AS/NZS 60598.2.1:2014

Australian/New Zealand Standard™

Luminaires

Part 2.1: Particular requirements—Fixed general purpose luminaires

STANDARDS Australia

STANDARDS® NEW ZEALAND PAEREWA AOTEAROA

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Australasian Fire and Emergency Service Authorities Council
Australian Industry Group
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Department of Industry
Electrical Compliance Testing Association
Electrical Regulatory Authorities Council
Energy Efficiency and Conservation Authority of New Zealand
Fair Trading NSW
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Australian/New Zealand Standard™

Luminaires

Part 2.1: Particular requirements—Fixed general purpose luminaires

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-041, Lamps and Related Equipment, to supersede AS/NZS 60598.2.1:1998 on publication.

The objective of this Standard is to provide the lighting industry with essential safety requirements for fixed general purpose luminaires.

The objective of this revision is to include essential safety requirements for double-capped LED lamps.

This Standard is based on, but not equivalent to, IEC [60]598-2-1:1979, *Luminaires*, Part 2-1: *Particular requirements—Fixed general purpose luminaires*, and includes its Amendment No.1 (1987).

Extensive reference is made to AS/NZS 60598.1. The requirements of AS/NZS 60598.1 are varied in this Standard for fixed general purpose luminaires. Variations for double-capped LED lamps are provided in Appendix A.

The essential safety requirements in AS/NZS 3820, *Essential safety requirements for electrical equipment*, that could be applicable to fixed general purpose luminaires and double-capped LED lamps are covered by this Standard, taken in conjunction with any other relevant requirements affecting safety.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a standard.

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Part 2.1: Particular requirements—Fixed general purpose luminaires

1 SCOPE

This Standard specifies requirements for fixed general purpose luminaires incorporating electric light sources for operation on supply voltages not exceeding 1000 V. It is to be read in conjunction with those sections of AS/NZS 60598.1 to which reference is made. This Standard also specifies requirements for double-capped LED lamps (Appendix A). Appendix A is to be read in conjunction with those sections of AS/NZS 60598.1 to which reference is made.

2 REFERENCED DOCUMENT

The following document is referred to in this Standard:

AS/NZS
60598 Luminaires
60598.1 Part 1 General requirements and tests (IEC 60598-1, Ed. 7.0 (2008) MOD)

3 GENERAL TEST REQUIREMENTS

The provisions of Section 0 of AS/NZS 60598.1 apply. The tests described in each appropriate section of AS/NZS 60598.1 shall be carried out in the order listed in this Standard.

4 DEFINITIONS

For the purposes of this Standard, the definitions of Section 1 of AS/NZS 60598.1 apply.

5 CLASSIFICATION OF LUMINAIRES

Luminaires shall be classified in accordance with the provisions of Section 2 of AS/NZS 60598.1.

6 MARKING

The provisions of Section 3 of AS/NZS 60598.1 apply.

LED luminaires with G5 or G13 lampholders shall be marked with the following warning:

WARNING: NOT FOR USE WITH ANY FLUORESCENT LAMP—FOR USE ONLY WITH TYPE X LED LAMPS

In the warning, ‘X’ shall be replaced by ‘A’ or ‘B’ to denote Type A or Type B, as appropriate.

The warning label shall be durable and the font size shall be a minimum of 5 mm for letters and numbers and 5 mm for symbols and shall be visible during lamp replacement.

NOTE: Manufacturers should specify minimum requirements for the operations of their lamps, including spacing, enclosure design and temperature limitations.

7 CONSTRUCTION

The provisions of Section 4 of AS/NZS 60598.1 apply.

LED luminaires with G5 and G13 lampholders shall include a fuse to protect a fluorescent lamp that is inadvertently installed:

Each fuse shall—

(a) be of the 250 V HRC type;

(b) have a 0.5 A max. quick-acting type rating; and

(c) be used to protect a maximum of two lamps.

8 CREEPAGE DISTANCES AND CLEARANCES

The provisions of Section 11 of AS/NZS 60598.1 apply.

9 PROVISION FOR EARTHING

The provisions of Section 7 of AS/NZS 60598.1 apply.

10 TERMINALS

The provisions of Sections 14 and 15 of AS/NZS 60598.1 apply.

11 EXTERNAL AND INTERNAL WIRING

The provisions of Section 5 of AS/NZS 60598.1 apply.

12 PROTECTION AGAINST ELECTRIC SHOCK

The provisions of Section 8 of AS/NZS 60598.1 apply.

13 ENDURANCE TESTS AND THERMAL TESTS

The provisions of Section 12 of AS/NZS 60598.1 apply.

Luminaires with an IP classification greater than IP20 shall be subjected to the relevant tests of Clauses 12.4, 12.5 and 12.6 of Section 12 of AS/NZS 60598.1 after the test(s) of Clause 9.2 but before the test(s) of Clause 9.3 of Section 9 of AS/NZS 60598.1 specified in Clause 14 of this Standard.

14 RESISTANCE TO DUST AND MOISTURE

The provisions of Section 9 of AS/NZS 60598.1 apply.

For luminaires with an IP classification greater than IP20 the order of the tests specified in Section 9 of AS/NZS 60598.1 shall be as specified in Clause 13 of this Standard.

15 INSULATION RESISTANCE AND ELECTRIC STRENGTH

The provisions of Section 10 of AS/NZS 60598.1 apply.

16 RESISTANCE TO HEAT, FIRE AND TRACKING

The provisions of Section 13 of AS/NZS 60598.1 apply.

APPENDIX A

SAFETY REQUIREMENTS FOR DOUBLE-CAPPED LED LAMPS

(Normative)

A1 GENERAL

A1.1 Scope

This Appendix specifies the safety and interchangeability requirements of double capped LED lamps, and the exchange operation together with the test methods and conditions required to show compliance of lamps with caps G5 and G13 intended for replacing fluorescent lamps with the same caps, or other lamp caps and lampholder types that are intended for new luminaires.

This Appendix includes requirements for double capped lamps for retrofit or new luminaires. These lamps may have integral, built-in or independent control gear.

The requirements of this Appendix relate only to type testing.

NOTES:

1 Where the term ‘lamp(s)’ is used in this Appendix, it stands for ‘double-capped LED light source(s) [lamp(s)]’, except where it is obviously assigned to another type(s) of lamp(s).

2 This Appendix does not apply to self-ballasted LED lamps within the scope of AS/NZS IEC 62560.

A1.2 Application

This Appendix is to be read in conjunction with AS/NZS 60598.1, with all provisions applying unless varied herein. Where the term ‘luminaire’ is used in AS/NZS 60598.1, it shall be replaced with the term ‘lamp’. The tests described in each appropriate section of AS/NZS 60598.1 shall be carried out in the order listed in this Appendix.

A1.3 Testing

In general, all tests are carried out on each type of lamp or, where a range of similar lamps is involved, for each power in the range or on a representative selection from the range.

Specially prepared samples for testing may be required if lamps cannot be opened without being permanently damaged, or have other characteristics that prevent tests from being applied or assessed.

Specially prepared samples may need to be prepared after inspection of the lamp and components and examination of the circuit diagram. Samples may require such special preparation as the output terminals being short-circuited, or lamps may need to be specially prepared so that a fault condition can be simulated to ensure adequate testing (e.g. to comply with the test requirements of Clause 13 of AS/NZS 60598.1). Unassembled samples or samples without potting may need to be supplied.

A1.4 Specific requirements of this Appendix

A lamp(s) shall be deemed to comply with this Appendix only if it complies with all the appropriate requirements of this Appendix and passes the relevant tests specified herein.

A1.5 Requirements of relevant test specifications

Equipment and components incorporated in a lamp that is safety dependant shall comply with the appropriate requirements of any relevant test specification, unless such requirements are varied herein.

A2 REFERENCED DOCUMENTS

The following documents are referred to in this Appendix:

AS
2293 Emergency escape lighting and exit signs for buildings
2293.3 Part 3: Emergency escape luminaires and exit signs

AS/NZS
60155 Glow-starters for fluorescent lamps

60598 Luminaires
60598.1 Part 1: General requirements and tests (IEC 60598-1, Ed. 7.0 (2008) MOD)

AS/NZS IEC
62560 Self-ballasted LED-lamps for general lighting services by voltage > 50 V—Safety specifications (IEC 62560, Ed. 1.0 (2011) MOD)

62471 Photobiological safety of lamps and lamp systems
62471.2 Part 2: Guidance on manufacturing requirements relating to non-laser optical radiation safety

IEC
60061 Lamp caps and holders together with gauges for the control of interchangeability and safety
60061-1 Part 1: Lamp caps
60061-3 Part 3: Gauges

60081 Double-capped fluorescent lamps—Performance specifications

60127 Miniature fuses (series)

61032 Protection of persons and equipment by enclosures—Probes for verification

61195 Double-capped fluorescent lamps—Safety specifications

A3 DEFINITION

For the purposes of this Appendix, the following definition applies:

A3.1 Double-capped LED lamp

Tubular LED light source which may be used as a replacement for another type of lamp.

NOTE: Typical types of lamps that may be replaced include linear fluorescent lamps.

A4 CLASSIFICATIONS OF LAMP(S)

A4.1 Class

Lamps shall be classified in accordance with the provisions of Section 2 of AS/NZS 60598.1. Lamps shall be classified as class II or class III for protection against electric shock.

A class III lamp shall have class II construction and comply with all of the requirements for protection against electric shock for a class II lamp at a nominal rating of 240 V a.c.

A4.2 Type

Lamps shall be classified as either Type A or Type B, in accordance with the following:

(a) Type A: Type A LED lamps shall be constructed such that one end of the lamp has the lamp cap pins electrically bridged and the other end of the lamp has the line and neutral supply connected to the pins of that lamp cap.

(b) Type B: Type B LED lamps shall be constructed such that one end of the lamp has the lamp cap pins electrically isolated from each other and the other end of the lamp has the line and neutral supply connected to the pins of that lamp cap.

Type B lamps will no longer be permitted 3 years from the date of publication of this Standard.

A5 MARKING

A5.1 General

The Test of Marking of Clause 3.4 of AS/NZS 60598.1 shall be used to determine the durability of the markings specified in A5.2 to A5.4.

A5.2 Marking on the lamp

Lamps shall be clearly and durably marked with the following markings, the size of which shall be a minimum of 2 mm:

(a) Mark of origin (this may take the form of a trademark, or be the manufacturer's name or the name of the responsible vendor).

(b) Rated supply voltage or voltage range (marked 'V' or 'volts').

(c) Rated wattage (marked 'W' or 'watts').

(d) Rated frequency (marked in 'Hz').

(e) A value for allowable case temperature t_c and a marked point of measurement.

(f) Model number.

(g) IP rating if greater than IP20.

(h) Markings to identify the line and neutral supply connections of the lampholder.

(i) The lamp type shall be marked with the text 'Type A' or 'Type B', as per the appropriate subfigure of Figure A1, to indicate the lamp cap configuration.

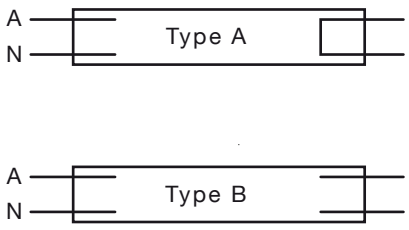


FIGURE A1 LAMP CAP CONFIGURATION FOR TYPE A AND TYPE B LED LAMPS

A5.3 Warning label for the luminaire

The following warning label shall be supplied with the lamp:

WARNING: NOT FOR USE WITH ANY FLUORESCENT LAMP—FOR USE ONLY WITH TYPE X LED LAMPS

In the warning label, 'X' shall be replaced by 'A' or 'B' to denote Type A or Type B, as appropriate.

The warning label shall be durable and the font size shall be a minimum of 5 mm for letters and numbers and 5 mm for symbols.

The instructions for the warning label shall state that the installer, when installing the lamp, is to ensure that this label is placed in a prominent position on the luminaire and visible when the lamp is installed.

A5.4 Marking of associated components

If lamps need to be used with a component which replaces the starter, the component to replace the starter shall be marked as shown in Figure A2.

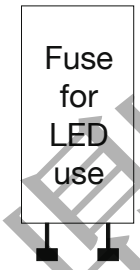


FIGURE A2 STARTER REPLACEMENT

A6 INSTRUCTIONS

A6.1 Information to be supplied with the lamp

The following information shall be supplied with the lamp:

(a) Special conditions or restrictions to be observed for lamp operation. For example, operation in dimming circuits' high frequency circuits.

Where lamps are not suitable for dimming, the following symbol (Figure A3) may be used:

IEC 928/99

FIGURE A3 DIMMING NOT ALLOWED

(b) *Wiring diagram for lamp installation* For wiring diagrams for retrofit situations see Figure A4 for guidance. Figure A4(a) shows an example of an original wiring diagram for a typical 2×18 W twin fluorescent lamp. Figure A4(b) shows an example of the required wiring diagram for lamp installation to be included for LED lamp retrofit for that typical 2×18 W twin fluorescent lamp. Figure A4(c) shows an example of an original wiring diagram for a typical 1×36 W fluorescent lamp. Figure A4(d) shows an example of the required wiring diagram for lamp installation to be included for LED lamp retrofit for that typical 1×36 W fluorescent lamp.

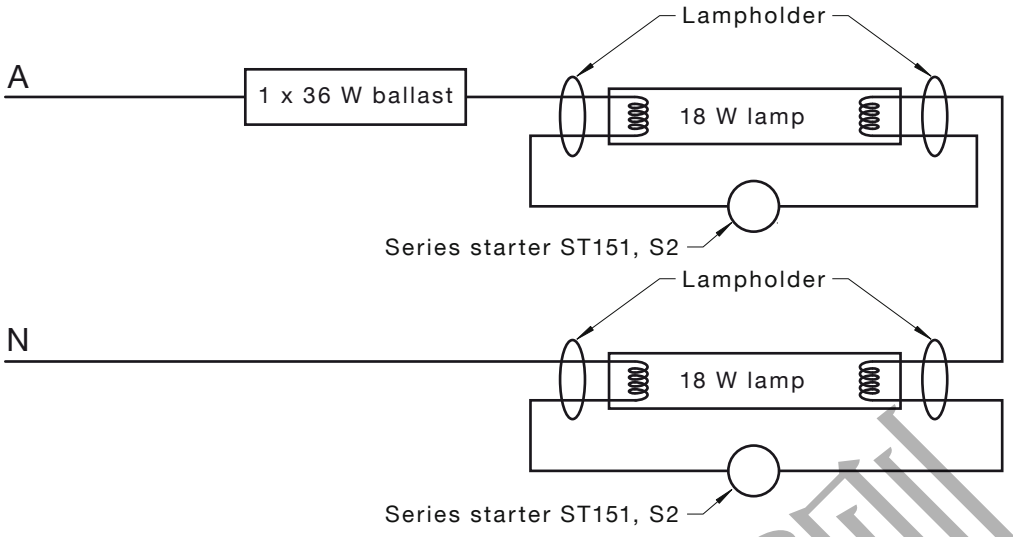
For wiring diagrams for new luminaires (including existing fluorescent luminaires that are rewired), see Figure A5, which shows, as an example, the required wiring diagram for lamp installation to be included for Type A or Type B single LED lamp fittings.

NOTE: Type B LED lamps will no longer be permitted 3 years from the date of publication of this Standard.

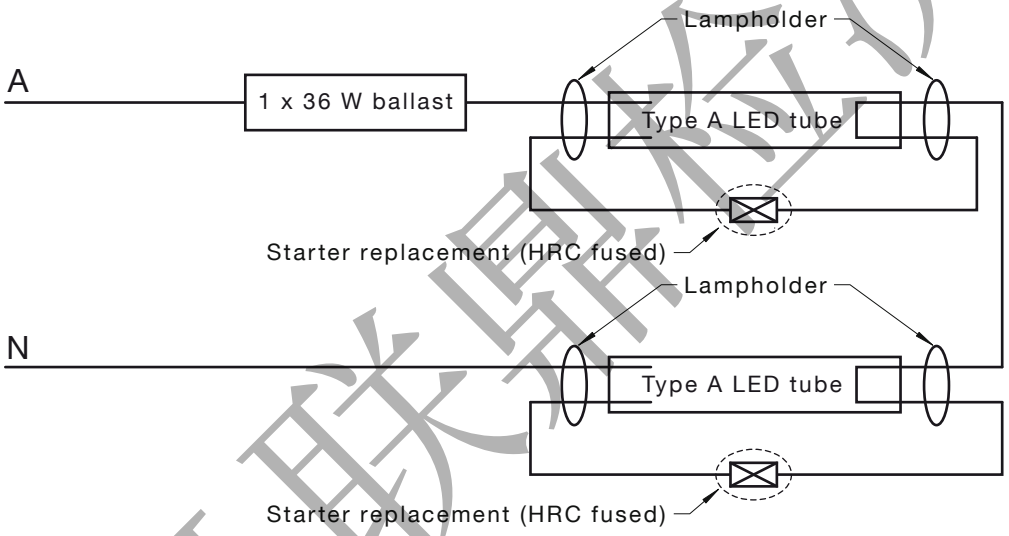
(c) Information on the specification and compatibility of control gear with which the lamp can be used.

(d) The ambient operating temperature range of the lamp if other than 10 to 30°C.

(e) The type of lamp it replaces, including lamp length, lamp cap configuration and IP rating.

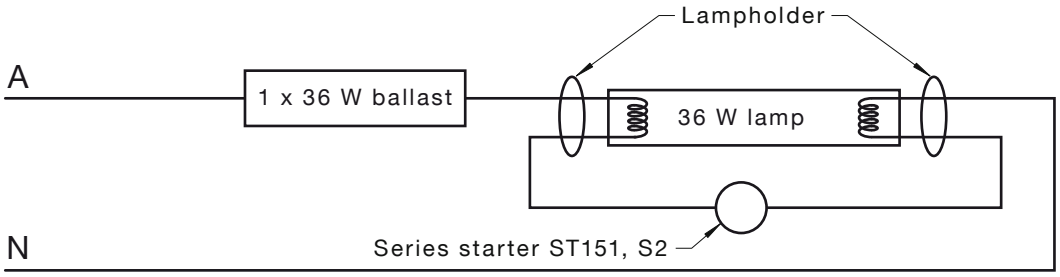


(a) Existing series 2 x 18W fluorescent luminaire

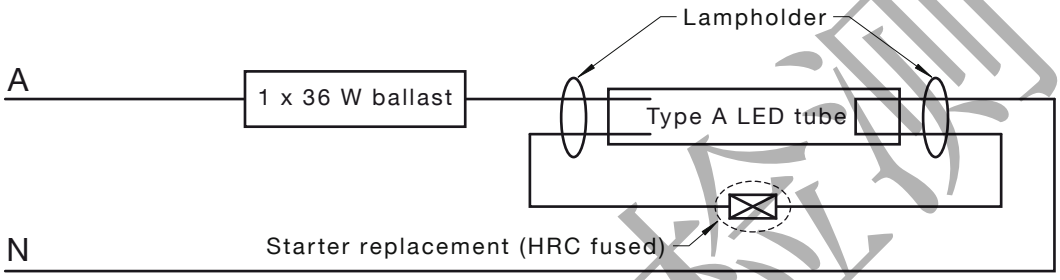


(b) Retrofit series twin luminaire example

FIGURE A4 (in part) WIRING DIAGRAM FOR LAMP INSTALLATION



(c) Existing series 36W fluorescent luminaire



(d) Retrofit luminaire example

FIGURE A4 (in part) WIRING DIAGRAM FOR LAMP INSTALLATION

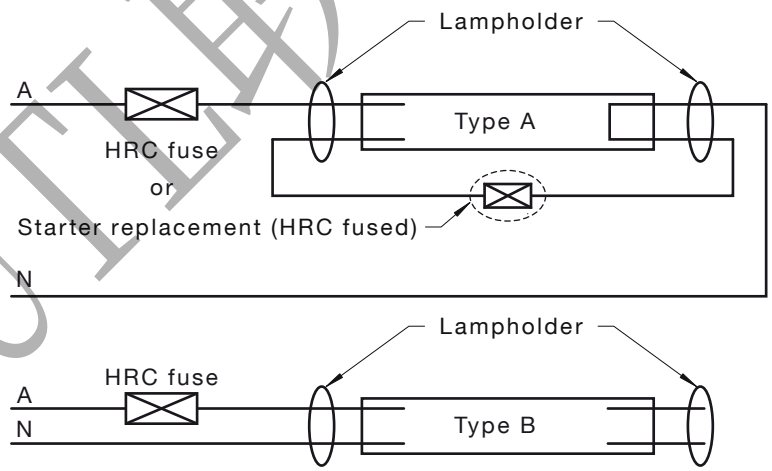


FIGURE A5 WIRING DIAGRAMS FOR NEW LUMINAIRES (INCLUDING REWIRED MODIFIED EXISTING LUMINAIRE) FOR TYPE A AND TYPE B FOR LED LAMPS

A6.2 Information to be supplied for emergency luminaires

If lamps are not suitable for use in emergency luminaires, the instructions shall include the following statement: ‘This lamp is not suitable for use in emergency luminaires designed for double-capped fluorescent lamp(s)’.

Lamps suitable for use in emergency luminaires shall be marked to identify the specific luminaires that they are suitable for use in.

A6.3 Information about additional components

If lamps need to be used with a component which replaces the starter, the instructions shall indicate the 'type reference' of the component to replace the starter.

A6.4 Warnings

The instructions for lamps intended for use in an existing luminaire that requires modification other than replacement of the lamp or starter shall include the following warnings:

WARNING: The manufacturer of the original luminaire will no longer be responsible for the compliance of the modified product. Any modifications made to the original luminaire may alter the safety aspects of the original luminaire; hence compliance assessments of the original luminaire may no longer be applicable to the modified luminaire.

WARNING: The supplied warning sticker shall be placed on the luminaire and shall be visible during lamp replacement.

WARNING: A fuse shall be used to protect a fluorescent lamp that is inadvertently installed against short circuits. Each fuse shall—

(a) be of the 250 V HRC type;

(b) have a 0.5 A max. quick-acting type rating; and

(c) be used to protect a maximum of two lamps.

NOTE: A quick-acting type fuse is defined in the IEC 60127 series as 'Type F'.

The luminaire shall have a fuse replacement rating label.

WARNING: The rating of the lamp shall not exceed the maximum wattage of the lamp that it is intended to replace or the total wattage of the replacement lamps shall not exceed the maximum wattage of the luminaire.

The instructions for lamps intended for use in a new luminaire shall include the following warnings:

WARNING: The supplied warning sticker shall be placed on the luminaire and shall be visible during lamp replacement.

WARNING: A fuse shall be used to protect a fluorescent lamp that is inadvertently installed against short circuits. Each fuse shall—

(a) be of the 250 V HRC type;

(b) have a 0.5 A max. quick-acting type rating; and

(c) be used to protect a maximum of two lamps.

The luminaire shall have a fuse replacement rating label.

WARNING: The rating of the lamp shall not exceed the maximum wattage of the lamp that it is intended to replace or the total wattage of the replacement lamps shall not exceed the maximum wattage of the luminaire.

NOTE: Manufacturers should specify minimum requirements for the operations of their lamps, including spacing, enclosure design and temperature limitations.

A6.5 Additional information

Installation instructions shall be provided. The instructions shall give adequate guidance to safely perform the retrofit or modification. Graphical instructions, describing all necessary steps for the replacement of the fluorescent lamp with a lamp, such as replacement of the starter, may be used.

The instruction manual shall be written in English and provided with the lamp.

If the lamp requires additional mechanical support then instructions for fitting shall be supplied.

For eye protection, the appropriate warnings and instructions as indicated in AS/NZS IEC 62471.2, as relevant to the risk type listed in that Standard, shall be placed on the packaging or in the instructions, or on the lamp itself if required by AS/NZS IEC 62471.2 (i.e. high risk group product requirements).

A7 CONSTRUCTION

A7.1 General

Lamps shall be so designed and constructed that in normal use they function reliably and cause no danger to the user or surroundings. In general, compliance shall be checked by carrying out all the tests specified.

The provisions of Section 4 of AS/NZS 60598.1 are not applicable, except as specified in A11.3. The following applies:

(a) There shall be adequate provision, with or without the use of tools, for the replacement of lamps and replacement or general cleaning of optical components (such as diffusers or reflectors) without exposing live parts or unearthed exposed metal parts to personal contact.

(b) Protection against electric shock shall be maintained for all methods and positions of installation in normal use, having regard to the limitations indicated in the manufacturer's installation instructions. Protection shall be maintained after removal of all parts that can be removed by hand.

(c) Where necessary, to ensure continued safe use, metal parts shall be inherently non-corrosive, protected against corrosion or otherwise suitable for the purpose.

A7.2 Components that replace the starter

If lamps need to be used with a component that replaces the starter, the component shall have an internal 250 V HRC 0.5 A max. quick-acting fuse.

A7.3 Emergency lamps

Lamps suitable for use in emergency luminaires shall comply with the requirements of AS 2293.3 in that specific luminaire.

A7.4 Compatibility of electrical supply to the lamp

Lamps shall be constructed such that one end of the lamp has the lamp cap pins electrically bridged (Type A) or electrically isolated from each other (Type B) and the other end of the lamp has the line and neutral supply connected to the pins of that lamp cap.

Type B lamps will no longer be permitted 3 years from the date of publication of this Standard.

A8 INTERCHANGEABILITY

Interchangeability shall be ensured by the use of lamp caps in accordance with IEC 60061-1 and gauges in accordance with IEC 60061-3.

Compliance shall be checked by the use of the relevant gauges or measurement.

If lamps need to operate in combination with a component which replaces the starter, this component shall be supplied together with the lamp. This component shall comply with the dimensions and electrical, mechanical and thermal tests required by Section 1 of AS/NZS 60155.

A9 MASS

The entire mass of a lamp shall not exceed 500 g for a G13-capped lamp or 200 g for a lamp with another type of end cap.

Compliance shall be checked by weighing the lamp.

These values may be exceeded where additional mechanical support is provided.

Any additional mechanical support needed shall be provided with the lamp. Any additional mechanical support shall be double insulated and the fixing means shall not penetrate the enclosure of the luminaire.

All tests shall be conducted with the additional mechanical support in place in accordance with the manufacturer's instructions.

Compliance of any additional mechanical support shall be checked by the tests of Clause 4.14 of AS/NZS 60598.1.

A10 DIMENSIONS

Lamps shall have the dimensions of the corresponding lamps they are replacing in accordance with the relevant data sheets.

NOTE: Relevant data sheets for some lamps are given in IEC 60081.

These dimensional requirements do not apply to any additional support mechanisms.

Compliance shall be checked by measurement or gauges as appropriate.

A11 MECHANICAL REQUIREMENTS AND TESTS FOR CAPS

A11.1 Construction and assembly

Caps shall be so constructed and assembled that they remain attached to the tubes during and after operation.

Compliance shall be checked by the tests of Paragraphs A11.2 and A11.3.

A11.2 Torque test

A torque test shall be applied to the lamp contact pins, as follows:

The test holder for the application of the torque shall be that shown in Annex A of IEC 61195:2012.

In the case of lamps with adjustable caps, before applying the torque test, the lamp cap shall be rotated to its extreme positions. Both extreme positions shall be tested. Component parts of the cap shall be marked to allow measurement of angular displacement during the test.

A torque shall be applied such that it is increased progressively from zero to 1 $N\,m$ then maintained for 30 s.

During the test the lamp cap shall remain firmly attached to the tube and there shall be no rotational movement between component parts of the cap exceeding an angular displacement of 6°.

After the test, the sample shall comply with the requirements of Paragraph A16.

A11.3 Heat treatment test

Lamp caps shall be securely fixed in position and the lamp cap fixing shall not be affected by heat.

Compliance shall be checked by the following test:

This test shall be applied to a new sample not previously tested.

Where the lamp cap fixing uses cement or chemical bonding, the lamp cap fixing shall be subject to a treatment of 2000 ±50 h at a temperature of 85 ±5°C with the lamp not energized.

After the treatment, the test specified in Paragraph A11.2 shall be applied. However, the screws and their fixings shall comply with the requirements of the torque test on screws of Section 4 of AS/NZS 60598.1.

If two screws or a similar mechanical connection is used for fixing the cap to the tube, the test in this Clause (A11.3) is not applicable.

A12 CREEPAGE DISTANCES AND CLEARANCES

The provisions of Section 11 of AS/NZS 60598.1 apply. Compliance shall be checked by measurement in the most onerous position.

A13 PROVISION FOR EARTHING

The provisions of Section 7 of AS/NZS 60598.1 are not applicable.

A14 TERMINALS

The provisions of Section 14 and 15 of AS/NZS 60598.1 apply to supply terminals only; they are not applicable to lamp caps.

A15 EXTERNAL AND INTERNAL WIRING

The provisions of Section 5 of AS/NZS 60598.1 apply.

A16 PROTECTION AGAINST ELECTRIC SHOCK

A16.1 General

The provisions of Section 8 of AS/NZS 60598.1 apply.

A16.2 Protection against electric shock

The lamp shall be so constructed that, without any additional enclosure in the form of a luminaire, no internal metal parts, basic insulated external metal parts (other than caps), or live metal parts of the lamp cap or of the lamp itself are accessible when the lamp is installed in a lampholder in accordance with the relevant IEC lampholder data sheet.

Metal parts of class II lamps which are insulated from live parts by basic insulation only are live parts for the purpose of this Paragraph (A16).

External metal parts other than the current-carrying metal parts of the cap shall not be or become live.

Compliance: The accessibility shall be checked with test probe B of IEC 61032, applied with a force of 10 N. Any movable conductive material shall be placed in the most onerous position without using a tool.

A16.3 Discharge capacitors

Lamps incorporating a capacitor of capacitance exceeding 0.1 μF shall be provided with an internal discharge device, so that 1 s after disconnection the voltage between the pins of the lamp does not exceed 34 V.

Compliance shall be checked by measurement.

A16.4 Electrical continuity

Lamp caps do not ensure the insertion of both ends of the lamp simultaneously; for this reason, there shall be no electrical continuity between the two ends of the lamp during the insertion.

Compliance shall be checked by the insulation resistance test and electric strength test of Section 10 of AS/NZS 60598.1, applied between the pin(s) or contacts of one cap and the pin(s) or contacts of the other cap, in accordance with the provisions of Sections 8 and 10 of AS/NZS 60598.1. All possible combinations of single end lamp insertion into both lampholders shall be checked.

A17 ENDURANCE TEST AND THERMAL TESTS

A17.1 General

The provisions of Section 12 of AS/NZS 60598.1 apply, together with the requirements of Paragraphs A17.2 to A17.5.

A17.2 Endurance test

The duration of the endurance test of Clause 12.3 of AS/NZS 60598.1 shall be 240 h (i.e. 10 × 24 cycles at normal operation) in free air.

A17.3 Thermal test (normal operation)

During the thermal test of Clause 12.4 of AS/NZS 60598.1, no accessible surface of the lamp shall exceed 70°C for metallic surfaces or 85°C for non-metallic surfaces.

A17.4 Thermal test compliance

The surface temperature of inaccessible parts of the lamp cap shall not exceed 120°C.

NOTE: The limit of 120°C is based on the 95 K temperature rise limit for lamps using caps of G5 and G13 specified in IEC 61195.

A17.5 Thermal test (abnormal operation) for class III lamps

Class III lamps shall, in addition, be subject to the abnormal operation test of Clause 12.5 of AS/NZS 60598.1 for a 240 V a.c. rating. The lamp shall not become unsafe during this test.

NOTE: Symptoms of possible unsafe conditions include cracks, scorches and deformation.

A18 POWER REQUIREMENT

The measured power of the lamp and any associated circuitry shall not be greater than 1.1 times the rated power.

Compliance shall be checked by measurement conducted at maximum rated voltage and under the conditions of Clause 12.4 of AS/NZS 60598.1. The measured value shall not exceed that marked as required by Paragraph A5.2(c). In addition, for a retrofit lamp, the rated power of the lamp shall not be greater than the power rating of the lamp that it is intended to replace.

A19 RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE

Where the lamp is marked with an IP rating in accordance with Paragraph A5.2(g), the tests of Section 9 of AS/NZS 60598.1 shall be conducted on the lamp at its marked rating.

A20 INSULATION RESISTANCE AND ELECTRIC STRENGTH

The provisions of Section 10 of AS/NZS 60598.1 apply.

A21 RESISTANCE TO HEAT, FIRE AND TRACKING

The provisions of Section 13 of AS/NZS 60598.1 apply.

A22 PHOTOBIOLOGICAL HAZARD

This Clause becomes applicable two years from the date of publication of this Standard.

The lamp shall not exceed the photobiological hazard ratings for Risk Group 1 (low risk), in accordance with Clause 6.1.2 of AS/NZS IEC 62471:2011.

Compliance shall be checked by conducting the relevant tests of AS/NZS IEC 62471:2011.

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