

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Luminaires –
Part 1: General requirements and tests**

**Luminaires –
Partie 1: Exigences générales et essais**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LUMINAIRES –

Part 1: General requirements and tests

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IEC 60598-1 has been prepared by subcommittee 34D: Luminaires, of IEC technical committee 34: Lighting. It is an International Standard.

This tenth edition cancels and replaces the ninth edition published in 2020. This edition constitutes a technical revision.

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

- a) new structure to comply with the ISO/IEC Directives, Part 2;
- b) addition of a new Annex V for comparison with the previous edition;
- c) revision of 7.32 for SPDs and for SPCs;
- d) the terms "live part" and "active part" were reviewed and aligned with the definitions of "live part" and "hazardous live part" given in IEC 60050-195;

- e) revision of 7.14.2 for conductor mechanical stress;
- f) revision of 14.5.2, Item 4 to include controlgear;
- g) revision of 9.2.1 (Earthing) with the deletion of the word "permanently";
- h) revision of Annex N: earth continuity test time;
- i) revision of 7.11.4; 7.14.1; Table 22 (14.4.3): Introduction of requirements for suspension by magnets;
- j) addition of a new Annex W for luminaires using batteries;
- k) clarification of Clause 6 for marking requirements for nature of supply;
- l) addition of a new Subclause 7.31.5: Additional requirements for luminaires using controllable controlgear providing SELV output(s);
- m) revision of 6.4.16: Information to be provided for luminaire having protective earth current > 10 mA;
- n) revision of 6.3.23; 6.4.18; 6.4.24; 7.30 and 10.2.1 for serviceable, non-user serviceable and non-serviceable components;
- o) revision of Annex D: Draught-proof enclosure;
- p) revision of 8.2.1 and 13.2.1: Inconsistencies in the inclusion of the limits of voltage ranges;
- q) revision of 9.2.10 for looping-in;
- r) Revision of Clause 2 and 7.8: update of the reference to IEC 61058-1-1, IEC 61058-1-2 and IEC 61058-2-1. Update of temperature limits in Table 21 (14.4.3) for luminaires incorporating switches according to IEC 60669-1 or IEC 60669-2-1;
- s) revision of 6.3.22 and 7.24 for photobiological safety;
- t) addition of a new Subclause 6.3.27 for marking of mains socket outlet moved from information requirements.

The major changes which can affect certification are given in Annex O.

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

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

Draft	Report on voting
34D/1739/FDIS	34D/1751/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

When using this document with already published parts of the IEC 60598-2 series, Annex V of this document is to be used to update the cross-referencing of the relevant part of the IEC 60598-2 series to the new structure of this document. SC 34D projects to update the structure of the IEC 60598-2 series in line with the new structure of this document are to follow.

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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

INTRODUCTION

In general, this document covers safety requirements for luminaires. The object of this document 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 the IEC 60598-2 series. This document 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 the IEC 60598-2 series.

Each part of the IEC 60598-2 series details the requirements for a particular type of luminaire or group of luminaires. These parts of the IEC 60598-2 series are published separately for ease of revision and additional documents will be added as and when a need for them is recognized.

The IEC 60598-2 series comprises the following parts:

IEC 60598-2-1:	Fixed general purpose luminaires
IEC 60598-2-2:	Recessed luminaires and recessed air-handling luminaires
IEC 60598-2-3:	Luminaires for road and street lighting
IEC 60598-2-4:	Portable general purpose luminaires
IEC 60598-2-5:	Floodlights
IEC 60598-2-6:	Luminaires with built-in transformer for filament lamps (withdrawn)
IEC 60598-2-7:	Portable luminaires for garden use (withdrawn)
IEC 60598-2-8:	Handlamps
IEC 60598-2-9:	Photo and film luminaires (non-professional) (withdrawn)
IEC 60598-2-10:	Portable luminaires for children
IEC 60598-2-11:	Aquarium luminaires
IEC 60598-2-12:	Mains socket-outlet mounted nightlights
IEC 60598-2-13:	Ground recessed luminaires
IEC 60598-2-14:	Luminaires for cold cathode tubular discharge lamps (neon tubes) and similar equipment
IEC 60598-2-15:	Not used at present
IEC 60598-2-16:	Not used at present
IEC 60598-2-17:	Luminaires for stage lighting, television and film studios (outdoor and indoor)
IEC 60598-2-18:	Luminaires for swimming pools and similar applications
IEC 60598-2-19:	Air-handling luminaires (safety requirements) (withdrawn)
IEC 60598-2-20:	Lighting chains
IEC 60598-2-21:	Rope lights
IEC 60598-2-22:	Luminaires for emergency lighting
IEC 60598-2-23:	Extra-low-voltage lighting systems for filament lamps
IEC 60598-2-24:	Luminaires with limited surface temperatures
IEC 60598-2-25:	Luminaires for use in clinical areas of hospitals and health care buildings

LUMINAIRES –

Part 1: General requirements and tests

1 Scope

This part of IEC 60598 specifies general safety requirements for luminaires, incorporating electric light sources for operation from supply voltages up to 1 000 V.

Requirements for semi-luminaires are included in this document.

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

This document does not cover performance. Performance of luminaires is covered by the IEC 62722 series.

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 60061-2, *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 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14:2023, *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 60112:2020, *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 60335-1:2020, *Household and similar electrical appliances – Safety – Part 1: General requirements*

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

IEC 60669-1, *Switches for household and similar fixed-electrical installations – Part 1: General requirements*

IEC 60669-2-1, *Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic control devices*

IEC 60684 (all parts), *Flexible insulating sleeving*

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

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

IEC 60990, *Methods of measurement of touch current and protective conductor current*

IEC 60998-2-1, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units*

IEC 60998-2-2, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units*

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

IEC 61051-2:2021, *Varistors for use in electronic equipment – Part 2: Sectional specification for surge suppression varistors*

IEC 61058-1:2016, *Switches for appliances – Part 1: General requirements*

IEC 61058-1-1, *Switches for appliances – Part 1-1: Requirements for mechanical switches*

IEC 61058-1-2, *Switches for appliances – Part 1-2: Requirements for electronic switches*

IEC 61058-2-1, *Switches for appliances – Part 2-1: Particular requirements for cord switches*

IEC 61167, *Metal halide lamps – Performance specification*

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 61535:2023, *Installation couplers intended for permanent connection in fixed installations*

IEC 61558 (all parts), *Safety of transformers, reactors, power supply units and combinations thereof*

IEC 61558-1:2017, *Safety of transformers, reactors, power supply units and combinations thereof – Part 1: General requirements and tests*

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

IEC 61643-331:2020, *Components for low-voltage surge protection – Part 331: Performance requirements and test methods for metal oxide varistors (MOV)*

IEC 61984:2008, *Connectors – Safety requirements and tests*

IEC 62133-2, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems*

IEC 62368-1:2018, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

IEC 62391-1, *Fixed electric double-layer capacitors for use in electric and electronic equipment – Part 1: Generic specification*

IEC 62391-2, *Fixed electric double-layer capacitors for use in electronic equipment – Part 2: Sectional specification – Electric double layer capacitors for power application*

IEC 62471-7:2023, *Photobiological safety of lamps and lamp systems – Part 7: Light sources and luminaires primarily emitting visible radiation*

IEC 62493:2015, *Assessment of lighting equipment related to human exposure to electromagnetic fields*
IEC 62493:2015/AMD1:2022

IEC 62680 (all parts), *Universal serial bus interfaces for data and power*

IEC TR 62778:2014¹, *Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires*

ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

ISO 7000, *Graphical symbols for use on equipment – Registered symbols*, available at <https://www.graphical-symbols.info/equipment>

ISO 8124-1:2022, *Safety of toys – Part 1: Safety aspects related to mechanical and physical properties*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

NOTE Other definitions related to light sources can be found in the relevant light source standards.

¹ Withdrawn.

3.1

luminaire

apparatus which distributes, filters or transforms the light transmitted from at least one source of optical radiation and which includes, except the sources themselves, all the parts necessary for fixing and protecting the sources, and where necessary, circuit auxiliaries together with the means for connecting them to the power supply

[SOURCE: IEC 60050-845:2020, 845-30-001]

3.2

main part

<of luminaire> part that is fixed to the mounting surface or is directly suspended from it or standing on it

Note 1 to entry: The main part can, or cannot, carry the lamps, lampholders and controlgear.

Note 2 to entry: In luminaires for tungsten filament lamps, the part carrying the lampholder is usually the main part.

3.3

ordinary luminaire

luminaire providing protection against accidental contact with hazardous live parts but without any other special protection against dust, solid objects or moisture

[SOURCE: IEC 60050-845:2020, 845-30-006, modified – "hazardous" has been added.]

3.4

general purpose luminaire

luminaire which is not designed for a special purpose

Note 1 to entry: Examples of general purpose luminaires include pendants, some spotlights and certain fixed luminaires for surface or recessed mounting. Examples of special purpose luminaires are those for rough usage, photo and film applications and swimming pools.

3.5

adjustable luminaire

luminaire whose main part can be turned or moved by means of joints, raising and lowering devices, telescopic tubes or similar devices

Note 1 to entry: An adjustable luminaire can be fixed or portable.

[SOURCE: IEC 60050-845:2020, 845-30-010]

3.6

basic luminaire

smallest number of assembled parts that can satisfy the requirements of any of the parts of the IEC 60598-2 series

3.7

combination luminaire

luminaire consisting of a basic luminaire in combination with one or more parts which may be replaced by other parts, or used in a different combination with other parts and changed either by hand or with the use of tools

3.8

fixed luminaire

luminaire that cannot easily be moved from one place to another, either because the fixing is such that the luminaire can only be removed with the aid of a tool, or because it is intended for use out of arm's reach

Note 1 to entry: In general, fixed luminaires are designed for permanent connection to the power supply, but connection can also be made by means of a plug or similar device.

[SOURCE: IEC 60050-845:2020, 845-30-013]

3.9

portable luminaire

luminaire that can easily be moved from one place to another even while connected to the power supply

Note 1 to entry: Luminaires for wall mounting provided with a supply cord for connection to a plug and luminaires which can be fixed to their support by means of a wing screw, a clip or a hook so that they can easily be removed from their support by hand, are considered to be portable luminaires.

[SOURCE: IEC 60050-845:2020, 845-30-011]

3.10

recessed luminaire

luminaire intended by the manufacturer to be fully or partly recessed into a mounting surface

Note 1 to entry: The term applies both to luminaires for operation in enclosed cavities and to luminaires for mounting through a surface such as a suspended ceiling.

[SOURCE: IEC 60050-845:2020, 845-30-018]

3.11

rated voltage

supply voltage or supply voltages assigned to the luminaire by the manufacturer

3.11.1

rated constant input voltage

input voltage or input voltages assigned by the manufacturer for luminaires not equipped with controlgear

Note 1 to entry: The rated constant input voltage of the luminaire corresponds to the rated output voltage of the constant voltage controlgear.

3.12

supply current

current at the supply terminals when the luminaire has stabilized in normal use at the rated voltage and frequency

Note 1 to entry: The supply current is typically expressed in ampere (A).

[SOURCE: IEC 60050-845:2020, 845-27-120, modified – "when the luminaire has stabilized in normal use at the rated voltage and frequency" has been added.]

3.12.1

rated constant input current

input current or input currents assigned by the manufacturer for luminaires not equipped with controlgear

Note 1 to entry: The rated constant input current of the luminaire corresponds to the rated output current for constant current controlgear.

3.13

rated power

either the number and rated power of the lamps for which the luminaire is designed or the input power of the luminaire in case of other light sources

Note 1 to entry: Other light sources can be LED modules.

3.14

supply cord

external flexible cable or cord that is fixed to the luminaire for supply purposes

Note 1 to entry: Luminaires may be provided with the supply cord or designed for attachment of a supply cord e.g. type X or Y attachment.

Note 2 to entry: A supply cord can be termed a non-detachable flexible cable or cord.

3.15

live part

<electrical> conductive part intended to be energized under normal operating conditions, including the neutral conductor and mid-point conductor, but excluding the PEN conductor, PEM conductor and PEL conductor

Note 1 to entry: This concept does not necessarily imply a risk of electric shock.

Note 2 to entry: This definition is essentially equivalent to the term "active part" used in the ninth edition of this standard.

Note 3 to entry: For the definitions of PEN, PEM and PEL see IEC 60050-195.

[SOURCE: IEC 60050-195:2021, 195-02-19, modified – The Notes to entry have been added.]

3.16

hazardous live part

live part that, under certain conditions, can give a harmful electric shock

Note 1 to entry: The test to determine whether or not a conductive part is a live part which can cause an electric shock is given in Annex A.

Note 2 to entry: The neutral conductor is, however, regarded as a hazardous live part.

Note 3 to entry: This definition is essentially equivalent to the definition of "live part" in the ninth edition of this document.

[SOURCE: IEC 60050-195:2021, 195-06-05, modified – Note 1 to entry has been replaced by three new Notes to entry.]

3.17

basic insulation

insulation that provides basic protection

Note 1 to entry: This concept does not apply to insulation used exclusively for functional purposes.

[SOURCE: IEC 60050-195:2021, 195-06-06]

3.18

basic protection

protection against electric shock under normal conditions

[SOURCE: IEC 60050-195:2021, 195-06-01]

3.19**supplementary insulation**

independent insulation applied in addition to basic insulation, that provides fault protection

[SOURCE: IEC 60050-195:2021, 195-06-07]

3.20**fault protection**

protection against electric shock under single fault conditions

[SOURCE: IEC 60050-195:2021, 195-06-02]

3.21**double insulation**

insulation comprising both basic insulation and supplementary insulation

[SOURCE: IEC 60050-195:2021, 195-06-08]

3.22**reinforced insulation**

insulation that provides a degree of protection against electric shock equivalent to double insulation

Note 1 to entry: Reinforced insulation can comprise several layers that cannot be tested singly as basic insulation or supplementary insulation.

[SOURCE: IEC 60050-195:2021, 195-06-09]

3.23**protective impedance device**

component or assembly of components whose impedance and construction limit steady-state touch current and electric charge to non-hazardous levels

[SOURCE: IEC 60050-195:2021, 195-06-34]

3.24**class I luminaire**

luminaire in which protection against electric shock does not rely on basic insulation only, but which includes an additional safety precaution in such a way that means are provided for the connection of accessible conductive parts to the protective (earthing) conductor in the fixed wiring of the installation in such a way that accessible conductive parts cannot become a hazardous live part in the event of a failure of the basic insulation

Note 1 to entry: For a luminaire intended for use with a flexible cord or cable, this provision includes a protective conductor as part of the flexible cord or cable.

Note 2 to entry: Class I luminaires may have parts with double insulation or reinforced insulation.

Note 3 to entry: Class I luminaires may have parts in which protection against electric shock relies on operation at safety extra-low voltage (SELV) or protective extra-low voltage (PELV).

3.25**class II luminaire**

luminaire in which protection against electric shock does not rely on basic insulation only, but in which additional safety precautions such as double insulation or reinforced insulation are provided, there being no provision for protective earthing or reliance upon installation conditions

Note 1 to entry: A class II luminaire can be one of the following types:

- a) A luminaire having a durable and substantially continuous enclosure of insulating material which envelops all metal parts with the exception of small parts such as nameplates, screws and rivets which are isolated from hazardous live parts by insulation at least equivalent to reinforced insulation. Such a luminaire is called an insulation encased class II luminaire.
- b) A luminaire having a substantially continuous enclosure of metal, insulated from hazardous live parts by insulation at least equivalent to double or reinforced insulation. Such a luminaire is called a metal-encased class II luminaire.
- c) A luminaire which is a combination of types a) and b) above.

Note 2 to entry: The enclosure of an insulation-encased class II luminaire can form a part or the whole of the supplementary insulation or the reinforced insulation.

Note 3 to entry: If functional earthing is provided to assist starting, or for EMC reasons, but is not connected to an accessible metal part, the luminaire may still be deemed to be of class II. Accessible metal parts in compliance with the appropriate IEC lamp specification and other metal parts not normally earthed and not normally accessible during normal use are not regarded to be conductive parts which can cause an electric shock unless the tests of Annex A show them to be hazardous live parts.

Note 4 to entry: If a luminaire with double insulation or reinforced insulation throughout, or both, has a protective earthing terminal or a protective earthing contact, it is a class I construction. However, a fixed class II luminaire can have an internal terminal or contact for maintaining the electrical continuity (e.g. for looping-in or through wiring) of a protective earthing conductor.

Note 5 to entry: Class II luminaires can have parts in which protection against electric shock relies on operation at safety extra-low voltage (SELV) or protective extra-low voltage (PELV).

3.26**class III luminaire**

luminaire in which protection against electric shock relies on supply of safety extra-low voltage (SELV) or protective extra-low voltage (PELV) and in which voltages higher than those allowed for SELV or PELV are not generated

Note 1 to entry: An energy source ES1 power sourcing equipment (PSE) fulfilling the requirements of IEC 62368-3:2017 can be regarded as SELV.

3.27**rated maximum ambient temperature**

t_a

temperature assigned to a luminaire by the manufacturer to indicate the highest sustained temperature in which the luminaire may be operated under normal conditions

Note 1 to entry: This does not preclude temporary operation at a temperature not exceeding $(t_a + 10) ^\circ\text{C}$.

3.28**rated maximum operating temperature**

t_c

<of a controlgear or capacitor> highest permissible temperature which can occur on the outer surface (at the indicated place if marked) of the component under normal operating conditions at the rated voltage or maximum of the rated voltage range

3.29**rated maximum operating temperature** t_w

<of a controlgear winding> winding temperature assigned by the manufacturer as the highest temperature at which electromagnetic controlgear may be expected to have a service life of at least 10 years continuous operation

[SOURCE: IEC 61347-1:2015, 3.17, modified – "a 50 Hz/60 Hz lamp controlgear" has been replaced by "electromagnetic controlgear".]

3.30**ballast**

unit inserted between the power supply and at least one discharge lamp that, by means of inductance, capacitance or resistance, single or in combination, serves mainly to limit the current of the discharge lamp(s) to the required value

Note 1 to entry: A ballast can also include means for transforming from the power supply voltage and arrangements which help to provide starting voltage and preheating current, to prevent cold starting, to reduce stroboscopic effect, to correct the power factor and to suppress radio interference.

[SOURCE: IEC 60050-845:2020, 845-28-044]

3.31**electronic step-down convertor**

unit inserted between the supply and one or more tungsten-halogen or other filament lamps which serves to supply the lamp(s) with its (their) rated voltage, generally at high frequency

Note 1 to entry: The unit may consist of one or more separate components and may include means for dimming, correcting the power factor and suppressing radio interference.

[SOURCE: IEC 61347-2-2:2011, 3.1, modified – The second part of the definition has been included as a Note to entry.]

3.32**independent controlgear**

controlgear consisting of one or more separate elements so designed that it can be mounted separately outside a luminaire, with protection according to the marking of the controlgear and without any additional enclosure

Note 1 to entry: This can consist of a built-in controlgear housed in a suitable enclosure which provides all the necessary protection according to its markings.

[SOURCE: IEC 60050-845:2020, 845-28-055, modified – "lamp controlgear" has been replaced by "controlgear".]

3.33**component**

constituent part of a luminaire which cannot be physically divided into smaller parts without losing its function

EXAMPLE LED modules, starters, batteries, controlgear auxiliaries.

Note 1 to entry: Lamps are not considered to be components.

[SOURCE: IEC 60050-151:2001, 151-11-21, modified – "device" has been replaced by "luminaire", "particular" has been deleted, the examples and the Note to entry have been added.]

3.34

built-in component

component, designed to be built into a luminaire, a box, an enclosure or the like and not intended to be mounted outside a luminaire

[SOURCE: IEC 60050-845:2020, 845-27-062, modified – "LED module" has been replaced by "component", and "form a replaceable part" has been deleted.]

3.35

serviceable component

component of the luminaire that can be replaced by hand or by the use of common available tools, for the repair or upgrading of the luminaire, or component that is accessible in the luminaire for the adjustment of its operation

EXAMPLE Batteries, controlgear with a settable output characteristic, presence detection devices, fuses, replaceable starters.

Note 1 to entry: Light sources can also be considered to be serviceable components but under the scope of this document the replaceability requirements for light sources are currently covered separately. Lamps are normally always regarded as serviceable light sources.

3.36

non-serviceable component

component which is a non-replaceable part of the luminaire either because it cannot be replaced or accessed for adjustment without breaking or destroying the luminaire or because it is enclosed under a cover fixed by a fixing means designed to be used only once and which cannot be opened

3.37

non-user serviceable component

component which can only be replaced or accessed for adjustment by the manufacturer, their service agent, or a similarly skilled person

3.38

integral lampholder

part of a luminaire which supports the electric lamp and provides electrical contact with it and which is designed as part of the luminaire

[SOURCE: IEC 60050-845:2020, 845-28-026]

3.39

translucent cover

light-transmitting part of the luminaire which may also protect the lamps and other component parts including diffusers, lens panels and similar light-control elements

3.40

fixed wiring

cable which is part of the fixed installation to which the luminaire is connected

Note 1 to entry: Fixed wiring can be brought into the luminaire and connected to terminals, including terminals of lampholders, switches and the like.

3.41

appliance coupler

appliance connector

means enabling a flexible cable to be connected at will to the luminaire consisting of two parts: a connector provided with contact tubes which is the part integral with or designed to be attached to the flexible cable connected to the supply and an appliance inlet, provided with contact pins, which is the part incorporated in or fixed to the luminaire

3.42**external wiring**

wiring generally outside the luminaire but delivered with it

Note 1 to entry: External wiring may be used for connecting the luminaire to the supply, to other luminaires, or to any external controlgear.

Note 2 to entry: External wiring is not necessarily outside the luminaire for its full length.

3.43**internal wiring**

wiring generally inside the luminaire and delivered with it, which forms the connection between terminations for external wiring or supply cords and terminations of lampholders, switches and similar components

Note 1 to entry: Internal wiring is not necessarily inside the luminaire for its full length.

3.44**normally flammable material**

material having an ignition temperature of at least 200 °C and which will not deform or weaken at this temperature

EXAMPLE Wood and materials based on wood of more than 2 mm thickness.

Note 1 to entry: The ignition temperature and the resistance of normally flammable materials to deformation or weakening are based on widely accepted values determined during a test period of 15 min.

3.45**readily flammable surface**

surface material which cannot be classified as either normally flammable or non-combustible

EXAMPLE Wood fibre and materials based on wood of up to 2 mm thickness.

3.46**non-combustible surface**

surface material incapable of supporting combustion

Note 1 to entry: For the purposes of this document, materials such as metal, plaster and concrete are regarded as non-combustible materials.

3.47**flammable material**

material which does not comply with the glow-wire test requirements of 15.3.3

3.48**ELV****extra-low voltage**

voltage which does not exceed 50 V AC RMS or 120 V ripple free DC between conductors, or between any conductor and earth

Note 1 to entry: "Ripple free" is conventionally defined for sinusoidal ripple voltage as a ripple content of not more than 10 % RMS: the maximum peak value does not exceed 140 V for a nominal 120 V ripple-free DC system, respectively 70 V for a nominal 60 V ripple-free DC system, and 35 V for a nominal 30 V ripple-free system.

Note 2 to entry: For interrupted direct current, for frequencies between 10 Hz and 200 Hz, this document applies a maximum 50 V peak limit for ELV, this limit includes a possible ripple. For frequencies outside this frequency range, the limits of direct current apply. The requirements for the frequency range between 10 Hz and 200 Hz comes from a 1936 research paper, entitled "Electric Shock Effects of Frequency", authored by W.B. Kouwenhoven, D.R. Hooker and E.L. Lotz.

3.48.1**FELV circuit****functional extra-low-voltage circuit**

electric circuit with ELV voltage for functional reason and not fulfilling the requirements for a SELV circuit or PELV circuit

Note 1 to entry: In this document the term "FELV" is used when a FELV circuit is meant.

3.48.2**SELV circuit****safety extra-low-voltage circuit**

electric circuit in which the voltage cannot exceed the value of extra-low voltage

- under normal conditions and
- under single fault conditions, including earth faults in other electric circuits

Note 1 to entry: In this document the term "SELV" is used when a SELV circuit is meant.

Note 2 to entry: Maximum voltage lower than 50 V AC RMS or 120 V ripple free DC may be specified in particular requirements, especially when direct contact with current-carrying parts is allowed.

[SOURCE: IEC 60050-195:2021, 195-06-28, modified – "safety extra-low-voltage circuit" has been added as an admitted term, "system" has been replaced by "circuit" and Note 1 to entry has been replaced by two new Notes to entry.]

3.48.3**PELV circuit****protective extra-low-voltage circuit**

electric circuit in which the voltage cannot exceed the value of extra-low voltage

- under normal conditions and
- under single fault conditions, except earth faults in other electric circuits

Note 1 to entry: In this document the term "PELV" is used when a PELV circuit is meant.

[SOURCE: IEC 60050-195:2021, 195-06-29, modified – "protective extra-low-voltage circuit" has been added as an admitted term, "system" has been replaced by "circuit" and Note 1 to entry has been replaced by a new Note 1 to entry.]

3.49**working voltage**

highest RMS voltage which can occur across any insulation at rated supply conditions, transients being neglected, under normal and under abnormal conditions, including no-load

3.49.1**maximum working peak output voltage**

$\hat{U}_{out}$

maximum repetitive occurring peak working voltage between the output terminals or between the output terminals and earth, during normal or abnormal operating condition and with transients neglected

[SOURCE: IEC 61347-1:2015, 3.45]

3.49.2**ignition voltage**

peak voltage applied to ignite a discharge lamp

[SOURCE: IEC 61347-1:2015, 3.46]

3.49.3**ignition pulse voltage**

peak ignition voltage with a total duration of $\leq 750 \mu\text{s}$ (summation of all pulses durations) within 10 ms, with the duration time (width) of each pulse being measured at the level of 50 % of the maximum absolute peak value

Note 1 to entry: Ignition pulse waveforms, which are considered as ignition pulse voltage, should not contain any dominant frequency above 30 kHz or should be usually highly damped (after 20 μs the peak voltage level should be less than one half of the maximum peak voltage). For the assessment of the dominant frequency IEC 60664-4:2005, Annex E should be consulted.

[SOURCE: IEC 61347-1:2015, 3.46.1]

3.49.4**equivalent transformed peak voltage** U_p

transformed output peak voltage, which is converted for the worst case peak voltage with its related frequency into an ignition pulse voltage

Note 1 to entry: The value of the declared equivalent transformed output peak voltage is the essential parameter for selecting the associated components.

Note 2 to entry: See 3.49.3.

[SOURCE: IEC 61347-1:2015, 3.47, modified – Notes to entry 3 and 4 have been deleted.]

3.50**type test**

test or series of tests for the purpose of checking compliance of the design of a given product with the requirements of the relevant standard

3.51**type test sample**

sample consisting of one or more similar units being representative of the production and submitted by the manufacturer or the responsible vendor for the purpose of the type test

3.52**by hand**

not requiring the use of a tool

3.53**terminal**

that part of a luminaire or component which is necessary to make an electrical connection to a conductor

Note 1 to entry: See Clause 16 and Clause 17.

3.54**looping-in**

system of mains supply connection to two or more luminaires where each supply conductor is taken into and out of the same terminal

Note 1 to entry: A supply conductor can be cut to facilitate connections to a terminal (see Figure 1).

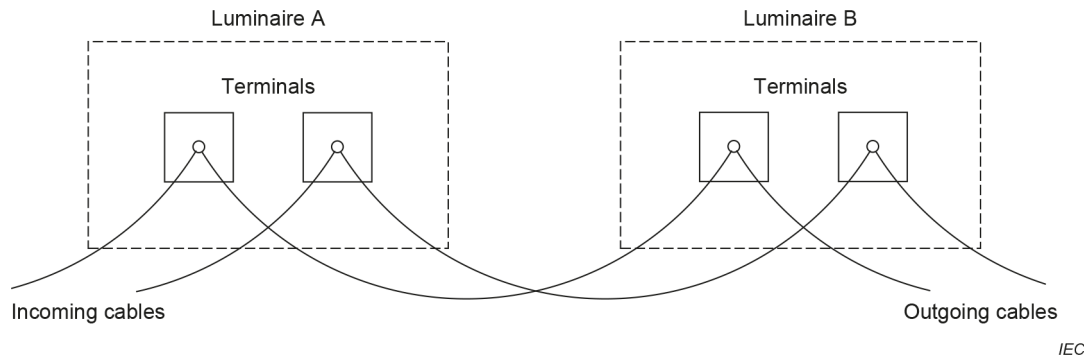


Figure 1 – Example of "looping-in" (feed through)

3.55

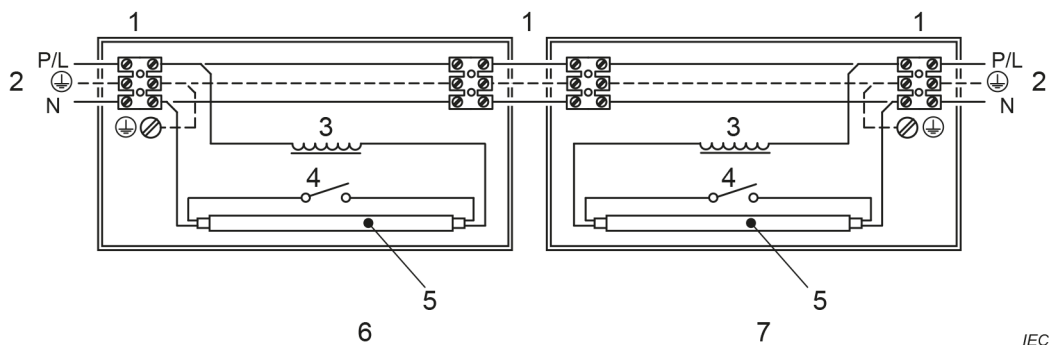
through wiring

wiring which passes through the luminaire intended for interconnection of a row of luminaires

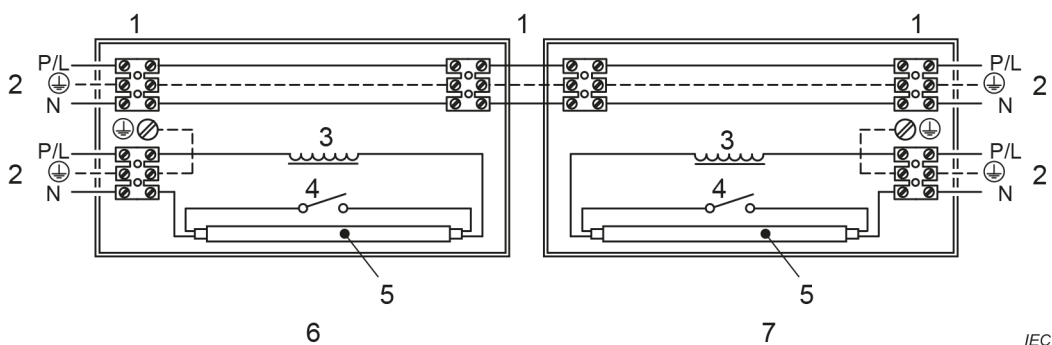
Note 1 to entry: Some countries do not permit joints in through wiring.

Note 2 to entry: The luminaire can, or cannot, be electrically connected to the through wiring (see Figure 2).

Note 3 to entry: Through wiring can provide continuity of different types of wiring systems e.g. three phase system.



a) "through wiring" with internal wiring electrically connected to the through wiring



b) "through wiring" with internal wiring electrically separated from the through wiring

Key

1	terminals	5	lamp
2	supply	6	luminaire A
3	ballast	7	luminaire B
4	starter		

Figure 2 – Examples of "through wiring"

3.56**starting device**

device designed to provide the appropriate electrical conditions to start a discharge lamp by itself or in combination with other components in the circuit

[SOURCE: IEC 60050-845:2020, 845-28-041]

3.57**starter**

device, usually for fluorescent lamps, which is used for the purpose of starting the discharge lamp by providing the necessary preheating of the cathode and, in combination with the series inductance of the ballast, causes a voltage surge applied to the discharge lamp

Note 1 to entry: The starter element that releases the starting voltage pulse can be either triggered or non-triggered.

[SOURCE: IEC 60050-845:2020, 845-28-042]

3.58**ignitor**

device intended, either by itself or in combination with other components, to generate voltage pulses to start a discharge lamp without providing for the preheating of the electrodes

Note 1 to entry: The element that releases the starting voltage pulse can be either triggered or non-triggered.

[SOURCE: IEC 60050-845:2020, 845-28-043]

3.59**terminal block**

assembly of one or more terminals in or on a housing or body of insulating material to facilitate the interconnection between conductors

3.60**rough service luminaire**

luminaire designed to withstand severe mechanical handling

Note 1 to entry: The luminaire can:

- be permanently fixed, or
- be temporarily fixed on a construction or stand, or
- incorporate an integral stand or handle.

Note 2 to entry: Rough service luminaires are for use where normally rough circumstances occur, or where temporary lighting is required, for example on building sites, in engineering workshops and for similar applications.

[SOURCE: IEC 60050-845:2020, 845-30-009]

3.61**electro-mechanical contact system**

connection system within a luminaire by which the main part carrying the lampholder is electrically and mechanically connected to the base plate or suspension device

Note 1 to entry: Figure 3 describes an electro-mechanical contact system. As such the requirements of 7.11.6 and 9.2.1 apply. Because, in the situation described, the base and gear tray are unique and non-interchangeable, the base plate does not require marking with the rated current of the electrical connection, as specified in 6.2.

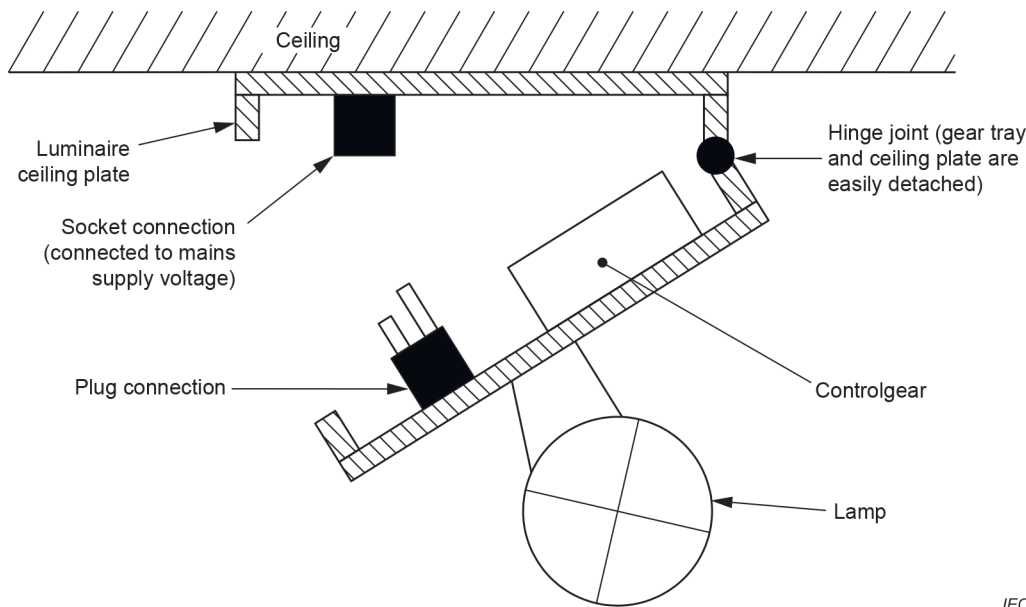


Figure 3 – Example of electro-mechanical contact system with plug or socket connection

Note 2 to entry: The system can incorporate an adjusting device.

Note 3 to entry: The system can be dedicated to a specific luminaire design or can provide for connection of a variety of luminaire types.

3.62 mounting surface

part of any building, furniture or other structure which a luminaire is attached to, suspended from, stood on or placed upon in normal use and which will or is intended to support the luminaire

Note 1 to entry: Lighting tracks, parts of luminaires, controlgear, mounting plates or other housings are not considered to be a mounting surface.

3.63 integral component

component which forms a non-replaceable part of a luminaire and which cannot be tested separately from the luminaire

3.64 integrated lamp self-ballasted lamp

electric lamp that cannot be dismantled without being permanently damaged, incorporating controlgear, and all additional elements necessary for starting and stable operation of the light source, designed for direct connection to the supply voltage

Note 1 to entry: The light source component of an integrated lamp is not replaceable.

Note 2 to entry: The ballast component is part of the integrated lamp; it is not part of the luminaire.

[SOURCE: IEC 60050-845:2020, 845-27-009, modified – The second preferred term "self-ballasted lamp" and the Notes to entry have been added.]

3.65**semi-luminaire**

unit similar to an integrated lamp, but designed to utilize a replaceable light source and/or a replaceable starting device

Note 1 to entry: The ballast component is not replaceable and is not disposed of each time a light source is replaced.

Note 2 to entry: A lampholder is required for a supply connection.

[SOURCE: IEC 60050-845:2020, 845-30-002]

3.66**plug-in independent controlgear**

independent controlgear provided with an integral plug as the means of connection to the electrical supply

3.67**mains socket-outlet mounted luminaire**

luminaire provided with an integral plug as the means of both mounting and connection to the electrical supply

3.68**clip-mounted luminaire**

integral assembly of a luminaire and resilient spring clip, securing the luminaire in position on its mounting surface by a single hand action

3.69**lamp connector**

device consisting of electrical contacts, with insulation and mounted on flexible conductors, which provides for connection of the electric lamp to the power supply but does not support the electric lamp

[SOURCE: IEC 60050-845:2020, 845-28-035, modified – The first preferred term "connector" has been deleted.]

3.70**mains socket-outlet**

accessory having socket-contacts designed to engage with the pins or blades of a mains plug and having terminals for the connection of cables or cords

3.71**controlgear**

unit inserted between the power supply and at least one light source, which serves to supply the light source(s) with its (their) rated voltage or rated current, and which can consist of one or more separate components

Note 1 to entry: A controlgear can include means for igniting, dimming, correcting the power factor and suppressing radio interference, and further control functions.

Note 2 to entry: A controlgear can consist of a power supply and a control unit.

Note 3 to entry: A controlgear can be partly or totally integrated in the light source.

Note 4 to entry: The terms "control gear" and "controlgear" are interchangeable. In IEC standards, the term "controlgear" is commonly used.

[SOURCE: IEC 60050-845:2020, 845-28-048, modified – The first preferred term "control gear" has been deleted.]

3.72

dummy lamp

device incorporating a cap which is in compliance with the requirements of the IEC 60061 series where applicable

3.73

self-shielded lamp

tungsten-halogen lamp or metal halide lamp for which the luminaire needs no protective shield for protection against UV emission or lamp shattering

[SOURCE: IEC 60050-845:2020, 845-27-094]

3.74

external flexible cable

external flexible cord

flexible cable or cord for external connection to the input or output circuit, fixed to or assembled with the luminaire according to a type X, Y or Z method of attachment

3.74.1

type X attachment

method of attachment of the cable or cord such that it can be easily replaced

Note 1 to entry: The flexible cable or cord may be specially prepared and only available from the manufacturer or their service agent.

Note 2 to entry: A specially prepared cable or cord may also include a part of the luminaire.

3.74.2

type Y attachment

method of attachment of the cable or cord such that any replacement can only be made by the manufacturer, their service agent or a similarly skilled person

Note 1 to entry: Type Y attachment may be used either with an ordinary or a special flexible cable or cord.

3.74.3

type Z attachment

method of attachment of the cable or cord such that it cannot be replaced without breaking or destroying the luminaire

3.75

earthing

3.75.1

protective earthing

earthing for purposes of electrical safety

[SOURCE: IEC 60050-195:2021, 195-01-11, modified – The second preferred term "protective grounding, US" has been deleted.]

3.75.2

functional earthing

earthing for purposes other than electrical safety

Note 1 to entry: Functional earthing can be used to assist the starting of a lamp or to avoid radio interference.

[SOURCE: IEC 60050-195:2021, 195-01-13, modified – The second preferred term "functional grounding, US" has been deleted and Note 1 to entry has been added.]

3.76**interconnecting cable**

wiring or wiring assembly between two main parts of a luminaire as supplied by the luminaire manufacturer and which can be regarded as being part of the luminaire

Note 1 to entry: A wiring assembly can contain a combination of different wiring, e.g. to feed through the supply voltage, to provide earthing, to supply starting and working voltages and wiring providing functional connection. Examples of applications are: between a luminaire and a controlgear box, a mounting box or a connector fitting to a track system.

3.77**ferrule**

mechanical fixture, generally a rigid tube, used to confine the stripped end of a cable

3.78**overvoltage category****impulse withstand category**

numeral defining a transient overvoltage condition

Note 1 to entry: Overvoltage categories I, II, III and IV are used.

Note 2 to entry: The following explanation is taken from IEC 60364-4-443 (withdrawn).

a) Purpose of classification of impulse withstand categories

Impulse withstand categories are to distinguish different degrees of availability of equipment with regard to required expectations on continuity of service and on an acceptable risk of failure.

By selection of impulse withstand levels of equipment insulation, coordination can be achieved in the whole installation reducing the risk of failure to an acceptable level providing a basis for overvoltage control.

A higher characteristic numeral of an impulse withstand category indicates a higher specific impulse withstand of the equipment and offers a wider choice of methods for overvoltage control.

The concept of impulse withstand categories is used for equipment energized directly from the mains.

b) Description of impulse withstand categories

Equipment of impulse withstand category I is equipment which is intended to be connected to the fixed electrical installations of buildings. Protective means are taken outside the equipment – either in the fixed installation or between the fixed installation and the equipment – to limit transient overvoltages to the specific level.

Equipment of impulse withstand category II is equipment to be connected to the fixed electrical installations of buildings.

Equipment of impulse withstand category III is equipment which is part of the fixed electrical installations and other equipment where a higher degree of availability is expected.

Equipment of impulse withstand category IV is for use at or in the proximity of the origin of the electrical installations of buildings upstream of the main distribution board.

3.79**circuits and circuit characteristics****3.79.1****primary circuit**

circuit that is directly connected to the mains supply

Note 1 to entry: It includes, for example, the means for connection to the mains supply, the primary windings of transformers, motors and other loading devices.

[SOURCE: IEC 60950-1:2005, 1.2.8.4 (withdrawn), modified – "AC mains supply" has been replaced by "mains supply", the second part of the definition has been included as Note 1 to entry and the existing note has been deleted.]

3.79.2

secondary circuit

circuit that has no direct connection to a primary circuit and derives its power from a transformer, converter or equivalent device, or from a battery

Note 1 to entry: In autotransformers, although having direct connection to a primary circuit, the tapped part of the transformer is also deemed to be a secondary circuit in the above sense.

Note 2 to entry: Mains transients in such a circuit are attenuated by the corresponding primary windings. Inductive ballasts also reduce the mains transient voltage height. Therefore, components located after a primary circuit or after an inductive ballast can be suited for an overvoltage category of one step lower, see Annex Q.

[SOURCE: IEC 60950-1:2005, 1.2.8.5 (withdrawn), modified – "equivalent isolation device" has been replaced by "equivalent device" and the note has been replaced by two new Notes to entry.]

3.80

touch current

electric current passing through a human body or through livestock when it touches one or more accessible parts of an installation or of equipment

Note 1 to entry: In this document, the human body is represented by the networks in Figure G.2 or Figure G.3.

[SOURCE: IEC 60050-195:2021, 195-05-21, modified – The Note 1 to entry has been added.]

3.81

protective conductor current

electric current appearing in a protective conductor, such as leakage current or electric current resulting from an insulation fault

Note 1 to entry: This current may have an influence on the operation of RCDs (residual current protection devices) connected in the same circuit.

[SOURCE: IEC 60050-195:2021, 195-05-22, modified – The Note 1 to entry has been added.]

3.82

electric burn

burning of the skin or an organ caused by an electric current along its surface or through it

[SOURCE: IEC 60050-195:2021, 195-03-01]

3.83

means of adjustment

part of a luminaire, which may be the lamp compartment, obviously intended to be manipulated by the user during use of the luminaire, for example to redirect the light beam

3.84

arm's reach

zone of accessibility to touch extending from any point on a surface where persons usually stand or move about to the limits that a person can reach with the hand, in any direction, without assistance

Note 1 to entry: IEC 60364-4-41 incorporates a drawing representing the zone of accessibility. In general terms, the height is 2,5 m from the floor, and the width is 1,25 m in all horizontal directions from the location a person may be.

[SOURCE: IEC 60050-195:2021, 195.06.12, modified – The Note 1 to entry has been replaced by a new Note 1 to entry.]

3.85**terminal block with integrated screwless protective earthing contact**

terminal with earthing connection performed by means of an integrated contact or by means of an auxiliary contact without additional assembly actions (e.g. screwing) when fitted

3.86**tool**

screwdriver, coin or other object that may be used to operate a screw or similar fixing means

3.87**specially prepared cord**

flexible cable or cord the replacement of which with another non-special cable or cord would create a hazard or diminish safety

3.88**settable luminaire**

fixed luminaire, the main part of which can be turned or moved by means of joints, raising and lowering devices, telescopic tubes or similar devices, but which has a locking device (or devices) operated by a tool and is not intended to be adjusted during use

[SOURCE: IEC 60050-845:2020, 845-30-014]

3.89**light source**

surface or object emitting light

Note 1 to entry: A light source can be self-emitting (primary light source) or non-self-emitting (secondary light source).

Note 2 to entry: An electric light source can be an electric lamp, or LED module designed to be connected by terminals, connectors or similar devices.

[SOURCE: IEC 60050-845:2020, 845-27-001, modified – The Note 2 to entry has been replaced by a new Note 2 to entry.]

3.89.1**replaceable light source**

light source designed to be replaced by an ordinary person or a skilled person

Note 1 to entry: When incorporated into a luminaire, a replaceable light source can be classified as replaceable, non-user replaceable or non-replaceable depending on the luminaire design.

Note 2 to entry: All kinds of lamps provided with lamp caps are considered as replaceable light sources.

[SOURCE: IEC 60050-845:2020, 845-27-005, modified – "qualified" has been replaced by "skilled" and the Note 2 to entry has been added.]

3.89.2**non-replaceable light source**

light source designed to be a non-replaceable part of the luminaire

Note 1 to entry: An integral light source is always non-replaceable. A non-replaceable light source is not always an integral light source.

Note 2 to entry: The non-replaceability can be the result of the luminaire design.

[SOURCE: IEC 60050-845:2020, 845-27-006]

3.89.3

non-user replaceable light source

replaceable light source intended by the manufacturer to be replaced only by a service agent, or a similarly skilled person

Note 1 to entry: When incorporated into a luminaire, a non-user replaceable light source can become classified as non-replaceable depending on the luminaire design.

[SOURCE: IEC 60050-845:2020, 845-27-007]

3.90

skilled person

electrically skilled person

person with relevant education and experience to enable him or her to perceive risks and to avoid hazards that electricity can create

[SOURCE: IEC 60050-195:2021, 195-04-01]

3.91

ordinary person

person who is neither a skilled person nor an instructed person

Note 1 to entry: The definition of an "instructed person or electrically instructed person" is: a person adequately advised or supervised by electrically skilled persons to enable him or her to perceive risks and to avoid hazards that electricity can create.

[SOURCE: IEC 60050-195:2021, 195-04-03, modified – The Note 1 to entry has been added.]

3.92

control terminal

connections, other than power supply terminals to the electronic controlgear, which are used to exchange information with the controlgear

Note 1 to entry: The power supply terminals can also be used to exchange information with the controlgear.

3.93

mains

AC or DC power distribution system (external to the luminaire) that supplies operating power to the luminaire and whose voltage corresponds to the low-voltage (LV) band excluding the extra-low-voltage (ELV) band

Note 1 to entry: The limits for LV and ELV voltage bands are specified in IEC 61140:2016, Table 1.

[SOURCE: IEC 60664-1:2020, 3.1.2, modified – "mains supply" has been replaced by "mains", "equipment" has been replaced by "luminaire", "and whose voltage corresponds to the low-voltage (LV) band excluding the extra-low-voltage (ELV) band has been added and the Note 1 to entry has been replaced with a new Note 1 to entry.]

3.94

connecting leads

tails

internal wiring of luminaires intended to be connected to fixed wiring through separate terminals which will be enclosed inside the luminaire or connecting box

3.95

rated value

value of a quantity used for specification purposes, established under standard test conditions as declared by the manufacturer or responsible vendor

[SOURCE: IEC 62504:2014, 3.33, modified – The Note 1 to entry has been deleted.]

3.96**input power**

electrical power consumed by the luminaire

3.97**constant light output function**

function where the current passing through a light source is gradually increased through life to compensate for the gradual light output degradation of the light source that can be expected to occur

Note 1 to entry: Constant light output functions can be controlled by a programmed software algorithm based on the expected gradual light output degradation or on feedback from a connected sensor such as a photocell.

3.98**interrupted DC voltage**

DC signal changing between zero and a certain level with a certain frequency, where the time of the signal being at the certain level can vary within one period

3.99**PSE****power sourcing equipment**

equipment generating power to supply other equipment through information technology communication cabling providing energy source ES1 according to the IEC 62368 series

3.100**PoE****power over Ethernet**

powering of a device with a PSE according to IEC 62368-3, via twisted pair Ethernet cabling including the appropriate connectors

Note 1 to entry: Typical examples of cables are CAT 5 cables and CAT 7 cables.

3.101**USB****universal serial bus**

communication interface including appropriate connectors for communication and powering devices, according to the IEC 62680 series

Note 1 to entry: A class III luminaire is an example of a device as given in the definition.

Note 2 to entry: Several versions exist (USB 1.0, 2.0, 3.0).

3.102**information technology communication cabling**

any cable, meant for data transfer, provided with a connector defined by an industry standard that permits DC power transfer between equipment, even if communication does not take place

EXAMPLE USB or Ethernet cables.

3.103**track-mounted luminaire**

luminaire designed to be used on a track system, for which the electrical and mechanical connection is ensured either with an adaptor or by a luminaire supply connector together with a luminaire suspension device

Note 1 to entry: Class I and Class II luminaires may be used with Class I track systems or sectors, Class III luminaires can only be used with Class III track systems or sectors.

Note 2 to entry: Track-mounted luminaires can have control interface facilities.

3.104**pillar terminal**

terminal in which the conductor is inserted in a hole or cavity, where it is clamped under the shank of the screw or screws

Note 1 to entry: The clamping pressure may be applied directly by the shank of the screw or through an intermediate clamping member to which pressure is applied by the shank of the screw.

Note 2 to entry: Examples of pillar terminals are shown in Figure 46.

3.105**screw terminal**

terminal in which the conductor is clamped under the head of the screw

Note 1 to entry: The clamping pressure may be applied directly by the head of the screw or through an intermediate part, such as a washer, clamping plate or anti-spread device.

Note 2 to entry: Examples of screw terminals are shown in Figure 47.

3.106**stud terminal**

terminal in which the conductor is clamped under a nut

Note 1 to entry: The clamping pressure may be applied directly by a suitably shaped nut or through an intermediate part, such as a washer, clamping plate or anti-spread device

Note 2 to entry: Examples of stud terminals are shown in Figure 47.

3.107**saddle terminal**

terminal in which the conductor is clamped under a saddle by means of two or more screws or nuts

Note 1 to entry: Examples of saddle terminals are shown in Figure 48.

3.108**lug terminal**

screw terminal or stud terminal, designed for clamping a cable lug or bar by means of a screw or nut

Note 1 to entry: Examples of lug terminals are shown in Figure 49.

3.109**mantle terminal**

terminal in which the conductor is clamped against the base of a slot by a suitably shaped washer under the nut, by a central peg if the nut is a cap nut, or by equally effective means for transmitting the pressure from the nut to the conductor within the slot

Note 1 to entry: Examples of mantle terminals are shown in Figure 50.

3.110**screwless terminal**

part required to make connection in electrical circuits by mechanical means without screws

3.111**permanent connection**

connection designed to be made only once with the same conductor

EXAMPLE Wire wrapping or crimping.

3.112**non-permanent connection**

connection which allows lead assemblies or conductors to be connected and disconnected several times

EXAMPLE Pin or tab and receptacle, or some spring-type terminals.

3.113**lead assembly**

conductor fitted with auxiliary parts, usually by permanent connection

3.114**non-prepared conductor**

conductor without special preparation or auxiliary parts

Note 1 to entry: Insulation may, however, be stripped to expose the conductor.

Note 2 to entry: The term "special preparation" covers the application of additional solder to the strands of the conductor, use of cable lugs, pins or tabs and receptacles, formation of eyelets, etc., but not the reshaping of the conductor for its introduction into the terminal or the twisting of a stranded conductor to consolidate the end.

The bonding together by heating of the tinned strands of a flexible conductor without the addition of solder is not considered to be special preparation.

3.115**test current**

current assigned to a terminal or connection by the manufacturer

Note 1 to entry: When terminals are part of a component, the test current shall be the rated current of the component.

3.116**battery/EDLC-operated luminaire**

luminaire powered by rechargeable or non-rechargeable batteries or electric double-layer capacitor (EDLC)

3.117**battery**

one or more cells fitted with devices necessary for use, for example case, terminals, marking and protective devices

[SOURCE: IEC 60050-482:2004, 482-01-04]

3.118**cell**

basic functional unit, consisting of an assembly of electrodes, electrolyte, container, terminals and usually separators, that is a source of electric energy obtained by direct conversion of chemical energy

Note 1 to entry: See primary cell and secondary cell.

[SOURCE: IEC 60050-482:2004, 482-01-01]

3.119**replaceable battery**

battery intended to be replaced by the user

3.120

non-replaceable battery/EDLC

battery or EDLC which is a non-replaceable part of the luminaire either because it cannot be replaced without breaking or destroying the luminaire or because it is enclosed under a cover fixed by screw or similar fixing means designed to be used only once and which cannot be opened

3.121

non-user replaceable battery/EDLC

battery or EDLC which can only be replaced by the manufacturer, their service agent, or a similarly skilled person

3.122

button battery

small round battery where the overall height is less than the diameter and having an electrochemical system that does not contain lithium

[SOURCE: IEC 60050-482:2004, 482-02-40, modified – The definition has been adapted to include batteries instead of cells and to differentiate between lithium and non-lithium batteries.]

3.123

coin battery

small round battery where the overall height is less than the diameter and having an electrochemical system that contains lithium

[SOURCE: IEC 60050-482:2004, 482-02-40, modified – The definition has been adapted to include batteries instead of cells and to differentiate between lithium and non-lithium batteries.]

3.124

EDLC

electric double-layer capacitor

capacitor used to perform the function of a battery

3.125

rated capacity

capacity value of a battery determined under specified conditions and declared by the manufacturer

[SOURCE IEC 60050-482:2004, 482-03-15]

3.126

battery/EDLC charger

device to charge batteries or EDLCs

3.127

charging system

circuitry intended to charge and which can balance or maintain the state of charge of the battery

Note 1 to entry: The functional elements of the charging system can be distributed between the charger, any detachable battery, and the luminaire itself.

3.128

detachable battery pack

battery which is contained in a separate enclosure from the battery luminaire and is intended to be removed from the luminaire for charging purposes

3.129**general purpose cell****general purpose battery**

battery and cell available from a variety of manufacturers, through a variety of outlets intended for a variety of different manufacturers' products

EXAMPLE 12-V lead acid automotive style batteries and non-rechargeable AA, C, and D alkaline batteries.

3.130**fully charged**

at the maximum state of charge

Note 1 to entry: For cells and batteries that are rechargeable, this is the maximum state of charge permitted by the charging system.

Note 2 to entry: The maximum state of charge for non-rechargeable batteries and batteries that are rechargeable is specified in the artificial source characteristics of Table W.1.

4 General requirements**4.1 General**

4.1.1 Luminaires shall be so designed and constructed that in normal use they function safely and cause no danger to persons or surroundings. In general, compliance is checked by carrying out all the tests specified.

4.1.2 A luminaire shall comply with a part of the IEC 60598-2 series. If, however, an appropriate part of the IEC 60598-2 series does not exist for a particular luminaire or group of luminaires, the nearest applicable part of the IEC 60598-2 series may be used as a guide to the requirements and tests.

Where the design of a luminaire is such that two or more parts of the IEC 60598-2 series are applicable, the luminaire shall comply with both or all of the appropriate parts.

The parts of the IEC 60598-2 series, in making reference to any of the clauses of this document, specify the extent to which that clause is applicable and the order in which the tests are performed; they also include additional requirements as necessary.

The order in which the clauses of this document 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 the IEC 60598-2 series. Each part of the IEC 60598-2 series is self-contained and therefore does not contain references to other parts of the IEC 60598-2 series.

Where the requirements of any of the clauses of this document are referred to in parts of the IEC 60598-2 series by the phrase "The provisions of Section X of Part 1 apply..." or the phrase "This Clause of Part 1 applies...", these phrases are interpreted as meaning that all the requirements of that clause of this document apply except those which are clearly inapplicable to the particular type of luminaire covered by that part of the IEC 60598-2 series.

4.1.3 Where the terms "voltage" and "current" are used, they imply the RMS values unless otherwise stated.

4.2 General test requirements and verification

4.2.1 Tests according to this document are type tests. For the definition of a "type test", see 3.50.

Guidance on conformity testing during manufacturing is given in Annex N.

The requirements and tolerances permitted by this document 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. Compliance for production is the responsibility of the manufacturer and can include routine tests and quality assurance in addition to type testing.

4.2.2 Luminaires shall be evaluated as delivered, and installed as for normal use, in an ambient temperature of between 10 °C and 30 °C, having regard to the manufacturer's installation instructions, except where otherwise specified in this document or the relevant part of the IEC 60598-2 series. Lamps and replaceable light sources are not included except where essential for the test. Non-replaceable light sources and non-user replaceable light sources are components which are essential to demonstrate the compliance with this document.

Requirements in this document are based on overvoltage category II which is considered appropriate for normal application of luminaires covered under the scope of the IEC 60598 series. Annex Q provides a recommendation that would allow luminaires to have a higher overvoltage capability according to overvoltage category III.

Luminaires cannot be regarded as meeting the requirements of this document unless all internal wiring is complete.

In general, the tests are made on a single sample luminaire or, where a range of similar luminaires is involved, on a single luminaire of each rated power in the range or on a representative selection from the range as agreed with the manufacturer (see Annex P). This selection shall include the luminaire, together with any attachments, which represents the most unfavourable combination from a testing point of view.

Each sample luminaire shall comply with all the relevant tests. To reduce the time of testing and to allow for any tests which can be destructive, the manufacturer may submit additional identical luminaires or parts of luminaires of the same materials. Where the test for compliance is shown as being "by inspection", this shall include any necessary handling.

For track-mounted luminaires the manufacturer shall provide, together with the luminaire, a sample of the appropriate track, connector and adaptors for the luminaire to be connected.

Combination luminaires are tested for safety requirements with that assemblage of parts which gives the most unfavourable result.

Certain parts of luminaires, such as joints, raising and lowering devices, may be tested separately provided that the design of these parts is such that their performance is not dependent upon the other parts of the luminaires.

Luminaires intended to be used with supply cords are tested with the flexible supply cord connected to the luminaire.

For luminaires intended to be used with a shade, but not normally supplied with a shade, the manufacturer shall provide a shade, typical of the type that can be used with the luminaire.

Luminaires containing batteries or EDLCs and their accessories (e.g. remote control) shall additionally comply with the requirements given in Annex W.

Annex W is not applicable for emergency lighting luminaires. All battery/EDLC related requirements for emergency lighting luminaires are given in IEC 60598-2-22.

4.2.3 With regard to the verification and tests, luminaires for testing to the requirements of this document can have earlier test reports updated in accordance with this document by submitting a new sample for test, together with the previous test reports.

Full type testing is not generally necessary and the product and the previous test results are reviewed only against any amended clauses listed in Annex O.

4.3 Components of luminaires

4.3.1 Components, other than integral components, shall comply with the requirements of the relevant IEC standards, if any. However, cells and batteries shall be considered in accordance with 4.3.4.

NOTE 1 Examples of components are lampholders, switches, transformers, controlgear, flexible cables and cords and plugs.

Components which comply with the requirements of the relevant IEC standard and marked with individual ratings are checked to establish that they suit the conditions which can occur in use. Aspects of use not covered by the respective standard shall require them to satisfy the additional relevant requirements of this document.

Compliance is checked by inspection and the relevant tests.

Integral components shall comply as far as is reasonable with the IEC component standards, as part of the luminaire.

NOTE 2 This does not imply that components are separately tested before approval of the luminaire.

NOTE 3 Guidance on the selection of components in different kinds of luminaires can be found in Annex J.

Internal wiring of a luminaire shall comply with the requirements in 8.3.

NOTE 4 This does not exclude the use of standardized cables.

4.3.2 Components complying with the requirements of their own standard and used in accordance with their intended use, shall only be tested to the requirements of this document where there are no requirements in the component standard (covering the requirement heading of this document).

A valid test report is considered adequate to show compliance.

For terminal blocks with integrated screwless protective earthing contacts for direct connection to the luminaire or to parts of the body, special requirements apply according to Annex R.

4.3.3 Components for which no appropriate IEC standard exists shall satisfy the relevant requirements of this document as part of the luminaire. Lampholders and starterholders shall additionally comply with the gauging and interchangeability requirements of the appropriate IEC component standard where applicable.

4.3.4 Batteries/EDLCs for luminaires shall comply with IEC standards as follows:

- Batteries comprising Li-ion cells are not required to comply with IEC 62133-2. They are tested as part of the luminaire according to this document.
- Li-ion cells are required to comply with IEC 62133-2.
- Cells and batteries of other technologies than Li-ion are not required to comply with IEC 62133-1 nor IEC 62133-2. They are tested as part of the luminaire according to this document.
- EDLCs are required to comply with IEC 62391-1 and IEC 62391-2.

4.4 Information for luminaire design in light sources and controlgear standards

4.4.1 In accordance with IEC guidelines, IEC standards are divided into those covering either safety or performance.

4.4.2 In light source and controlgear safety standards, "information for luminaire design" is given for the safe operation of light sources or controlgear; this shall be regarded as normative when testing luminaires in accordance with this document.

4.4.3 In light source and controlgear performance standards, "information for luminaire design" is given for the correct performance of light sources or controlgear; this shall be regarded as informative when testing luminaires in accordance with this document. Testing of light source or controlgear performance is not required as part of the type test approval for luminaires.

5 Classification of luminaires

5.1 General

Luminaires are classified according to the type of protection against electric shock, the degree of protection against ingress of dust, solid objects and moisture, the material of the mounting surface and the circumstances of use.

5.2 Classification according to the type of protection against electric shock

Luminaires shall be classified according to the type of protection against electric shock provided, as class I, class II or class III (see definitions 3.24, 3.25 and 3.26).

Luminaires shall have only a single classification. For instance, for a luminaire with a built-in component such as an extra-low-voltage transformer with provision for protective earthing, the luminaire shall be classified as class I and no part of the luminaire shall be classified as class III even though the lamp compartment is separated by a barrier from the transformer compartment.

Semi-luminaires shall comply with all relevant requirements for class II luminaires without being provided with the class II symbol.

NOTE 1 Unless a luminaire has been specifically designed for use with semi-luminaires, the luminaire manufacturer is not responsible for continued conformity with the IEC 60598 series in the situation where the user has replaced specified lamp types with semi-luminaires. The semi-luminaire manufacturer is responsible for providing information with respect to limitations of use.

NOTE 2 The class II symbol is omitted in order to avoid the symbol being applied to the complete luminaire in which the semi-luminaire is used.

5.3 Classification according to the degree of protection against ingress of dust, solid objects and moisture

Luminaires shall be classified in accordance with the "IP number" system of classification described in IEC 60529.

Tests for the degrees of protection are given in Clause 11.

NOTE Luminaires classified as watertight are not necessarily suitable for operation under water. Pressure watertight luminaires can be used for such applications.

5.4 Classification according to the material of the mounting surface for which the luminaire is designed

Luminaires shall be classified according to whether they are suitable for direct mounting on normally flammable surfaces or are only suitable for mounting on non-combustible surfaces as follows:

Classification	Symbol
– Luminaires suitable for direct mounting on normally flammable surfaces	No symbol required
– Luminaires not suitable for direct mounting on normally flammable surfaces (suitable only for mounting on non-combustible surfaces)	Relevant symbols (See Figure 9)

NOTE Readily flammable surfaces are not suitable for the direct mounting of luminaires. Requirements for luminaires classified as primarily intended for direct mounting on normally flammable surfaces are given in Clause 7 and related tests in Clause 14.

5.5 Classification according to the circumstances of use

Luminaires shall be classified according to whether they are intended for normal use or for rough service.

Classification	Symbol
– Luminaires for normal use	No symbol
– Luminaires for rough service	Symbol (See Figure 16)

6 Marking

6.1 General

Any written instructions related to safety shall be in a language which is acceptable in the country in which the equipment is to be installed.

6.2 Marking on luminaires

The following information shall be distinctly and durably marked on the luminaire (see Table 1). Each marking in Table 1 shall be read with the corresponding subclause as detailed in the table.

- Marking to be observed when replacing lamps or other replaceable components shall be visible on the outside of the luminaire (except the mounting side) or behind a cover which is removed during lamp or other component replacement and with the lamp removed.
- Marking to be observed during installation shall be visible during installation on the outside of the luminaire or behind a cover or part which is removed during installation.
- Marking to be observed after installation shall be visible with the luminaire assembled and installed as for normal use and with the lamp in place.

Marking may be on controlgear provided the conditions under a) or b) above, as appropriate, are fulfilled. See Table 1 for details.

Table 1 – Marking

Markings belonging to 6.2, item a)	Markings belonging to 6.2, item b)	Markings belonging to 6.2, item c)
6.3.8 a) and c) ^a Rated power	6.3.1 to 6.3.2 ^b	6.3.13 Lighted objects ^d
6.3.10 Special lamps	6.3.3 Ambient temperature	6.3.14 Rough service
6.3.11 Cool beam	6.3.4 to 6.3.5	6.3.20 Means of adjustment
6.3.15 Bowl mirror	6.3.6 IP number	6.3.22 Do not stare at light source ^e
6.3.16 Protective shield	6.3.7 Type reference	6.3.27 Rated current of the mains socket outlet
6.3.18 Ignition warning	6.3.8 b) Rated input power	
6.3.19 Self-shielded lamp	6.3.9 Symbols	
6.3.21 Internal replaceable fuse(s)	Relevant symbol for luminaires not suitable for direct mounting on normally flammable surfaces	
6.3.22 Do not stare at light source ^e	6.3.12 Termination	
6.3.23 Symbol for electric shock risk	6.3.17 ^c Interconnected luminaires	
6.3.26 Rated electrical output characteristics ^h	6.3.24 Rated input constant voltage ^f	
	6.3.25 Rated input constant current and value of U_{out} ^g	
	6.3.26 Rated electrical output characteristics ^h	
^a 6.3.8 c) Rated power. For luminaires for discharge lamps with remote controlgear, the marking may be replaced by the instruction: "For lamp designation, see controlgear". ^b 6.3.2 Rated voltage. For luminaires for discharge lamps, if the ballast is not built into the luminaire, the luminaire shall be marked with the working voltage instead of the mains voltage. ^c 6.3.17 Interconnected luminaires. For fixed luminaires, this information may alternatively be provided within the installation instructions. ^d 6.3.13 Lighted objects. Only the symbol shall be provided on the luminaire. The explanation of the symbol shall be provided in the instruction accompanying the luminaire, where not already provided on the luminaire. ^e 6.3.22 The different conditions of this marking for fixed, portable and handheld luminaires are given in 6.3.22. ^f 6.3.24 For constant voltage operation of the luminaire. ^g 6.3.25 For constant current operation of the luminaire. ^h 6.3.26 The different conditions of this marking for luminaires with built-in or external independent controlgear are given in 6.3.26.		

The earthing symbol referred to in 6.3.12 may be marked on the controlgear, instead of the luminaire, if the controlgear is of a non-replaceable type. The height of graphical symbols shall not be less than 5 mm, except for symbols for class II and class III classification which may be reduced to a minimum of 3 mm where the space available for marking is restricted. The height of letters and numerals either shown separately or with or as part of symbols shall not be less than 2 mm.

For luminaires marketed as combination of different parts (e.g. light source enclosure and controlgear enclosure) where the type references or the rated inputs are different for different combinations, the main part and the alternative parts may be marked with a type reference or a rated input, as appropriate, provided that the type can be identified and the rated input of the complete unit may be established from a catalogue or a similar document.

For luminaires with electro-mechanical contact systems, the base plate shall be marked with the rated current of the electrical connection if the system can be used with a variety of different luminaire types.