

Specification for

**Transformers for tubular
discharge lamps having a
no-load output voltage
exceeding 1000 V (generally
called neon-transformers)**

**General and safety
requirements**

The European Standard EN 61050 : 1992 has the status of a
British Standard

Cooperating organizations

The European Committee for Electrotechnical Standardization (CENELEC), under whose supervision this European Standard was prepared, comprises the national committees of the following countries:

Austria	Italy
Belgium	Luxembourg
Denmark	Netherlands
Finland	Norway
France	Portugal
Germany	Spain
Greece	Sweden
Iceland	Switzerland
Ireland	United Kingdom

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Summary of pages

The following table identifies the current issue of each page. Issue 1 indicates that a page has been introduced for the first time by amendment. Subsequent issue numbers indicate an updated page. Double vertical sidelining on replacement pages indicates the most recent changes (amendment, addition deletion).

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National foreword

This British Standard has been prepared under the direction of the Electrical Consumer and Process Products Committee and is the English language version of EN 61050 : 1992 and its Amendment 1 : 1995 *Transformers for tubular discharge lamps having a no-load output voltage exceeding 1000 V (generally called neon-transformers) — General and safety requirements* published by the European Committee for Electrotechnical Standardization (CENELEC). It was derived by CENELEC from IEC 1050 : 1991 and its Amendment No. 1 : 1994 published by the International Electrotechnical Commission (IEC) of the same title.

The foreword of the EN makes reference to 'date of withdrawal (dow) of conflicting national standards' as '1996-07-01'. In this case the relevant national standard is BS EN 61050 but the date of withdrawal relates only to those parts of the British Standard subject to Amendment A1. Certificates and marks will not be awarded after this date with respect to the British Standard not incorporating Amendment A1. They will be awarded only to the amended British Standard. However, such certificates and marks already awarded with respect to the British Standard not incorporating Amendment A2 may continue to apply for production until 2001-07-01.

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by a sideline in the margin. Parts of the original IEC text which do not form part of the text of EN 61050 have been quoted in national annex NA.

The following print types are used in this standard:

- requirements proper: in roman type;
- test specifications: *in italic type*;
- notes: in smaller roman type.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

English version

Transformers for tubular discharge lamps having a no-load output voltage exceeding 1000 V (generally called neon-transformers) General and safety requirements

(IEC 1050 : 1991 + Corrigendum March 1992, modified)
(includes amendment A1 : 1995)

Transformateurs pour lampes tubulaires à
décharge ayant une tension secondaire à vide
supérieure à 1000 V (couramment appelés
transformateurs-neón)
Prescriptions générales et de sécurité
(CEI 1050 : 1991 + corrigendum mars 1992,
modifiée)
(inclut l'amendement A1 : 1995)

Transformatoren mit einer Leerspannung über
1000 V für Leuchtröhren (allgemein
Neontransformatoren genannt)
Allgemeine und Sicherheits-Anforderungen
(IEC 1050 : 1991 + Corrigendum März 1992,
modifiziert)
(enthält Änderung A1 : 1995)

This European Standard was approved by CENELEC on 1992-03-24; amendment A1 was approved by CENELEC on 15 May 1995. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, 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

At the request of the secretary of CENELEC Technical Committee TC 34Z, Luminaires and associated equipment, the International Standard IEC 1050 : 1991 was submitted to the CENELEC Unique Acceptance Procedure (UAP) in June 1991 for acceptance as a European Standard.

The reference document and its corrigendum March 1992, together with some common modifications agreed by 71 Technical Board, were approved by CENELEC as EN 61050 on 24 March 1992.

EN 61050 supersedes HD 388 S2 : 1983.

The following dates were fixed:

- latest date of (dop) 1993-03-01
publication of an
identical national
standard
- latest date of (dow) 1993-03-01
withdrawal of
conflicting national
standards

For products which have complied with HD 388 S2 : 1983 before 1993-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1998-03-01.

Annexes designated 'normative' are part of the body of the standard. In this standard, annex ZA is normative.

Foreword to amendment A1

The text of amendment 1 : 1994 to the International Standard IEC 1050 : 1991, prepared by SC 34C, Auxiliaries for discharge lamps, of IEC TC 34, Lamps and related equipment, together with common modifications prepared by the Technical Committee CENELEC TC 34Z, Luminaires and associated equipment, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A1 to EN 61050 : 1992 on 1995-05-15.

The following dates were fixed:

- latest date by (dop) 1996-07-01
which the amendment
has to be implemented
at national level by
publication of an
identical national
standard or by
endorsement
- latest date by (dow) 1996-07-01
which the national
standards conflicting
with the amendment
have to be withdrawn

For products which have complied with EN 61050 : 1992 before 1996-07-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2001-07-01.

Annexes designated 'informative' are given for information only. In this standard, annex D is informative.

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**TRANSFORMERS FOR TUBULAR DISCHARGE LAMPS
HAVING A NO-LOAD OUTPUT VOLTAGE EXCEEDING 1 000 V**

(generally called neon-transformers)

General and safety requirements

SECTION 1: GENERAL REQUIREMENTS

1 General

1.1 Scope

This International Standard is applicable to independent and built-in single-phase transformers with separate input and output windings, for use on a.c. supply up to 1 000 V at 50 Hz or 60 Hz, to supply and stabilize cold cathode tubular lamps (or assemblies of such lamps) having a no-load rated output voltage exceeding 1 000 V but not exceeding 10 000 V (see notes 1 and 2) and intended for lighting and for electric advertising signs, light signals and similar purposes.

In order to ensure the safety of these transformers, it is necessary to check their performance. But since no standardization of the characteristics of these lamps exists, reference loads are defined in this standard to ensure reproducible test results.

In locations where special conditions prevail, as in ships, vehicles and the like, and in dangerous locations, for example, where explosions are liable to occur, special constructions may be required.

This standard does not apply to transformers intended for the supply of lamps or tubes such as low-pressure or high-pressure sodium vapour lamps, high-pressure mercury vapour lamps, halogen lamps, xenon lamps, hot cathode tubular fluorescent lamps, special lamps for document copying machines, etc.

This standard does not apply to auto-transformers and electronic converters.

This standard may, nevertheless, serve as a guide for transformers with applications other than those specified in the scope, for instance transformers for photographic lamps, as long as their characteristics remain within the framework of those specified in the scope and they are not the subject of a particular IEC standard.

Capacitors shall comply with IEC 1048, where applicable.

NOTES

1 See definition of 2.9

2 Other limits may be specified in national standards or wiring rules, see annex A.

Tests in this standard are type tests. Guidance on routine testing is given in annex C.

1.2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC standards

IEC 112: 1979, *Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions.*

IEC 417: 1973, *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets.*

IEC 529: 1989, *Degrees of protection provided by enclosures (IP Code).*

IEC 598-1: 1986, *Luminaires - Part 1: General requirements and tests. Amendment No. 1* (1988).

IEC 695-2-1: 1980, *Fire hazard testing - Part 2: Test methods. Glow-wire test and guidance.*

IEC 817: 1984, *Spring-operated impact-test apparatus and its calibration.*

IEC 1048: 1990, *Capacitors for use in tubular fluorescent and other discharge lamp circuits. General and safety requirements.*

ISO Standard

ISO 3: 1973, *Preferred numbers - Series of preferred numbers.*

2 Definitions

Unless otherwise specified, r.m.s. values are implied.

2.1 **rated values:** Values (of voltage, of current, etc.) for which the transformer is constructed and which are indicated by the manufacturer on the nameplate of the transformer.

2.2 short-circuit current: Current between output terminals when joined together at rated input voltage and frequency.

2.3 independent transformer: Transformer consisting of one or more separate units which can be mounted separately outside a luminaire, without any additional enclosure. This may consist of a built-in transformer housed in a suitable enclosure which provides all the necessary protection according to its marking.

2.4 built-in transformer: Transformer consisting of one or more separate units exclusively designed to be built into a luminaire, a box, an enclosure, or the like.

2.5 short-circuit proof transformer: Transformer in which the temperature rise does not exceed the specified limits when the transformer is overloaded or short-circuited, and which remains capable of functioning after the overload is removed.

2.6 inherently short-circuit proof transformer: Transformer in which the temperature in the case of overload or short-circuit and in the absence of a protective device does not exceed the specified limits and which continues to function after the overload or short-circuit is removed.

2.7 tubular cold cathode discharge lamp: Discharge tube having cathodes which may be coated with an electron emitting material and which during the starting process without external heating, emits electrons by field emission. These lamps have a low-pressure filling of a rare gas (or a mixture of rare gases) and possibly mercury vapour. They can have an inside coating of fluorescent materials.

2.8 no-load rated output voltage: Maximum voltage between the terminals of the output winding(s) of the transformer connected to rated supply voltage at rated frequency, with no load on the output circuit. It is the peak value divided by $\sqrt{2}$.

2.9 normal load equivalent resistance: Non-inductive resistance connected to the output terminals of the transformer which will allow the rated output current to flow in the output winding(s) when the rated supply voltage at rated frequency is applied to the input winding (see figure 1).

2.10 effective load: Discharge lamps connected to the output terminals of the transformer which allow the rated output current to flow in the output winding(s) when the rated supply voltage at rated frequency is applied to the input winding.

2.11 high power factor transformer: Transformer having an overall power factor of at least 0,85 at 50 Hz or 0,9 at 60 Hz when connected to effective load at rated input voltage and frequency.

2.12 rated maximum ambient temperature, symbol t_a : Temperature assigned to a transformer by the manufacturer to indicate the highest sustained temperature in which the transformer may be operated under normal conditions.

2.13 rated maximum operating temperature (of a capacitor case), symbol t_c : Highest permissible temperature which may occur at any place on the outer surface of the component under normal operating conditions.

NOTE - The internal losses in a capacitor, though small, will result in the surface temperature being above ambient air temperature and due allowance for this should be made. The temperature difference will depend upon the nature of the enclosure.

2.14 rated maximum operating temperature (of a winding), symbol t_w : Winding temperature assigned by the manufacturer as the highest declared winding temperature which gives the transformer an expectancy of five years continuous operation at that temperature.

2.15 rated temperature rise (of a winding), symbol Δt : Temperature rise assigned by the manufacturer to the winding under the specified conditions.

NOTE - See clause 10 for heating test.

2.16 working voltage: Highest r.m.s. voltage which may occur across any insulation, transients being neglected, in open-circuit conditions or during lamp operation, when the transformer is supplied at its rated voltage.

2.17 detachable part: Part which can be removed only by hand, without the use of a tool, coin or any other object.

2.18 type test: Test, or a series of tests, made on a type test sample for the purpose of checking compliance of the design of a given product with the requirements of the relevant specification.

2.19 type test sample: Sample consisting of one or more similar units submitted by the manufacturer or the responsible vendor for the purpose of a type test.

3 General requirements

Transformers shall be so designed and constructed that in normal use they operate without danger to the user or surroundings. Capacitors and other components incorporated in transformers shall comply with the requirements of the appropriate IEC standards.

In general, compliance for transformers and other elements is checked by carrying out all the tests specified. In addition, the enclosure of independent transformers shall comply with the requirements of IEC 598-1, including the classification and marking requirements according to that standard.

4 General notes on tests

4.1 Tests in this standard are type tests.

NOTE - The requirements and tolerances permitted by this standard are related to testing of a type test sample submitted for that purpose. Compliance of the type test sample does not ensure compliance of the whole production of a manufacturer with this safety standard. Conformity of production is the responsibility of the manufacturer and may include routine tests and quality assurance in addition to type testing.

4.2 The tests are carried out in the order of the clauses unless otherwise specified.

4.3 Unless otherwise specified, the tests shall be carried out on the sample placed in normal conditions and positions of use, the ambient temperature being within the range of 20 °C to 27 °C.

4.4 The following number of units shall be submitted for the type test:

- for transformers without temperature markings: one unit;
- for transformers with temperature markings: eight units (of which seven are for the test of clause 11 - Endurance - and one for all other tests);
- for independent transformers, for the tests of 16.5: three units.

In general all the tests shall be made for each type of transformer or where a range of similar transformers is involved on a representative selection from the range as agreed with the manufacturer. A reduction of the number of samples for the endurance test according to clause 11, or even the omission of this test is allowed when transformers of the same construction but with different characteristics are submitted together for approval, or when test reports from the manufacturer or other authority are accepted by the testing station.

The transformers shall contain, or shall be supplied with the series capacitors if needed to ensure the correct operation of the transformer.

4.5 For the test of clause 11, the results shall be considered to be satisfactory if at least six of the seven units satisfy the requirements of 11.3. The test shall be considered to be negative if more than two units fail the test.

In the case of two failures, the test shall be repeated with seven more units and no failure shall then be permitted.