

Australian/New Zealand Standard™

**Auxiliaries for lamps—Capacitors for
use in tubular fluorescent and other
discharge lamp circuits—General
and safety requirements
(IEC 61048:1991, MOD)**



Standards Australia



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AS/NZS 61048:2002

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Australian Chamber of Commerce and Industry
Australian Electrical and Electronic Manufacturers Association
Consumer Federation of Australia
Electrical Compliance Testing Association of Australia
Energy Efficiency and Conservation Authority of New Zealand
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Australian/New Zealand Standard™

Auxiliaries for lamps—Capacitors for use in tubular fluorescent and other discharge lamp circuits—General and safety requirements (IEC 61048:1991, MOD)

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-041, Lamps and related equipment.

In Australia, this Standard will supersede AS 2644—1990, *Capacitors for use in discharge lamp circuits*. AS 2644—1990 will co-exist with AS/NZS 61048 until 31 December 2002 on which date AS 2644 will be withdrawn.

The objective of this Standard is to specify general and safety requirements for continuous rated capacitors up to 2.5 kVAR intended for use in discharge lamp circuits up to 1000 V operating at 50/60 Hz.

This Standard is an adoption with national modifications and is reproduced from IEC 61048:1991, *Auxiliaries for lamps—Capacitors for use in tubular fluorescent and other discharge lamp circuits—General and safety requirements* (including Amendment 1:1995 and Amendment 2:1999 and has been varied as indicated to take account of Australian/New Zealand conditions. IEC Amendments 1 and 2 are identified by numbered marginal bars beside the affected text.

Variations to IEC 61048:1991 are indicated at the appropriate places throughout this Standard. Strikethrough (~~example~~) identifies IEC tables, figures and passages of text which, for the purposes of this Australian/New Zealand Standard, are deleted. Where Australian/New Zealand tables, figures or passages of text are added, each is set in its proper place and identified by shading (**example**). Added figures are not themselves shaded, but are identified by a shaded border.

A reference to an International Standard identified in the Normative References Clause by strikethrough (~~example~~) is replaced by a reference to the Australian or Australian/New Zealand Standard(s) listed immediately thereafter and identified by shading (**example**). Where the struck-through referenced document and the referenced Australian or Australian/New Zealand Standard are identical, this is indicated in parenthesis after the title of the latter.

In this Standard, the following print types are used:

- requirements proper: in arial type;
- *test specifications: in italic type;*
- explanatory matter: in smaller arial type.

As this Standard is reproduced from an International Standard, the following applies:

- (a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.
- (b) In the source text ‘this standard’ should read ‘this Australian/New Zealand Standard’.
- (c) A full point should be substituted for a comma when referring to a decimal marker.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annex to which they apply. A ‘normative’ annex is an integral part of a Standard, whereas an ‘informative’ annex is only for information and guidance.

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Any IEC table, figure or passage of text that is struck-through is not part of this Standard. Any Australian/New Zealand table, figure or passage of text that is added (and identified by shading) is part of this Standard.

SECTION 1 - GENERAL

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.

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.

* These lamps and associated ballasts are covered in the specifications of the following IEC Standards:
 60081:1984, *Tubular fluorescent lamps for general lighting service*
 Amendments No. 1 (1987) and No. 2 (1988)
 60188:1974, *High-pressure mercury vapour lamps*
 Amendments No. 1 (1976), No. 2 (1979), No. 3 (1984) and No. 4 (1988)
 60192:1973, *Low pressure sodium vapour lamps*
 Amendment No. 2 (1988)
 60920:1990, *Ballasts for tubular fluorescent lamps. General and safety requirements*
 60922:1989, *Ballasts for discharge lamps (excluding tubular fluorescent lamps). General and safety requirements*

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

References to International Standards that are struck through in this Clause are replaced by references to equivalent Australian or Australian/New Zealand Standards that are listed immediately thereafter and identified by shading. Any Australian or Australian/New Zealand Standard that is identical to the International Standard it replaces is appropriately identified.

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

IEC 60384-14:1981, *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 60529:2001, *Degrees of protection provided by enclosures (IP Code)*

~~IEC 60598-1:1999 Ed. 5, Luminaires – Part 1: General requirements and tests~~

AS/NZS 60598.1:2001, *Luminaires, Part 1: General requirements and tests*

~~IEC 60695-2-1:1980, Fire hazard testing – Part 2: Test methods – Glow-wire test and guidance~~

AS/NZS 60695.2.10:2001, *Glowing/hot wire based test methods – Glow-wire apparatus and common test procedure*

~~IEC 60695-2-2:1980, Fire hazard testing – Part 2: Test methods – Needle-flame test~~

AS/NZS 4695.2.2:1996, *Fire hazard testing of electrotechnical products – Test methods – Needle-flame test*

~~IEC 61049:1990, Capacitors for use in tubular fluorescent and other discharge lamp circuits – Performance requirements~~

AS/NZS 61049—2002, *Capacitors for use in tubular fluorescent and other discharge lamp circuits – Performance requirements*

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

3 Definitions

For the purpose of this International Standard, 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 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.

3.3 Rated minimum temperature

Temperature, in degrees Celsius, of any part of the surface of the capacitor below which the capacitor shall not be energized.

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.

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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 must 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.

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5 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 12.

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

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

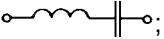
NOTE 2 – 'Cross-sectional shape' means: round, rectangular, oval, etc.

6 Marking

6.1 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  ;

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- g) rated frequency or frequency range;
- h) rated minimum and maximum temperatures, for example $-10^{\circ}\text{C}/70^{\circ}\text{C}$;
- i) if the capacitor is self-healing, the symbol  ;
- j) if a non-self-healing capacitor is exclusively intended for series operation the symbol  ;
- k) type A or B as applicable.

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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.

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 $(t_c + 10)^{\circ}\text{C}$.

6.3 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 $0,68 \text{ g/cm}^3$.

SECTION 2 – SAFETY

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 mm² and their insulation shall be appropriate to the capacitor rated voltage and temperatures.

Screw terminals shall comply with section fourteen of AS/NZS 60598.1.

Screwless terminals shall comply with section fifteen of AS/NZS 60598.1.

7.2 The capacitor container, if of metal, shall either be fitted with an earthing terminal or be capable of being earthed (or connected to other metal parts, if any, of the luminaire) by clamping or by an appropriate fixing bracket. The part of the container to which such a clamp is fitted or the fixing bracket attached shall be free from paint or other non-conducting covering in order to ensure the maintenance of good electrical contact.

Compliance is checked by inspection and the following test:

A current of at least 10 A, derived from a source with a no-load voltage not exceeding 12 V, shall be passed between the earthing terminal or earthing contact and each of the accessible metal parts in turn. The voltage drop between the container and the clamping means or fixing bracket shall be measured and the resistance calculated from the current and the voltage drop.

In no case shall the resistance exceed 0,5 Ω .

The requirements of the previous paragraph do not apply to metal-cased capacitors completely covered in an insulating material, because these are tested according to 13.2.

8 Creepage distances and clearances

The creepage distances over external surfaces of terminal insulation and the clearances between the exterior parts of terminal connections or between such live parts and the metal container of the capacitor, if any, shall be not less than the minimum values given in table 1.

These minimum distances shall apply to the terminals with or without the external wiring connected.

They are not intended to apply to internal distances and clearances.

Compliance is checked by measurement.