med 1 kV in 10 kV - 1. del: Splošne zahteve

(istoveten EN 50107-1:2002)

Signs and luminous-discharge-tube installations operating from a no-load rated output voltage exceeding 1 kV but not exceeding 10 kV - Part 1: General requirements

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English version

**Signs and luminous-discharge-tube installations
operating from a no-load rated output voltage
exceeding 1 kV but not exceeding 10 kV
Part 1: General requirements**

Installations d'enseignes et de tubes
lumineux à décharge fonctionnant
à une tension de sortie à vide
assignée supérieure à 1 kV
mais ne dépassant pas 10 kV
Partie 1: Prescriptions générales

Leuchtröhrengeräte und
Leuchtröhrenanlagen
mit einer Leerlaufspannung
über 1 kV aber nicht über 10 kV
Teil 1: Allgemeine Anforderungen

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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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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 CENELEC BTTF 60-2, Electrical discharge lamp installations.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50107-1 on 2002-01-04.

This European Standard replaces EN 50107:1998.

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) 2003-05-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2005-01-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex B is normative and annexes A & C are informative.

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1 Scope

This European Standard specifies the requirements and method of installation 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, including the electrical components and wiring.

The standard covers installations used for publicity, decorative or general lighting purposes, either for external or internal use. Such signs or luminous-discharge-tube installations may be either fixed or portable supplied from a low-voltage (LV) or extra-low-voltage (ELV) source by means of a transformer, inverter or converter.

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 any of these publications apply to the European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 50107-2¹⁾, *Signs and luminous-discharge-tube installations operating from a no-load rated output voltage exceeding 1 kV but not exceeding 10 kV – Part 2: Requirements for earth-leakage and open-circuit protective devices*

EN 50143:1997 + A1:200X¹⁾, *Cables for signs and luminous-discharge-tube installations operating from a no-load rated output voltage exceeding 1 kV but not exceeding 10 kV*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code)* (IEC 60529:1989)

EN 60598-1:2000, *Luminaires — Part 1: General requirements and tests* (IEC 60598-1:2000, mod.)

EN 61347-2-10, *Lamp controlgear — Part 2-10: Particular requirements for electronic inverters and converters for high-frequency operation of cold start tubular discharge lamps (neon tubes)* (IEC 61347-2-10)

EN 61050, *Transformers for tubular discharge lamps having a no-load output voltage exceeding 1 kV (generally called neon-transformers) — General and safety requirements* (IEC 61050:1991 + corrigendum March 1992, mod.)

HD 384 (series), *Electrical installations of buildings* (IEC 60364 series, mod.)

IEC 60050, *International Electrotechnical Vocabulary*

ISO 3864:1984, *Safety colours and safety signs*

¹⁾ To be published.

3 Definitions

For the purposes of this European Standard, the definitions given in IEC 60050 (IEV) apply, together with the following.

NOTE 1 Sections 602 - 605 of IEC 60050 contain definitions relating to the generation, transmission and distribution of electricity.

NOTE 2 Where the terms 'voltage' and 'current' are used, they refer to r.m.s. values, unless otherwise stated.

3.1

luminous-discharge tube

tube, or other vessel or device, which is constructed of translucent material, hermetically sealed, and designed for the emission of light arising from the passage of an electric current through a gas or vapour contained within it

NOTE The tube may be with or without a fluorescent coating.

3.2

no-load rated output voltage

maximum rated voltage between the terminals of the output winding(s) of the transformer, inverter or converter connected to the rated supply voltage at rated frequency, with no load on the output circuit

NOTE 1 For output circuits supplied by transformers, it is the peak value divided by the square root of 2 (see EN 61050).

NOTE 2 For output circuits supplied by inverters or converters, it is the r.m.s. value or the peak value divided by 2, whichever is the greater (see EN 61347-2-10).

3.3

creepage distance

shortest path between two conductive parts or between a live part and an accessible surface of an enclosure, earthed metalwork or flammable materials, measured along the surface of the insulation material

3.4

clearance

shortest distance between two conductive parts or between a live part and an accessible surface of an enclosure, earthed metalwork or flammable materials, measured through the air

3.5

transformer

a static piece of apparatus with two or more windings which, by electromagnetic induction, transforms a system of alternating voltage and current into another system of voltage and current usually of different values and at the same frequency for the purpose of transmitting electrical power

[IEV 421-01-01]

NOTE The high output impedance of most transformers designed for cold-cathode discharge tubes allows the characteristics of transformer and current-limiting components to be combined in one unit.

3.6

inverter

transducer that converts direct current to alternating current

3.7

converter

unit for the electronic conversion of an a.c. supply at one frequency to an a.c. supply at another frequency

NOTE The voltage may or may not be altered during the conversion.

3.8**insulating sleeve**

insulation designed to be placed over the exposed high-voltage connections at tube electrodes or over cable-end insulators

3.9**installer**

person, qualified in sign installation practice, who takes responsibility for the installation and its testing in accordance with this standard

3.10**earth-leakage protective device**

device which will remove the output power from one or more transformer(s), inverter(s) or converter(s) in the event of a short circuit between any relevant part of the output circuit and earth

3.11**open-circuit protective device**

device which will remove the output power from one or more transformer(s), inverter(s) or converter(s) in the event of an interruption of the secondary high voltage circuit

3.12**live part**

conductor or conductive part intended to be energized in normal operation, including a neutral conductor but, by convention, not a PEN conductor, PEM conductor or a PEL conductor.

NOTE This concept does not necessarily imply a risk of electric shock.

3.13**input circuit**

that part of the device or installation between the point at which electrical energy is supplied to an installation and the input terminals of the transformer, converter or inverter

NOTE Also known as a 'mains supply circuit'.

3.14**output circuit**

that part of the device or installation between the output terminals of the transformer, converter or inverter and the discharge tubes inclusive

NOTE Also known as a 'lamp circuit'.

3.15**arm's reach**

zone extending from any point on a surface where persons usually stand or move about to the limits which a person can reach with the hand in any direction without assistance

NOTE This zone of accessibility is shown in Figure 1 in which the values refer to bare hands without any assistance, e.g. from tools or from a ladder.

3.16**outdoors**

location where all or part of a sign or luminous-discharge-tube installation or its components are situated out of doors and are subject to the effects of weather

3.17**dry room; dry location**

room or location where condensation does not usually occur or the air is not saturated with moisture

3.18**damp or wet room**

room where the safety of the sign or luminous-discharge-tube installation could be affected by humidity, condensation, chemical or similar influences

3.19**small portable sign**

small sign which can easily be moved from one place to another; which is supplied with an integral transformer, inverter or converter, together with a flexible mains supply lead and plug; and which is intended to be installed and connected by the customer to a socket outlet of the mains supply

3.20**flasher**

device for automatically switching one or more output circuits on and off continuously

NOTE The sequence of switching of the various output circuits may be suitably arranged to provide the impression of movement and other animated effects.

4 Means of attachment of signs

Electrical conductors shall be not used as means of suspension or attachment of signs.

5 Drain holes

In sign enclosures intended for external use, arrangements shall be made to allow moisture to drain away. Drain holes or similar apertures used for this purpose shall be sufficiently large to ensure that they do not become blocked with dirt or debris between maintenance visits.

6 Installation of the mains supply

Installation of the mains supply for signs and luminous-discharge-tube installations shall be carried out in accordance with HD 384.

NOTE Attention is drawn to the fact that wiring rules are not fully harmonized in CENELEC countries and, for this reason, national standards may apply.

7 Enclosures and protection of live parts

7.1 All high-voltage connections to discharge tubes shall be protected by means of insulating sleeves conforming to clause 13.

7.2 High-voltage connections situated within arm's reach (see 3.15) shall have additional protection conforming to 7.4 and 7.5.

7.3 High-voltage connections situated out of arm's reach shall have additional protection conforming to 7.4 or 7.6.

7.4 Additional protection shall consist of an enclosure or other means of protection conforming to the following:

- a) It shall provide a degree of protection corresponding to at least IP 2X as specified in EN 60529, Table 1.

NOTE 1 The requirements for protection against ingress of solid objects, specified in EN 60529, Table 2, do not apply.

NOTE 2 See Annex C, A-deviations.

- b) If it is constructed from metal parts, these shall be earthed in accordance with clause 8.
- c) If it is constructed from other materials, these shall be materials that have been certified by the supplier as suitable for use in the environment existing close to a tube electrode. The installer shall obtain from the supplier a guarantee for the materials covering the expected lifetime of the installation.

NOTE 3 Suppliers of such materials should be informed of the temperature, ultraviolet (UV) radiation, ozone and other conditions existing near a tube electrode. They should also be informed that such materials might be used in exterior situations.

- d) Access to the interior of an enclosure shall be by means of a tool, e.g. a screwdriver.

NOTE 4 Other means of additional protection may be permanent, e.g. it may have to be cut away using a knife.

NOTE 5 A fully enclosed sign letter or box sign is considered to be a suitable enclosure for this purpose.

7.5 Additional protection shall consist of either

- a) an enclosure as specified in 7.4 where the degree of protection (IP 2X) is maintained even if any external parts of a tube are broken, or
- b) an enclosure as specified in 7.4 plus open-circuit protection conforming to the requirements of EN 50107-2.

NOTE The requirement of 7.5 a) means that it is not possible to insert the appropriate test finger into the broken end of a tube and touch a live electrode.

7.6 Additional protection shall consist of open-circuit protection conforming to the requirements of EN 50107-2.

7.7 Symbols for 'caution, risk of electric shock' conforming to B.3.6 of ISO 3864:1984 shall be fixed at points of access to any sign, luminous-discharge-tube installation or enclosure containing high-voltage transformers, inverters or converters.

NOTE In small installations of limited extent, one such symbol is normally adequate. More than one symbol should be used for larger installations and these should be arranged so that at least one is visible from any likely direction of approach to the installation.

7.8 A conductor which is in metallic contact with a discharge tube operating at high voltage shall not be in connection (except in respect of its connection to earth) with any other conductor of the mains supply or with the primary winding of the transformer.

7.9 The creepage distances and clearances in millimetres between the following shall be as specified in Tables 1, 2, 3 or 4, as appropriate:

- a) between live parts carrying different voltage supplies;
- b) between live parts and earthed metalwork;
- c) between live parts and parts which are flammable; or
- d) between live parts and parts that can be touched with the standard test probe.

NOTE 1 The voltage given in Tables 1 to 4 is either the no-load rated output voltage between terminals or the no-load rated output voltage between terminals and earth, as appropriate, of the transformer, inverter or converter supplying the circuit.

NOTE 2 When considering the creepage distance or clearance from an electrode connection to, for example, earthed metal, the extra distance taken by an electrical discharge around the electrode sleeve may be taken into account (see 7.10) provided the distance conforms to 7.11.

NOTE 3 In most situations, the installer needs to consider the creepage distances and clearances between live parts and earth so the voltage in Tables 1 to 4 is the no-load rated output voltage to earth. The total no-load rated output voltage needs to be used only on the rare occasions when creepage distances and clearances between live terminals are being considered. For example, for a transformer rated at 5 kV – E – 5 kV, creepage distances and clearances for a voltage of 5 kV (not 10 kV) need to be taken from Tables 1 to 4, as applicable.

NOTE 4 An illustration of creepage distances and clearances is given in Figures 5 and 6. Figure 6 illustrates how the distances are increased with the use of an electrode sleeve.

Table 1 — Creepage distances and clearances for equipment operating at normal mains frequency, which is installed in dry rooms and similar protected situations

| No-load rated output voltage (see note 3 above) kV | Shortest creepage distance mm | Shortest clearance mm |
|--|----------------------------------|--------------------------|
| greater than 1,0 to 1,75 | 11 | 8 |
| greater than 1,75 to 2,25 | 13 | 9 |
| greater than 2,25 to 3,0 | 16 | 11 |
| greater than 3,0 to 4,0 | 19 | 13 |
| greater than 4,0 to 5,0 | 23 | 15 |
| greater than 5,0 to 6,0 | 27 | 17 |
| greater than 6,0 to 8,0 | 32 | 20 |
| greater than 8,0 to 10,0 | 40 | 25 |

Table 2 — Creepage distances and clearances for equipment operating at frequencies greater than 1 kHz, which is installed in dry rooms and similar protected situations

| No-load rated output voltage (see note 3 above) KV | Shortest creepage distance mm | Shortest clearance mm |
|--|----------------------------------|--------------------------|
| greater than 1,0 to 1,75 | 13 | 10 |
| greater than 1,75 to 2,25 | 16 | 11 |
| greater than 2,25 to 3,0 | 19 | 13 |
| greater than 3,0 to 4,0 | 23 | 16 |
| greater than 4,0 to 5,0 | 28 | 18 |
| greater than 5,0 to 6,0 | 32 | 20 |
| greater than 6,0 to 8,0 | 38 | 24 |
| greater than 8,0 to 10,0 | 48 | 30 |

Table 3 — Creepage distances and clearances for equipment operating at normal mains frequency which is installed outdoors or in damp or wet rooms

| No-load rated output voltage (see note 3 above) kV | Shortest creepage distance mm | Shortest clearance mm |
|--|----------------------------------|--------------------------|
| greater than 1,0 to 1,75 | 17 | 11 |
| greater than 1,75 to 2,25 | 21 | 13 |
| greater than 2,25 to 3,0 | 25 | 15 |
| greater than 3,0 to 4,0 | 31 | 18 |
| greater than 4,0 to 5,0 | 37 | 21 |
| greater than 5,0 to 6,0 | 44 | 24 |
| greater than 6,0 to 8,0 | 53 | 28 |
| greater than 8,0 to 10,0 | 65 | 34 |