

Australian/New Zealand Standard™

Glow-starters for fluorescent lamps

[Modified and containing the full text of IEC 60155:1993
incorporating IEC 60155:1993 Amendment 1: 1995]



AS/NZS 60155:2000

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL/41, Lamps and Related Equipment. It was approved on behalf of the Council of Standards Australia on 2 October 1999 and on behalf of the Council of Standards New Zealand on 2 November 1999. It was published on 10 January 2000.

The following interests are represented on Committee EL/41:

Association of Consulting Engineers, Australia
Australian Chamber of Commerce and Industry
Australian Electrical and Electronic Manufacturers Association
Electrical Compliance Testing Association of Australia
Electrical Regulatory Authorities Council
Energy Efficiency and Conservation Authority of New Zealand
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Glow-starters for fluorescent lamps

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incorporating IEC 60155:1993 Amendment 1: 1995]

Originated as AS 3138—1993 and AS 4111—1993.
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL/41, Lamps and Related Equipment to supersede AS 3138—1993, *Approval and test specification—Starters for fluorescent lamps* and AS 4111—1993, *Starters for fluorescent lamps—Performance requirements* on 1 January 2002, until which both those Standards remain current.

This Standard incorporates Amendment No. 2 (August 2000) which replaces Amendment No. 1 (May 2000). The change required by the Amendment is indicated in the text by a marginal bar and amendment number against the figure affected.

The objective of this Standard is to provide the lighting industry with safety and performance requirements for glow-starters for fluorescent lamps. Section 2, *Performance specification*, is not intended for mandatory reference by Regulators.

This Standard is an adoption with national modifications of, and has been reproduced from, IEC 60155:1993, *Glow-starters for fluorescent lamps*, incorporating IEC 60155:1993 Amend 1:1995.

In January 1997, the IEC commenced numbering its publications from 60000 by adding 60000 to the number of each publication. This coordinates IEC numbering with ISO numbering. During the transition period an IEC document might be identified by its new number or its old number (for example IEC 60155 or IEC 155).

Technical deviations from IEC 60155, for reasons of protection of human health and safety, a legitimate reason under the WTO Agreement on Technical Barriers to Trade (TBT), have been made by adding Clause 7.101 to cover resistance to ignitability and combustion propagation.

Variations to 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.

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

- (a) The AS/NZS number is shown only on the cover and title page.
- (b) In the source text ‘this International Standard’ should read ‘this Australian/New Zealand Standard’ and references to ‘relevant IEC Standard’ should read ‘relevant IEC, Australian or 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 appendix to which they apply. A normative appendix is an integral part of a Standard, whereas an informative appendix is only for information and guidance.

Attention is drawn to Electromagnetic Compatibility (EMC) schemes introduced in their respective countries by the Australian Communications Authority (ACA) and the Ministry of Commerce New Zealand (MOC) to manage the use and performance of devices that either intentionally or unintentionally emit electromagnetic energy in the radiofrequency spectrum. Mandated Standards form an integral part of the EMC compliance schemes. Electrical lighting products fall within the scope of AS/NZS 4051, *Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment*. AS/NZS 4051 has been reproduced from IEC/CISPR 15 (same title) but contains some changes to limits to protect local radio services.

Information on EMC compliance for lighting equipment is to be found on the Internet at <http://www.aca.gov.au/standards/emcindex.htm> and for NZ at <http://www.moc.govt.nz/rsm>

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INTRODUCTION

This standard for interchangeable glow-starters for fluorescent lamps comprises two sections: Section 1 describes the general requirements with which glow-starters shall comply in order to ensure safety, and Section 2 covers the requirements for performance.

The additional requirements with which glow-starters for use in class II luminaires shall comply are specified in annex B.

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Australian/New Zealand Standard

Glow-starters for fluorescent lamps

Any IEC table, figure or passage of text that is struckthrough 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.

1 Scope

This standard specifies interchangeable glow-starters used with pre-heat type fluorescent lamps, hereafter called "starters".

Section 1 specifies the general and safety requirements with which starters shall comply.

Section 2 specifies the performance.

NOTE - Starters are generally designed to operate with a range of lamps, depending on supply voltage, single lamp or series pair operation, maximum lamp voltage and lamp starting requirements.

Glow-starters for use in class II luminaires shall comply with annex B.

2 Normative references

The following normative documents 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 normative documents 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 normative documents indicated below. 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 81: 1984, Tubular fluorescent lamps for general lighting service~~

AS 1201 Tubular fluorescent lamps for general lighting service

IEC 400: 1991, Lampholders for tubular fluorescent lamps and starterholders

~~IEC 598: Luminaires~~

AS/NZS 60598 Luminaires

~~IEC 695-2-1: 1991, Fire hazard testing, Part 2: Test methods—Section 1: Glow wire test and guidance~~

AS/NZS 4695 Fire hazard testing of electrotechnical products
AS/NZS 4695.2.2 Test methods—Needle flame test
AS/NZS 4695.2.10 Glow-wire test methods—General

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IEC 901: 1987, *Single-capped fluorescent lamps – Safety and performance requirements*

IEC 921: 1988, *Ballasts for tubular fluorescent lamps. Performance requirements*

AS 2643 Fluorescent lamp ballasts of reactive type—Performance requirements

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

3 Definitions

3.1 starter:

A device, other than a main switch, which closes or opens the pre-heating circuit of a fluorescent lamp for the purpose of starting the lamp.

3.2 glow-starter:

A starter which depends for its operation on a glow discharge in a gaseous atmosphere.

3.3 non-reclosure voltage:

A reduced voltage at which the starter contacts must not reclose after operation at the test voltage specified for testing the speed of operation.

3.4 deactivated lamp:

A lamp in which one or both filaments are deprived of emitting material, but neither of which is broken.

3.5 glow-starters with operating time limitation:

A glow-starter which prevents prolonged attempts to start lamps which refuse to start, e.g. lamps with deactivated electrodes.

The following types can be distinguished:

- a) starters which are non-resettable (one shot);
- b) starters with a manual reset;
- c) starters with an automatic reset, by actuating the main switch or other intended actions.

4 General requirements

Starters shall be so designed and constructed that in normal use their operation is without danger to the user or surroundings. In general, compliance is checked by carrying out all the tests specified.

5 General requirements for tests

5.1 Requirements for type tests only are included.

5.2 Unless otherwise specified, the tests shall be made at an ambient temperature of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

5.3 The tests shall be carried out in the order of the clauses.

6 Marking

6.1 Starters shall be provided with durable and legible marking as follows:

- a) manufacturer's or responsible vendor's name, or trade mark;

- b) type or catalogue reference;
- c) lamp(s) for which the starter is intended.

If this requirement is marked in the form of a lamp wattage range, the marking shall:

- i) either include all the standardized wattages within that range in IEC 81 or 901; or
- ii) indicate departures from that range either on the packaging material or in catalogues published by the manufacturer;
- d) temperature range for which the starter is intended to be used, if applicable.

6.2 Other useful indications, for example the circuit for which the starter is intended and, in some cases, the rated voltage of the starter, shall either be marked on the starter, or be referred to in the manufacturer's publications.

If applicable, the information shall be given that the starter is equipped with means of operating time limitation.

6.3 Marking shall be indelible and easily legible. It shall comply with the requirements of 7.11.

7 Requirements and tests for safety

7.1 Type test quantity

The type test quantity shall consist of five starters to be submitted to the tests specified in 7.3 to 7.11 and 7.12.1, and 10 capacitors to be submitted to the test specified in 7.12.2 and 7.12.3. In addition, for starters with operating time limitations, five starters shall be submitted to the test specified in 7.13.

7.2 Conditions of acceptance

The type shall be considered as satisfying the requirements of this subclause if all five starters comply with the tests specified in 7.3 to 7.11 and in 7.12.1 and if applicable, 7.13, and if all 10 capacitors comply with the tests specified in 7.12.2 and 7.12.3.

If any failures occur during a test, that test and the preceding ones, which may have influenced the results of that test, are repeated on a further five starters, all of which shall then comply with the repeated tests.

All 10 starter capacitors submitted to the tests specified in 7.12.2 and 7.12.3 shall pass the tests. If any failure occurs during these tests, they shall be repeated on a further 10 starter capacitors, all of which shall comply with the repeated tests.

7.3 Protection against accidental electric shocks

Enclosures for interchangeable starters shall ensure protection against electric shocks. Protection may be ensured either by an insulating enclosure, by an appropriate non-metallic lining, or other means which prevent accidental contact between live parts and the enclosure.

Compliance is checked by inspection.

7.4 Insulation resistance under humidity conditions

Immediately after a humidity treatment of 24 h x 2 in an atmosphere of 91% to 95% relative humidity, and an ambient temperature between 20°C and 27°C maintained within limits of $\pm 1^\circ\text{C}$, the insulation resistance between live parts and the metal canister of the starter shall be not less than 2 M Ω measured after 1 min at 500 V d.c. In the case of canisters of insulating material, they shall be covered by tinfoil and the preceding requirements shall be satisfied, the test being carried out between the foil and live parts.

Before starting the humidity treatment, the starters shall be kept in an ambient temperature which does not differ from the temperature within the humidity test enclosure by more than +4, –0°C, for at least 4 h.

7.5 Dielectric strength

Immediately after the insulation resistance test, the starter shall be subjected to and satisfactorily withstand for 1 min without breakdown a sinusoidal a.c. voltage of 1 500 V r.m.s. applied between the same parts as those referred to in 7.4.

7.6 Dimensions

7.6.1 The dimensions shall comply with the requirements of figure 1. Compliance shall be checked by the gauges of figures 6, 7 and 8.

7.6.2 The external creepage distance and clearance shall be not less than 3 mm between live parts of different polarity, or between live parts and accessible metal parts.

The internal creepage distance between live parts and accessible metal parts shall be not less than 2 mm.

7.7 Torsion test

The starter shall withstand a torque of 0,6 Nm about the axis and applied at the top of the canister by holding the pins in a fixed support. The torque shall not be applied suddenly but increased gradually from zero to the value specified.

7.8 Mechanical strength

The starter shall withstand without damage affecting safety, 20 falls of 500 mm onto a 3 mm thick steel plate in a tumbling barrel turning at 5 rev/min (that is 10 falls per minute). Suitable equipment for this test is shown in figure 2.

7.9 Connections

Electrical connections shall be so designed that the contact pressure is not transmitted through insulating material other than ceramic material.

Compliance is checked by inspection.

This requirement does not apply to contacts between detachable parts, such as starters and their holders, for which adequate spring action is required.

7.10 Resistance to heat and fire

7.10.1 Enclosures and other external parts of insulating material shall be sufficiently resistant to heat.

Compliance is checked by the following tests.

Five samples are tested in a heating cabinet at a temperature of 125°C during 168 h.

During the test, the samples shall not undergo any change impairing their safety, especially in the following respects:

- reduction of the protection against electric shock;
- loosening of electrical contacts;
- cracks, swelling or shrinking.

At the end of the test, the dimensions shall comply with the requirements of 7.6.1

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7.10.2 Enclosures and other external parts of insulating material shall be subjected to a ball-pressure test by means of the apparatus shown in figure 10.

The surface of the part under test is placed in the horizontal position and a steel ball of 5 mm diameter is pressed against this surface by a force of 20 N. If the surface under test bends, the part where the ball presses should be supported.

The test shall be made in a heating cabinet at a temperature of $125^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

After 1 h the ball shall be removed and the diameter of the impression measured. This diameter shall not exceed 2 mm.

The test shall not be made on parts of ceramic, urea or alkyd plastics. For enclosures made from these materials, a test is under consideration.

7.10.3 Enclosures and other external parts of insulating material shall be resistant to abnormal heat and fire.

Compliance is checked by the following test.

Parts are subjected to a test using a nickel-chromium glow-wire heated to 650°C . The test apparatus shall be that described in IEC 695-2-1.

The sample to be tested is mounted vertically on the carriage and pressed against the glow-wire tip with a force of 1 N, preferably 15 mm, or more, from the upper edge of the sample. The penetration of the glow-wire into the sample is mechanically limited to 7 mm. After 30 s, the sample is withdrawn from contact with the glow-wire tip.

Any flame or glowing of the sample shall extinguish within 30 s of withdrawing the glow-wire, and any burning or molten drop shall not ignite a piece of tissue paper, consisting of five layers, spread out horizontally $200\text{ mm} \pm 5\text{ mm}$ below the sample.

The glow-wire temperature and heating current shall be constant for 1 min prior to commencing the test. Care shall be taken to ensure that heat radiation does not influence the sample during this period. The glow-wire tip temperature is measured by means of a sheathed fine-wire thermocouple constructed and calibrated as described in IEC 695-2-1.

Precautions shall be taken to safeguard the health of personnel conducting tests against:

- risks of explosion or fire;
- inhalation of smoke and/or toxic products;
- toxic residues.

7.11 Quality of marking

Compliance with the requirements shall be checked by inspection after rubbing the marking lightly for 15 s with a piece of cloth soaked with water.

The test shall be repeated using a further piece of cloth soaked with petroleum spirit.

7.12 Radio interference suppression capacitors

7.12.1 The starter shall incorporate a radio interference suppression capacitor value between $0,005\text{ }\mu\text{F}$ and $0,02\text{ }\mu\text{F}$, unless otherwise indicated on the appropriate lamp data sheet of IEC 81 or IEC 901. Compliance shall be checked by inspection.

7.12.2 The capacitor shall be resistant to moisture. Compliance shall be checked by the following test.

Before the humidity treatment, the capacitors shall be kept at an ambient temperature which does not differ from the temperature within the humidity test enclosure by more than $+4, -0^{\circ}\text{C}$ for at least 4 h.