

INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

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

[IEC 61048:2006](#)

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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
4 General requirements.....	9
5 General notes on tests	9
6 Marking	10
6.1 Required marking.....	10
6.2 Additional information.....	10
6.3 Durability and legibility of marking	10
7 Terminations	10
8 Creepage distances and clearances	11
9 Voltage rating.....	12
10 Fuses	12
11 Discharge resistors.....	13
12 Testing sequence	13
13 Sealing and heating test.....	13
13.1 Sealing and heating test for type A capacitors.....	13
13.2 Sealing and heating test for type B capacitors.....	14
14 High-voltage test	14
14.1 High-voltage test between terminals.....	14
14.2 High-voltage test between terminals and case.....	14
15 Resistance to adverse operating conditions.....	15
15.1 Humidity test with voltage applied	15
15.2 Current (discharge) test.....	16
16 Resistance to heat, fire and tracking.....	16
17 Self-healing test	17
18 Destruction test	18
18.1 Test A	18
18.2 Test B	21
18.3 Non-self-healing capacitors	23
Annex A (normative) Test voltage	29
Annex B (normative) Temperature adjustment of test enclosure.....	30
Annex C (normative) Test for conformity of manufacture.....	31
Annex D (informative) Guide to calculating equipment settings for tests in subclauses 15.2 and 18.1.3.....	32
Annex E (normative) Additional requirements for built-in capacitors having an insulation equivalent to double or reinforced insulation	34
Annex F (informative) Information for luminaire design	37
Bibliography.....	38

Figure 1 – AC conditioning circuit	24
Figure 2 – DC conditioning circuit	24
Figure 3 – Self-healing breakdown test equipment	25
Figure 4 – Voltage and current waveform for the tests in 15.2 and 18.1.3	26
Figure 5 – Typical test circuit for the tests in 15.2 and 18.1.3	27
Figure 6 – Summary of test procedure	28
Table 1 – Minimum creepage distances and clearances	12
Table 2 – Voltage and test duration for endurance test, first test sequence	18
Table 3 – Voltage and test duration for endurance test, second test sequence	19

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**AUXILIARIES FOR LAMPS –
CAPACITORS FOR USE IN TUBULAR FLUORESCENT AND
OTHER DISCHARGE LAMP CIRCUITS –
GENERAL AND SAFETY REQUIREMENTS**

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IEC 61048 edition 2.1 contains the second edition (2006-03) [documents 34C/720/FDIS and 34C/736/RVD] and its amendment 1 (2015-07) [documents 34C/1155/FDIS and 34C/1160/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through. A separate Final version with all changes accepted is available in this publication.

This International Standard has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lamps and related equipment.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this standard, the following print types are used:

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

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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INTRODUCTION

This International Standard covers general and safety requirements for certain capacitors for use in tubular fluorescent and other discharge lamp circuits.

Performance requirements for these capacitors are the subject of IEC 61049.

NOTE Safety requirements ensure that electrical equipment constructed in accordance with these requirements, does not endanger the safety of persons, domestic animals or property when properly installed and maintained and used in applications for which it was intended.

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AUXILIARIES FOR LAMPS – CAPACITORS FOR USE IN TUBULAR FLUORESCENT AND OTHER DISCHARGE LAMP CIRCUITS – GENERAL AND SAFETY REQUIREMENTS

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 μF , 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.

NOTE These lamps and associated ballasts are covered by IEC 60081, IEC 60901, IEC 60188, IEC 60192, IEC 60662, and IEC 61167 and by IEC 61347-2-8 and IEC 61347-2-9, respectively.

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 60384-14.

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

Particular requirements for built-in capacitors having an insulation equivalent to double or reinforced insulation are given in Annex E. [61048:2006](https://standards.iteh.ai/catalog/standards/iec/06b212b1-7b63-4090-a55e-96e98c7944c1/iec-61048-2016)

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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.

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

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

IEC 60598-1, *Luminaires – Part 1: General requirements and tests*

IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products*

IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle flame method – Apparatus, confirmatory test arrangement and guidance*

IEC 61049:1991, *Capacitors for use in tubular fluorescent and other discharge lamp circuits – Performance requirements*

ISO 4046-4:2002, *Paper, board, pulps and related terms – Vocabulary – Paper and board grades and converted products*

3 Terms and definitions

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

3.1

rated voltage

U_n

r.m.s. value of the sinusoidal voltage, marked on the capacitor

3.2

rated maximum temperature

t_c

temperature, in degrees Celsius, which must 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.

3.3

rated minimum temperature

temperature, in degrees Celsius, of any part of the surface of the capacitor below which the capacitor must not be energized

3.4

discharge resistor

resistor connected across the terminals of a capacitor to reduce shock hazard from the charge stored in the capacitor

3.5

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

3.6

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

3.7

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

3.8

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

3.9

capacitor of type A

self-healing parallel capacitor not necessarily including an interrupting device

3.10

capacitor of type B

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

4 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 shall not occur. The test of Clause 15 will show whether the capacitor is sufficiently protected against rust.

Tests for checking the mechanical robustness are under consideration.

Compliance with the requirements of Clauses 4 to 11 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.

5 General notes on tests

Tests according to this standard are type tests, (Annex C excluded).

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 includes routine tests and quality assurance in addition to type testing.

Capacitors shall be subjected to the tests detailed in Clause 12.

Unless otherwise specified, tests shall be carried out at a temperature of (20 ± 5) °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 ± 2 °C, unless otherwise stated.

Unless otherwise specified, the type shall be deemed to comply with any one clause or subclause if not more than one failure occurs in the test of that clause or subclause. 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 may 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 18, 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 12 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.


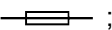


NOTE 1 The "same construction" is that which is declared by the manufacturer to be the same dielectric material, the same dielectric thickness, the same type of case (metal or plastic), the same generic family of filler or impregnating liquid, the same type of safety device and the same type of metallization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

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

6 Marking

6.1 Required marking

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 $-10\text{ °C}/70\text{ °C}$;
- 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.

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6.2 Additional information

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

6.3 Durability and legibility of marking

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 $0,68\text{ g/cm}^3$.

7 Terminations

7.1 Terminations shall be provided by means of either cables (tails) or terminals (screw, screwless, solder tag or the like). Terminations shall be capable of accepting the size and number of conductors appropriate to the rating and application of the capacitor. Cables (tails) shall be suitable for the rating of the capacitor, but in no case shall they be smaller than $0,5\text{ mm}^2$ and their insulation shall be appropriate to the capacitor rated voltage and temperatures.