

Specification for

Auxiliaries for lamps — Capacitors for use in tubular fluorescent and other discharge lamp circuits — General and safety requirements

The European Standard EN 61048:1993 together with its amendments
A1:1996 and A2:1999 has the status of a British Standard

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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
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Finland	Norway
France	Portugal
Germany	Spain
Greece	Sweden
Iceland	Switzerland
Ireland	United Kingdom

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 12, pages 12a and 12b, pages 13 to 20, pages 20a and 20b, pages 21 to 24, pages 24a and 24b, page 25, a blank page, an inside back cover and a back cover.

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Contents

	Page
Cooperating organizations	Inside front cover
National foreword	ii
Foreword	2
Text of EN 61048	3
National annexes	
NA <i>Annex deleted</i>	51
NB (informative) Committees responsible	Inside back cover
NC (informative) Cross-references	Inside back cover

National foreword

This British Standard has been prepared by Technical Committee CPL/34/3 (formerly LGL/21) and is the English language version of EN 61048:1993 *Capacitors for use in tubular and other discharge lamp circuits — General and safety requirements*, including amendments A1:1996 and A2:1999 and corrigendum December 1998, published by the European Committee for Electrotechnical Standardization (CENELEC). It was derived by CENELEC from IEC 61048:1991 including amendments 1:1995 and 2:1999, published by the International Electrotechnical Commission (IEC).

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by a side line in the margin.

This British Standard, together with BS EN 61049, supersedes BS 4017 : 1979 which is withdrawn.

The following print types are used in this standard:

- requirement proper: in roman type;
- *test specification: in italic type*;
- notes: in smaller roman type

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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

Descriptors: capacitor, safety requirement, discharge lamp, tubular lamp, fluorescent lamp, termination, test, marking

English version

Auxiliaries for lamps — Capacitors for use in tubular fluorescent and other discharge lamp circuits — General and safety requirements

(includes amendments A1:1996 and A2:1999)

(IEC 1048:1991, modified + corrigendum:1992 + A1:1995 + A2:1999)

Appareils auxiliaires pour lampes —
Condensateurs destinés à être utilisés dans les
circuits de lampes tubulaires à fluorescence et
autres lampes à décharge — Prescriptions
générales et de sécurité
(inclut les amendements A1:1996 et A2:1999)
(CEI 1048:1991, modifiée + corrigendum:1992
+ A1:1995 + A2:1999)

Geräte für Lampen — Kondensatoren für
Entladungslampeninsbesondere
Leuchtstofflampen-Anlagen Allgemeine und
Sicherheitsanforderungen
(enthält Änderungen A1:1996 und A2:1999)
(IEC 1048:1991, modifiziert + Corrigendum:1992
+ A1:1995 + A2:1999)

This European Standard was approved by CENELEC on 1992-09-15, amendment A1 was approved by CENELEC on 1995-11-28 and amendment A2 on 1999-01-01. 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.

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 CENELEC Technical Committee TC 34Z, Luminaires and associated equipment, the International Standard IEC 1048 : 1991 and its corrigendum of January 1992, together with some modifications prepared by CLC/TC 34Z, were submitted to the CENELEC members for formal vote in May 1992 for acceptance as a European Standard.

The text of the draft was approved by CENELEC as EN 61048 on 15 September 1992.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1993-09-01
- latest date of withdrawal of conflicting national standards (dow) 2000-09-01

Annexes designated 'normative' are part of the body of the standard. In this standard, annexes A, B and ZA are normative.

Foreword to amendment A1

The text of document 34/308/FDIS, future amendment 1 to IEC 1048 : 1991, prepared by SC 34C, Auxiliaries for lamps, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61048 : 1993 on 1995-11-28.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-09-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2000-09-01

Foreword to amendment A2

The text of document 34C/432/FDIS, future amendment 2 to IEC 61048:1991, prepared by SC 34C, Auxiliaries for lamps, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 61048:1993 on 1999-01-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1999-10-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2001-10-01

Annexes designated "normative" are part of the body of the standard.

In this standard, annex ZA is normative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of amendment 2:1999 to the International Standard IEC 61048:1991 was approved by CENELEC as an amendment to the European Standard without any modification.

CONTENTS

SECTION 1 - GENERAL

Clause	Page
1 General	4
1.1 Scope	4
1.2 Normative references	5
2 Definitions	5
3 General requirements	6
4 General notes on tests	6
5 Marking	8

SECTION 2 - SAFETY

6 Terminations	9
7 Creepage distances and clearances	9
8 Voltage rating	10
9 Fuses	11
10 Discharge resistors	11

SECTION 3 - TESTS

11 Testing sequence	11
12 Sealing and heating test	12
13 High-voltage test	12
14 Damp heat (insulation resistance and high-voltage test)	13
15 Resistance to heat, fire and tracking	14
16 Self-healing test	15
17 Destruction test	16

Annexes

A (normative) Test voltage	22
B (normative) Temperature adjustment of test enclosure	23
C (informative) Test for conformity of manufacture	24

Figures	24a
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Annex ZA (normative) Other international publications quoted in this standard with the references of the relevant European publications	25
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CAPACITORS FOR USE IN TUBULAR FLUORESCENT AND OTHER DISCHARGE LAMP CIRCUITS

General and safety requirements

SECTION 1 - GENERAL

1 General

1.1 Scope

This International Standard states the requirements for both self-healing and non-self-healing continuously rated a.c. capacitors of up to and including 2,5 kvar, and not less than 0,1 μ F, having a rated voltage not exceeding 1 000 V, which are intended for use in discharge lamp circuits* operating at 50 Hz or 60 Hz and at altitudes up to 3 000 m.

It covers capacitors intended for connection in shunt or in series with the lamp circuit or an effective combination of these.

It covers only impregnated or unimpregnated capacitors, having a dielectric of paper, plastic film or a combination of both, either metallized or with metal foil electrodes.

This standard does not cover radio-interference suppressor capacitors the requirements for which are found in IEC 384-14.

Tests given in this standard are type tests. Requirements for testing individual capacitors during production are not included.

* These lamps and associated ballasts are covered in the specifications of the following IEC standards:

81: 1984, *Tubular fluorescent lamps for general lighting service. Amendments Nos. 1 (1987) and 2 (1988).*

188: 1974, *High-pressure mercury vapour lamps. Amendments Nos. 1 (1976), 2 (1979), 3 (1984) and 4 (1988).*

192: 1973, *Low pressure sodium vapour lamps. Amendment No. 2 (1988).*

920: 1990, *Ballasts for tubular fluorescent lamps. General and safety requirements.*

922: 1989, *Ballasts for discharge lamps (excluding tubular fluorescent lamps). General and safety requirements.*

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.

1.2.1 IEC Standards

IEC 68-2-3: 1969, *Environmental testing - Part 2: Tests, Test Ca: Damp heat, steady state*.

IEC 241: 1968, *Fuses for domestic and similar purposes*.

|| IEC 60269 (all parts), *Low-voltage fuses*

IEC 384-14: 1981, *Fixed capacitors for use in electronic equipment - Part 14: Sectional specification: Fixed capacitors for radio interference suppression. Selection of methods of test and general requirements*.

IEC 410: 1973, *Sampling plans and procedures for inspection by attributes*.

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

IEC 598-1: 1986, *Luminaire - 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 695-2-2: 1980, *Fire hazard testing - Part 2: Test methods - Needle-flame test*.

IEC 1049: 1990, *Capacitors for use in tubular fluorescent and other discharge lamp circuits - Performance requirements*.

1.2.2 ISO Standard

ISO 4046: 1978, *Paper, board, pulp and related terms - Vocabulary*.

2 Definitions

For the purpose of this International Standard, the following definitions apply.

2.1 rated voltage (U_n): R.M.S. value of the sinusoidal voltage, marked on the capacitor.

2.2 rated maximum temperature (t_c): Temperature, in degrees Celsius, which shall not be exceeded by the hottest part of the capacitor surface during operation.

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

2.3 rated minimum temperature: Temperature, in degrees Celsius, of any part of the surface of the capacitor below which the capacitor shall not be energized.

2.4 discharge resistor: Resistor connected across the terminals of a capacitor to reduce shock hazard from the charge stored in the capacitor.

2.5 tangent of loss angle ($\tan \delta$): Power loss of the capacitor divided by the reactive power of the capacitor at a sinusoidal voltage of rated frequency.

2.6 self-healing: Process by which the electrical properties of the capacitor, after a local breakdown of the dielectric, are rapidly and essentially restored to the values before the breakdown.

2.7 type test: Test or 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.

2.8 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.

2.9
capacitor of type A
self-healing parallel capacitor not necessarily including an interrupter device

2.10
capacitor of type B
self-healing capacitor used in series lighting circuits or a self-healing parallel capacitor, containing an interrupter device

3 General requirements

Capacitors shall be so designed that in normal use they function safely and cause no danger to persons or surroundings.

All exposed metal parts shall be constructed of non-ferrous material or shall be protected against rusting. Visible rust must not occur. The test of clause 14 will show whether the capacitor is sufficiently protected against rust. Capacitors shall not contain polychlorinated biphenyls (PCBs).

Tests for checking the mechanical robustness are under consideration.

Compliance with the requirements of clauses 3 to 10 is checked by measurement, inspection and by carrying out all the tests specified in this standard.

NOTE - In Japan an additional capacitor type is permitted, details of which are to be found in JIS C 4908. Inclusion of the requirements for these capacitors in this standard is under consideration.

4 General notes on tests

Tests according to 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 protection is the responsibility of the manufacturer and may include routine tests and quality assurance in addition to type testing.

Capacitors shall be subjected to the tests detailed in clause 11.

Unless otherwise specified, tests shall be carried out at a temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, using where appropriate a voltage source as detailed in annex A.

Test temperatures specified in particular clauses shall be subject to a tolerance of $\pm 2\text{ }^{\circ}\text{C}$, unless otherwise stated.

Unless otherwise specified, the type shall be deemed to comply with any one clause if not more than one failure occurs in the test of that clause. If three or more failures occur, the type shall be rejected. If two failures occur in any one test, that test, and any preceding tests which may have influenced the test results, shall be repeated on the same quantity of capacitors and if any further failures occur, the type shall be rejected.

NOTE - A repeat test shall be permitted only once in a series of tests according to the requirements of this standard. A repeat test is not permitted in the destruction test, clause 17, in the case of a catastrophic failure.

For a range of capacitors of the same construction, rated voltage and cross-sectional shape, each group referred to in clause 11 shall contain as nearly as possible equal numbers of capacitors of the highest capacitance and the lowest capacitance in that range.

Moreover, the manufacturer shall provide data on the ratio of capacitance per area outer total surface of the container of each capacitance value in the range. The capacitor with the maximum capacitance per unit surface area shall also be tested if this ratio exceeds that of the maximum capacitance value in the range by 10 % or greater. Similarly, the capacitor with the minimum capacitance per unit area shall also be tested if the ratio is less than that of the minimum capacitance value in the range by 10 % or greater.

"Area" denotes total outer surface area of capacitor enclosure ignoring small protrusions, terminals and fixing studs.

With this procedure the tests qualify all intermediate values of capacitance in the range.

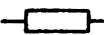
NOTES

1 The 'same construction' is that which is declared by the manufacturer to be the same dielectric material, the same dielectric thickness, the same type of case (metal or plastic), the same generic family of filler or impregnating liquid, the same type of safety device and the same type of metallization (e.g. zinc or aluminium).

2 "Cross-sectional shape" means: round, rectangular, oval, etc.

5 Marking

5.1 Capacitors shall be legibly marked as follows:

- a) name or trade mark of the manufacturer or responsible vendor;
- b) manufacturer's catalogue number and/or model reference;
- c) rated capacitance and tolerance;
- d) rated voltage;
- e) when a discharge resistor is fitted, the symbol  ;
- f) when a current fuse is fitted, the symbol  ;
- g) rated frequency or frequency range;
- h) rated minimum and maximum temperatures, for example -10 °C/70 °C;
- i) if the capacitor is self-healing, the symbol  ;
- j) if a non-self-healing capacitor is exclusively intended for series operation the symbol  ;

This symbol shall not appear on capacitors bearing the self-healing symbol.

NOTE - This type of capacitor is not intended to be connected across the mains supply.

- || k) type A or B as applicable.

5.2 Additional Information

- a) Declaration of value of discharge resistor, if fitted.
- b) Declaration whether the capacitor does not contain substances which are liquid at $(t_c + 10) ^\circ\text{C}$.

5.3 Marking shall be durable and legible.

Compliance is checked by inspection and by trying to remove the marking by rubbing lightly, for 15 s each, with one piece of cloth soaked with water and another with petroleum spirit. The marking shall be legible after the test.

NOTE - The petroleum spirit used should consist of a solvent hexane with a content of aromatics of maximum 0,1 volume percentage, a kauri-butanol value of 29, an initial boiling point of approximately 65 °C, a dry-point of approximately 69 °C and a density of approximately 0,68 g/cm³.