



SLOVENSKI STANDARD
SIST EN 50107:2001
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Signs and luminous-discharge-tube installations operating from a no-load rated output voltage exceeding 1 kV but not exceeding 10 kV

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

Leuchtröhrengeräte und Leuchtröhrenanlagen mit einer Leerlaufspannung über 1 kV aber nicht über 10 kV

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

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ICS:

29.140.30 Fluorescent lamps.
Discharge lamps

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EUROPEAN STANDARD

EN 50107

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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 CENELEC BTTF 60-2, Electrical discharge lamp installations.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50107 on 1997-07-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
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 - latest date by which the national standards conflicting
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CONTENTS

	Page
1. Scope.....	4
2. Normative references.....	4
3. Definitions.....	5
4. Means of attachment of signs.....	7
5. Drain holes.....	7
6. Installation of the mains supply.....	7
7. Enclosures and protection of live parts.....	7
8. Protection against indirect contact.....	9
9. Transformers.....	10
10. Earth-leakage and open-circuit protection.....	10
11. Invertors and convertors.....	15
12. Auxiliaries.....	15
13. Insulating sleeves.....	16
14. Specification and installation of high-voltage cables.....	16
15. High-voltage connections.....	19
16. Supports for luminous-discharge tubes.....	20
17. Electromagnetic compatibility.....	20
18. Inspection and testing of installations.....	21
19. Marking and site records.....	21

ANNEX

A. (informative) List of high-voltage cables specified in EN 50143.....	27
B. (normative) Special national conditions.....	28
C. (informative) A-deviations.....	28

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 (L.V) or extra-low-voltage (E.L.V) source by means of a transformer, inverter or convertor.

Note: Although the requirements are not specified in this Standard, attention is drawn to the need for an effective maintenance programme to be carried out on all signs or luminous-discharge-tube installations. The inspection and testing requirements included in any maintenance programme should closely follow those specified in Clause 18 of this Standard.

2.

NORMATIVE REFERENCES

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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 50143 - 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.

EN 55015 - Limits and methods of measurement of radio interference characteristics of fluorescent lamps and luminaires.

EN 60529 - Degrees of protection provided by enclosures (IP Code).

EN 61000 - Electromagnetic compatibility (EMC). Part 3, Limits. Section 2, Limits for harmonic current emissions (equipment input current not exceeding 16 A/phase).

EN 60598-1 - Luminaires. Part 1, General requirements and tests.

EN 61050 - Transformers for tubular discharge lamps having a no-load output voltage exceeding 1 000 V (generally called neon-transformers). General and safety requirements.

EN 61547 - Equipment for general lighting purposes. EMC immunity requirements.

HD 384 - Electrical installations of buildings.

ISO 3864 : - Safety colours and safety signs

3. DEFINITIONS

For the purposes of this European Standard, the definitions given in IEC 50 (IEV) apply, together with the following.

Note: Where the terms 'voltage' and 'current' are used, they imply the r.m.s. values unless otherwise specified.

- 3.1 luminous-discharge tube: Any 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 connected to the rated supply voltage at rated frequency, with no load on the output circuit. It is the peak value divided by the square root of 2.

- 3.3 creepage distance: The shortest path between two conductive parts or between a conductive part and the bounding surface of the installation, measured along the surface of the insulating material.

Note: The bounding surface of the installation is the inner surface of the enclosure, considered as though a metal foil were pressed into contact with all interior surfaces of insulating material.

- 3.4 clearance: The shortest distance between two conductive parts or between a conductive part and the bounding surface of the installation, measured through the air.

Note: See note to 3.3.

- 3.5 transformer: A unit for the conversion of an a.c. supply at one voltage and frequency to an a.c. supply at a different voltage and the same frequency.

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: An electric energy transducer that converts direct current to alternating current.

- 3.7 convertor: A 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: The 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: A device which will remove the output voltage from a transformer(s), inverter(s) or converter(s) in the event of a short circuit between any part of the secondary high voltage circuit and earth.
- Note: The device may be in two parts, a sensor and a protective switch (see 3.12 and 3.13), or may be combined in one unit.
- 3.11 open-circuit protective device: A device which will remove the output voltage from a transformer(s), inverter(s) or converter(s) in the event of an interruption of the secondary high voltage circuit.
- Note: The device may be in two parts, a sensor and a protective switch (see 3.12 and 3.13), or may be combined in one unit.
- 3.12 sensor: That part of a protective device which detects the presence of a secondary earth fault and/or an open circuit condition and provides a signal to operate a protective switch.
- 3.13 protective switch: That part of a protective device which disconnects the mains supply to a transformer(s), inverter(s) or converters(s) or otherwise removes the output power. It is operated by an electrical signal obtained from a sensor.
- 3.14 live part: A conductor or conductive part intended to be energised in normal use, including the neutral conductor but, by convention, not a PEN conductor.
- 3.15 input end (low-voltage circuit): The part of the device between the point at which electrical energy is supplied to an installation and the input terminals of the transformer, converter or inverter.
- 3.16 output end (lamp circuit): The part of the device between the output terminals of the transformer, converter or inverter and the discharge tubes inclusive.
- 3.17 arm's reach: A 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.
- 3.18 outdoor sites: Sites 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.
- 3.19 dry rooms and places: Rooms or places where condensation does not usually occur or the air is not saturated with moisture.

- 3.20 damp and wet rooms and places: Rooms or places where the safety of the sign or luminous-discharge-tube installation may be affected by humidity, condensation, chemical or similar influences.
- 3.21 small portable signs: Small signs which can easily be moved from one place to another; which are supplied with an integral transformer, inverter or convertor, together with a flexible mains supply lead and plug; and which are intended to be installed and connected by the customer to a socket outlet of the mains supply.
- 3.22 flasher: A device for automatically switching one or more lamp circuits on and off continuously. The sequence of switching of the various lamp circuits may be suitably arranged to provide the impression of movement and other animated effects.

4. MEANS OF ATTACHMENT OF SIGNS

Electrical conductors shall not be 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 harmonised in CENELEC countries and, for this reason, national standards 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 shall have additional protection conforming to 7.4 and 7.5.

Note: The description of arm's reach is shown in figure 1.

- 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 in Table 1 of EN 60529.

Note 1: The requirements for protection against ingress of solid objects, specified in Table 2 of EN 60529, 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 certified by the supplier as suitable for use in the environment existing close to a tube electrode. The materials shall be guaranteed by the supplier for 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 may 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:

- i) 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
- ii) the circuit shall be provided with open-circuit protection complying with the requirements of 10.6. This being in addition to the mechanical enclosure specified in 7.4.

Note: The requirement of 7.5(i) 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 complying with the requirements of 10.6.

- 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, invertors or convertors. The length of side of the triangle enclosing the symbol shall be not less than 50 mm.

Note: In small installations of limited extent, one such symbol should normally be 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 Creepage distances and clearances in millimetres between live parts carrying different voltage supplies, between live parts and earthed metalwork or between live parts and parts which may become conductive when wet or are flammable shall be as follows:

- a) for equipment which is installed in dry rooms and similar protected situations:

shortest creepage distance: $d = 8 + 4U$;

shortest clearance: $c = 6 + 3U$;

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- b) for equipment which is installed outdoors or in damp or wet rooms:

shortest creepage distance: $d = 10 + 5U$;

shortest clearance: $c = 7,5 + 3,75U$;

- c) for equipment operating at frequencies greater than 1 kHz, whether this is installed in dry or damp situations:

shortest creepage distance: $d = 12 + 6U$;

shortest clearance: $c = 9 + 4,5U$;

where:

U is the rated no-load output voltage of the transformer, inverter or convertor supplying the circuit in kilovolts.

8. PROTECTION AGAINST INDIRECT CONTACT

- 8.1 The protection against indirect contacts shall be provided by an equi-potential bonding, generalised between all metal parts and then connected to earth.
- 8.2 All exposed metalwork, with the exception of clips and clamps for fixing cables and tubes, shall be bonded together by means of a protective conductor and, unless this metalwork is connected to earth by other means, shall be provided with an earthing terminal.

- 8.3 The protective conductor shall be one of the following:
- a) a separate cable having insulation coloured yellow/green and having the following cross-sectional area:
 - i) in situations where it may suffer mechanical stress, 4 mm²;
 - ii) in other situations, 2,5 mm²; or
 - b) a stranded or solid copper conductor having a minimum cross-sectional area of not less than 1,5 mm², manufactured as part of a sheathed high-tension cable and protected by the overall sheath of that cable; or
 - c) the braided metal screen of a high-voltage cable, provided that the total cross-sectional area of the individual strands comprising that screen is not less than 1,5 mm². Connections to the screen shall be made by unravelling the braid and twisting the individual strands together to form a suitable length of conductor to attach to an earth terminal. The connection shall not be by means of a metal clamp around the braid.
- 8.4 Where adhesive is used between metal parts, or where painted metal parts are bolted or screwed together, unless a bonding conductor is connected between the parts, means shall be employed to ensure that earth continuity is maintained across the joint.
- 8.5 Equipotential bonding conductors shall not be connected to the neutral terminal of the mains supply to the sign or luminous-discharge-tube installation, except as specified in HD 384 for protective multiple earthing arrangements in TN-C systems.
9. **TRANSFORMERS**
- Transformers shall conform to EN 61050 except that the no-load rated output voltage shall not exceed 5 kV to earth or exceed 10 kV between terminals.
10. **EARTH-LEAKAGE AND OPEN-CIRCUIT PROTECTION**
- 10.1 The requirements for earth-leakage protection are specified in 10.2 to 10.5. Those for open-circuit protection are specified in 10.6 to 10.9. The requirements in 10.10 to 10.15 apply to both types of protection.
- 10.2 High-voltage circuits supplied from transformers, invertors or convertors shall be protected by an earth-leakage protective device conforming to 10.3 and 10.4. The installer shall ensure that performance of the earth-leakage protective device is certified by the manufacturer of the device as conforming to 10.5.