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Luminaires – Part 1: General requirements and tests

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LUMINAIRES –

Part 1: General requirements and tests

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60598-1 has been prepared by subcommittee 34D: Luminaires, of IEC technical committee 34: Lamps and related equipment.

This ninth edition cancels and replaces the eighth edition published in 2014 and Amendment 1:2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Revision of Clause 4.30, Fixing cover live parts of non-user replaceable light source;
- b) Subclause 4.24.2, Blue Light Hazard: removal of Risk Group 0;
- c) Subclause 5.2.16: additional requirements for AC mains appliance inlets related to IEC 61984;
- d) Addition of Subclause 3.3.25, UV protection of cable;
- e) Addition of Clause 4.34, Inclusion of EMF safety requirements (IEC 62493);
- f) Revision of the requirements for functional earth and protective earth;
- g) Addition of Clause 4.35, Protection against fast rotating parts;
- h) Revision of Clause 3.2, Rated voltage marking;
- i) Revision of Subclause 5.2.10, Cord anchorage;
- j) Revision of Annex G for touch current and protective conductor current test set-up;
- k) Addition of requirements for constant light output function and programmable current output;
- l) Revision of Subclause 8.2.3 c), touch voltage limits for interrupted DC voltage;
- m) Introduction of PELV;
- n) Introduction of Ethernet power supply connection for luminaires (PoE);
- o) Section 9, Introduction of IPX9;
- p) Addition of Subclause 3.3.26 for wall mounted luminaires;
- q) Revision of Annex D introducing alternative thermal tests for luminaires with t_a marking higher than 25°C;
- r) Revision of Table 10.3 and Subclause 3.3.19 for protective conductor current limits;
- s) Track-mounted luminaires: cross reference to Annex A of IEC 60570:2003/AMD2:2019;
- t) Revision of Subclause 10.2.2, alternative DC electric strength test;
- u) Revision of Annex D for recessed luminaires;
- v) Subclause 4.12.5: revision of Table 4.2 for torque test on metal glands;
- w) Revision of use of bridging capacitors in luminaires;
- x) Revision of electrical connection to class III plugs.

The major changes which may affect certification are given in Annex R.

Annex R shows where a new text has been included which contains more serious/critical requirements requiring products to be re-tested.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
34D/1546/FDIS	34D/1560/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

A list of all parts in the IEC 60598 series, published under the general title *Luminaires*, can be found on the IEC website.

NOTE In this document, the following print types are used:

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

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- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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LUMINAIRES –

Part 1: General requirements and tests

SECTION 0: GENERAL INTRODUCTION

0.1 Scope

This Part 1 of IEC 60598 specifies general requirements for luminaires, incorporating electric light sources for operation from supply voltages up to 1 000 V. The requirements and related tests of this document cover: classification, marking, mechanical construction, electrical construction and photobiological safety.

Each section of this Part 1 is read in conjunction with this Section 0 and with other relevant sections to which reference is made.

Each part of IEC 60598-2 details requirements for a particular type of luminaire or group of luminaires on supply voltages not exceeding 1 000 V. These parts are published separately for ease of revision and additional sections will be added as and when a need for them is recognized.

The presentation of photometric data for luminaires is under consideration by the International Commission on Illumination (CIE) and is not, therefore, included in this Part 1.

Requirements are included in this Part 1 for luminaires incorporating ignitors with nominal peak values of the voltage pulse not exceeding those of Table 11.2. The requirements apply to luminaires with ignitors built into ballasts and to luminaires with ignitors separate from ballasts. For luminaires with ignitors built into lamps, the requirements are under consideration.

Requirements for semi-luminaires are included in this Part 1.

In general, this Part 1 covers safety requirements for luminaires. The object of this Part 1 is to provide a set of requirements and tests which are considered to be generally applicable to most types of luminaires and which can be called up as required by the detail specifications of IEC 60598-2. This Part 1 is thus not regarded as a specification in itself for any type of luminaire, and its provisions apply only to particular types of luminaires to the extent determined by the appropriate part of IEC 60598-2.

The parts of IEC 60598-2, in making reference to any of the sections of Part 1, specify the extent to which that section is applicable and the order in which the tests are ~~to be~~ performed; they also include additional requirements as necessary.

The order in which the sections of Part 1 are numbered has no particular significance as the order in which their provisions apply is determined for each type of luminaire or group of luminaires by the appropriate part of IEC 60598-2. All parts of IEC 60598-2 are self-contained and therefore do not contain references to other parts of IEC 60598-2.

Where the requirements of any of the sections of Part 1 are referred to in the parts of IEC 60598-2 by the phrase "The requirements of section... of IEC 60598-1 apply", this phrase is ~~to be~~ interpreted as meaning that all the requirements of that section of Part 1 apply except those which are clearly inapplicable to the particular type of luminaire covered by that part of IEC 60598-2.

For explosion proof luminaires, as covered by IEC 60079, the requirements of IEC 60598 (selecting the appropriate parts 2) are applied in addition to the requirements of IEC 60079. In the event of any conflict between IEC 60598 and IEC 60079, the requirements of IEC 60079 take priority.

~~Attention is drawn to lamp performance standards which contain “information for luminaire design”; this should be followed for proper lamp operation; however, this standard does not require the testing of lamp performance as part of the type test approval for luminaires.~~

Improvements in safety to take into account the state of the art technology are incorporated in the standards with revisions and amendments on an ongoing basis. Regional standardization bodies ~~may~~ can include statements in their derived standards to cover products which have complied with the previous document as shown by the manufacturer or standardization body. The statements may require that for such products, the previous standard may continue to apply to production until a defined date after which the new standard shall apply.

0.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60061 (all parts), *Lamp caps and holders together with gauges for the control of interchangeability and safety* (available at <http://std.iec.ch/iec60061>)

IEC 60061-2, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 2: Lampholders* (available at <http://std.iec.ch/iec60061>)

IEC 60061-3, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 3: Gauges* (available at <http://std.iec.ch/iec60061>)

IEC 60065:2001/2014, *Audio, video and similar electronic apparatus – Safety requirements Amendment 1:2005*

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14:2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-31:2008, *Environmental testing – Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens*

IEC 60068-2-75, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC TR 60083, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

IEC 60085, *Electrical insulation – Thermal evaluation and designation*

IEC 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60155, *Glow-starters for fluorescent lamps*

IEC 60227 (all parts), *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*

IEC 60238:2016, *Edison screw lampholders*

IEC 60245 (all parts), *Rubber insulated cables – Rated voltages up to and including 450/750 V*

IEC 60320 (all parts), *Appliance couplers for household and similar general purposes*

~~IEC 60357, Tungsten halogen lamps (non-vehicle) – Performance specifications~~

IEC 60360, *Standard method of measurement of lamp cap temperature rise*

IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

~~IEC 60400, Lampholders for tubular fluorescent lamps and starterholders~~

IEC 60417, *Graphical symbols for use on equipment* (available at <http://www.graphical-symbols.info/equipment>)

IEC 60432-1:1999, *Incandescent lamps – Safety specifications – Part 1: Tungsten filament lamps for domestic and similar general lighting purposes*

IEC 60432-1:1999/AMD1:2005

IEC 60432-1:1999/AMD2:2011

IEC 60432-2:1999, *Incandescent lamps – Safety specifications – Part 2: Tungsten halogen lamps for domestic and similar general lighting purposes*

IEC 60432-2:1999/AMD1:2005

IEC 60432-2:1999/AMD2:2012

~~IEC 60432-3, Incandescent lamps – Safety specifications – Part 3: Tungsten halogen lamps (non-vehicle)~~

~~IEC 60449:1973, Voltage bands for electrical installations of buildings
Amendment 1:1979~~

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

IEC 60570:2003, *Electrical supply track systems for luminaires*

IEC 60570:2003/AMD1:2017

IEC 60570:2003/AMD2:2019

IEC 60598-2 (all parts), *Luminaires – Part 2: Particular requirements*

IEC 60598-2-4:2017, *Luminaires – Part 2-4: Particular requirements – Portable general purpose luminaires*

IEC 60603 (all parts), *Connectors for frequencies below 3 MHz for use with printed boards*

IEC 60662, *High-pressure sodium vapour lamps – Performance specifications*

~~IEC 60682, Standard method of measuring the pinch temperature of quartz-tungsten-halogen lamps~~

IEC 60664-4:2005, *Insulation coordination for equipment within low-voltage systems – Part 4: Consideration of high-frequency voltage stress*

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~~IEC 60838 (all parts), *Miscellaneous lampholders*~~

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IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61058-1:2000¹, *Switches for appliances – Part 1: General requirements*

IEC 61167, *Metal halide lamps – Performance specification*

~~IEC 61184, *Bayonet lampholders*~~

~~IEC 61199, *Single-capped fluorescent lamps – Safety specifications*~~

IEC 61249 (all parts), *Materials for printed boards and other interconnecting structures*

IEC 61347 (all parts), *Lamp controlgear*

IEC 61347-1:2015, *Lamp controlgear – Part 1: General and safety requirements*
IEC 61347-1:2015/AMD1:2017

IEC 61347-2-9, *Lamp controlgear – Part 2-9: Particular requirements for electromagnetic controlgear for discharge lamps (excluding fluorescent lamps)*

IEC 61535:2009², *Installation couplers intended for permanent connection in fixed installations*

IEC 61558 (all parts), *Safety of power transformers, power supplies, reactors and similar products*

IEC 61558-1:2005³, *Safety of power transformers, power supplies, reactors and similar products – Part 1: General requirements and tests*

¹ Withdrawn.

² Withdrawn.

³ Withdrawn.

~~IEC 61558-2 (all parts), Safety of power transformers, power supplies, reactors and similar products – Part 2: Particular requirements and tests~~

~~IEC 61558-2-5, Safety of transformers, reactors, power supply units and combinations thereof – Part 2-5: Particular requirements and test for transformer for shavers, power supply units for shavers and shaver supply units~~

IEC 61558-2-6, Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers

IEC 61643-11, Low-voltage surge protective devices – Part 11: Surge protective devices connected to low-voltage power systems – Requirements and tests ~~and~~ methods

IEC 61984:2008, Connectors – Safety requirements and tests

~~IEC 62031, LED modules for general lighting – Safety specifications~~

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IEC 62368-3:2017, Audio/video, information and communication technology equipment – Part 3: Safety aspects for DC power transfer through communication cables and ports

IEC 62493:2015, Assessment of lighting equipment related to human exposure to electromagnetic fields

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IEC TR 62778, Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires

IEC 80416-1, Basic principles for graphical symbols for use on equipment – Part 1: Creation of graphical symbol ~~originals~~ for registration

INTERNATIONAL STANDARD

Luminaires – Part 1: General requirements and tests

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LUMINAIRES –

Part 1: General requirements and tests

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60598-1 has been prepared by subcommittee 34D: Luminaires, of IEC technical committee 34: Lamps and related equipment.

This ninth edition cancels and replaces the eighth edition published in 2014 and Amendment 1:2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Revision of Clause 4.30, Fixing cover live parts of non-user replaceable light source;
- b) Subclause 4.24.2, Blue Light Hazard: removal of Risk Group 0;
- c) Subclause 5.2.16: additional requirements for AC mains appliance inlets related to IEC 61984;
- d) Addition of Subclause 3.3.25, UV protection of cable;
- e) Addition of Clause 4.34, Inclusion of EMF safety requirements (IEC 62493);

- f) Revision of the requirements for functional earth and protective earth;
- g) Addition of Clause 4.35, Protection against fast rotating parts;
- h) Revision of Clause 3.2, Rated voltage marking;
- i) Revision of Subclause 5.2.10, Cord anchorage;
- j) Revision of Annex G for touch current and protective conductor current test set-up;
- k) Addition of requirements for constant light output function and programmable current output;
- l) Revision of Subclause 8.2.3 c), touch voltage limits for interrupted DC voltage;
- m) Introduction of PELV;
- n) Introduction of Ethernet power supply connection for luminaires (PoE);
- o) Section 9, Introduction of IPX9;
- p) Addition of Subclause 3.3.26 for wall mounted luminaires;
- q) Revision of Annex D introducing alternative thermal tests for luminaires with t_a marking higher than 25°C;
- r) Revision of Table 10.3 and Subclause 3.3.19 for protective conductor current limits;
- s) Track-mounted luminaires: cross reference to Annex A of IEC 60570:2003/AMD2:2019;
- t) Revision of Subclause 10.2.2, alternative DC electric strength test;
- u) Revision of Annex D for recessed luminaires;
- v) Subclause 4.12.5: revision of Table 4.2 for torque test on metal glands;
- w) Revision of use of bridging capacitors in luminaires;
- x) Revision of electrical connection to class III plugs.

The major changes which may affect certification are given in Annex R.

Annex R shows where a new text has been included which contains more serious/critical requirements requiring products to be re-tested.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
34D/1546/FDIS	34D/1560/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

A list of all parts in the IEC 60598 series, published under the general title *Luminaires*, can be found on the IEC website.

NOTE In this document, the following print types are used:

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

LUMINAIRES –

Part 1: General requirements and tests

SECTION 0: GENERAL INTRODUCTION

0.1 Scope

This Part 1 of IEC 60598 specifies general requirements for luminaires, incorporating electric light sources for operation from supply voltages up to 1 000 V. The requirements and related tests of this document cover: classification, marking, mechanical construction, electrical construction and photobiological safety.

Each section of this Part 1 is read in conjunction with this Section 0 and with other relevant sections to which reference is made.

Each part of IEC 60598-2 details requirements for a particular type of luminaire or group of luminaires on supply voltages not exceeding 1 000 V. These parts are published separately for ease of revision and additional sections will be added as and when a need for them is recognized.

The presentation of photometric data for luminaires is under consideration by the International Commission on Illumination (CIE) and is not, therefore, included in this Part 1.

Requirements are included in this Part 1 for luminaires incorporating ignitors with nominal peak values of the voltage pulse not exceeding those of Table 11.2. The requirements apply to luminaires with ignitors built into ballasts and to luminaires with ignitors separate from ballasts. For luminaires with ignitors built into lamps, the requirements are under consideration.

Requirements for semi-luminaires are included in this Part 1.

In general, this Part 1 covers safety requirements for luminaires. The object of this Part 1 is to provide a set of requirements and tests which are considered to be generally applicable to most types of luminaires and which can be called up as required by the detail specifications of IEC 60598-2. This Part 1 is thus not regarded as a specification in itself for any type of luminaire, and its provisions apply only to particular types of luminaires to the extent determined by the appropriate part of IEC 60598-2.

The parts of IEC 60598-2, in making reference to any of the sections of Part 1, specify the extent to which that section is applicable and the order in which the tests are performed; they also include additional requirements as necessary.

The order in which the sections of Part 1 are numbered has no particular significance as the order in which their provisions apply is determined for each type of luminaire or group of luminaires by the appropriate part of IEC 60598-2. All parts of IEC 60598-2 are self-contained and therefore do not contain references to other parts of IEC 60598-2.

Where the requirements of any of the sections of Part 1 are referred to in the parts of IEC 60598-2 by the phrase "The requirements of section... of IEC 60598-1 apply", this phrase is interpreted as meaning that all the requirements of that section of Part 1 apply except those which are clearly inapplicable to the particular type of luminaire covered by that part of IEC 60598-2.

For explosion proof luminaires, as covered by IEC 60079, the requirements of IEC 60598 (selecting the appropriate parts 2) are applied in addition to the requirements of IEC 60079. In the event of any conflict between IEC 60598 and IEC 60079, the requirements of IEC 60079 take priority.

Improvements in safety to take into account the state of the art technology are incorporated in the standards with revisions and amendments on an ongoing basis. Regional standardization bodies can include statements in their derived standards to cover products which have complied with the previous document as shown by the manufacturer or standardization body. The statements may require that for such products, the previous standard may continue to apply to production until a defined date after which the new standard shall apply.

0.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60061 (all parts), *Lamp caps and holders together with gauges for the control of interchangeability and safety* (available at <http://std.iec.ch/iec60061>)

IEC 60061-2, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 2: Lampholders* (available at <http://std.iec.ch/iec60061>)

IEC 60061-3, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 3: Gauges* (available at <http://std.iec.ch/iec60061>)

IEC 60065:2014, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

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¹ Withdrawn.

² Withdrawn.

³ Withdrawn.

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