IEC 60598-2-22

Edition 5.0 2021-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Luminaires –
Part 2-22: Particular requirements – Luminaires for emergency lighting

Luminaires –
Partie 2-22: Exigences particulières – Luminaires pour éclairage de secours

IEC 60598-2-22:2021-12(en-fr)

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LUMINAIRES –

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FOREWORD

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IEC 60598-2-22 has been prepared by subcommittee 34D: Luminaires of IEC technical committee 34: Lighting. It is an International Standard.

This fifth edition cancels and replaces the fourth 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) update of requirements for rest mode and inhibiting mode;
b) clarification of high temperature operation tests;
c) introduction of new requirements for lithium batteries;
d) introduction of new requirements for electric double layer capacitors (EDLCs);

e) clarification of resistance to heat, fire and tracking;

f) clarification of test facilities for self-contained luminaires;

g) clarification of the test method for contrast measurements of exit signs.

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

Draft	Report on voting
34D/1635/FDIS	34D/1642/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/standardsdev/publications.

This Part 2-22 is to be used in conjunction with the latest edition of IEC 60598-1 and its amendment(s). It was established on the basis of the ninth edition (2020) of that standard.

NOTE 1 When "Part 1" is mentioned in this document, it refers to IEC 60598-1.

NOTE 2 In this document, the following print type is used:

– compliance statements: *in italic type.*

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

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

LUMINAIRES –

Part 2-22: Particular requirements – Luminaires for emergency lighting

22.1 Scope

This part of IEC 60598 specifies requirements for emergency luminaires for use with electrical lamps on emergency power supplies not exceeding 1 000 V.

This document does not cover the effects of non-emergency voltage reductions on luminaires incorporating high pressure discharge lamps.

This document gives general requirements for emergency lighting equipment.

In this document, the term "lamp" which also includes "light source(s)" where appropriate, is used.

22.2 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 60073, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators*

IEC 60155, *Glow-starters for fluorescent lamps*

IEC 60598-1, *Luminaires – Part 1: General requirements and tests*

IEC 60896-21, *Stationary lead-acid batteries – Part 21: Valve regulated types – Methods of test*

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

IEC 61056-1, *General purpose lead-acid batteries (valve-regulated types) – Part 1: General requirements, functional characteristics – Methods of test*

IEC TR 61341, *Method of measurement of centre beam intensity and beam angle(s) of reflector lamps*

IEC 61347-2-2, *Lamp controlgear – Part 2-2: Particular requirements for d.c. or a.c. supplied electronic step-down convertors for filament lamps*

IEC 61347-2-3:2011, *Lamp control gear – Part 2-3: Particular requirements for a.c. and/or d.c. supplied electronic control gear for fluorescent lamps*

IEC 61347-2-7:2011, *Lamp controlgear – Part 2-7: Particular requirements for battery supplied electronic controlgear for emergency lighting (self-contained)*
IEC 61347-2-7:2011/AMD1:2017
IEC 61347-2-7:2011/AMD2:2021

IEC 61347-2-12, *Lamp controlgear – Part 2-12: Particular requirements for d.c. or a.c. supplied electronic ballasts for discharge lamps (excluding fluorescent lamps)*

IEC 61347-2-13, *Lamp controlgear – Part 2-13: Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules*

IEC 61951-1, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary sealed cells and batteries for portable applications – Part 1: Nickel-Cadmium*

IEC 61951-2, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary sealed cells and batteries for portable applications – Part 2: Nickel-metal hydride*

IEC 62034, *Automatic test systems for battery powered emergency escape lighting*

IEC 62133-2:2017, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems*

IEC 62391-1:2015, *Fixed electric double-layer capacitors for use in electric and electronic equipment – Part 1: Generic specification*

IEC 62391-2:2006, *Fixed electric double-layer capacitors for use in electronic equipment – Part 2: Sectional specification – Electric double-layer capacitors for power application*

ISO 3864-4:2011, *Graphical symbols – Safety colours and safety signs – Part 4: Colorimetric and photometric properties of safety sign materials*

ISO 30061:2007, *Emergency lighting*

CIE 121 SP1, *The Photometry and Goniophotometry of Luminaires – Supplement 1: Luminaires for Emergency Lighting*

CIE S025, *Test Method for LED Lamps, LED Luminaires and LED Modules*

22.3 Terms and definitions

For the purposes of this document, the terms and definitions given in Part 1 and the following apply.

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

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

22.3.1
emergency lighting
lighting for use when the supply to the normal lighting fails

Note 1 to entry: Emergency lighting includes emergency escape lighting, high-risk task-area lighting and standby lighting.

22.3.2
emergency escape lighting
that part of emergency lighting that provides illumination for the safety of people leaving an area or attempting to terminate a dangerous process before vacating an area

22.3.3
standby lighting
that part of emergency lighting that enables normal activities to continue substantially unchanged

22.3.4
high-risk task-area lighting
part of emergency lighting provided to ensure the safety of people involved in a potentially dangerous process or situation and to enable proper shut-down procedures for the safety of the operator and occupants of the premises

22.3.5
maintained emergency luminaire
luminaire in which the emergency lighting lamps are energized at all times when normal or emergency lighting is required

22.3.6
non-maintained emergency luminaire
luminaire in which the emergency lighting lamps are in operation only when the supply to the normal lighting fails

22.3.7
combined emergency luminaire
luminaire containing two or more lamps, at least one of which is energized from the emergency lighting supply and the others from the normal lighting supply

Note 1 to entry: A combined emergency luminaire is either maintained or non-maintained.

22.3.8
self-contained emergency luminaire
luminaire providing maintained or non-maintained emergency lighting in which all the elements, such as the electric source for safety services (ESSS), the lamp, the control unit and the test and monitoring facilities, where provided, are contained within the luminaire or adjacent to it (that is, within 1 m cable length)

22.3.9
centrally supplied emergency luminaire
luminaire for maintained or non-maintained operation which is energized from a central emergency power system that is not contained within the luminaire

22.3.10
compound self-contained emergency luminaire
self-contained luminaire providing maintained or non-maintained emergency lighting and also providing emergency supply for operating a satellite luminaire

22.3.11
satellite emergency luminaire
luminaire for maintained or non-maintained operation which derives emergency operation supply from an associated compound self-contained emergency luminaire

22.3.12
control unit
unit or set of units comprising a supply changeover system, an electric source for safety services (ESSS) charging device and, where appropriate, a means for testing

Note 1 to entry: This unit can also contain the lamp controlgear.

22.3.13
normal supply failure
condition in which the normal lighting can no longer provide a minimum illuminance for emergency escape purposes and when the emergency lighting should become operative

22.3.14
emergency luminaire rated luminous flux
lumen output as claimed by the luminaire manufacturer, 60 s (0,5 s for high-risk task-area luminaires) after failure of the normal supply, and continuously maintained to the end of the rated duration of operation

22.3.15
rated duration of emergency operation
time, as claimed by the manufacturer, during which the rated emergency lumen output is provided

22.3.16
normal mode
state of a self-contained emergency luminaire that is ready to operate in emergency mode while the normal supply is on

Note 1 to entry: In the case of a normal supply failure, the self-contained luminaire automatically changes over to the emergency mode.

22.3.17
emergency mode
state of a self-contained emergency luminaire that provides lighting when energized by its internal power source, the normal supply having failed

22.3.18
rest mode
state of a self-contained emergency luminaire that has been intentionally extinguished while the normal supply is off and that, in the event of restoration of the normal supply, automatically reverts to normal mode

22.3.19
maximum overcharge rate
maximum continuous charge rate (e.g. current or voltage) that can be applied to a fully charged electric source for safety services (ESSS)

22.3.20
remote inhibiting facility
means for inhibiting remotely a luminaire associated with an emergency lighting system

22.3.21
remote inhibiting mode
state of a self-contained emergency luminaire which is inhibited from operating by a remote device while the normal supply is on and in the case of a normal supply failure when the luminaire does not change over to emergency mode

22.3.22
internally illuminated safety sign
self-contained or centrally supplied emergency luminaire intended to provide a specific safety message obtained by a combination of colour and geometric shapes

Note 1 to entry: Details are given in ISO 3864-1 and ISO 3864-4.

22.3.23
practical emergency lamp flux
PELF
minimum luminous flux of the lamp observed during the rated duration of the emergency mode

Note 1 to entry: PELF = LDL × EBLF
where LDL is the rated luminous flux of fluorescent or discharge lamp; this is taken as the initial lighting design lumens at 100 h.

22.3.24
self-contained portable emergency luminaire
portable luminaire providing emergency lighting where all of the elements, such as the electric source for safety services (ESSS), the lamp(s), the control unit, a manual switch for switching on or off one or more lamp and the test and monitoring facilities, where provided, are contained within the luminaire which can be detached from its base unit for use in the emergency mode

22.3.25
emergency ballast lumen factor
EBLF
ratio of the emergency luminous flux of the lamp supplied by the emergency controlgear to the luminous flux of the same lamp operated with the appropriate reference ballast at its rated voltage and frequency

Note 1 to entry: The emergency ballast lumen factor is the minimum of the values measured at the appropriate time after failure of the normal supply and continuously to the end of the rated time duration.

[SOURCE: IEC 61347-2-7:2011, 3.13]

22.3.26
emergency luminaire mounted on lighting track system
emergency luminaire specifically designed to be used on luminaire track systems

22.3.27
remote box
box complying with the same requirements as the emergency luminaire

Note 1 to entry: Its purpose is to contain any of the components e.g. battery, controlgear that will not be fitted into the emergency luminaire.

22.3.28
practical emergency light source flux
PELSF
minimum luminous flux of the light source observed during the rated duration of the emergency mode

Note 1 to entry: For LED light sources:

a) if EOF_l is given: PELSF = LDL × EOF_l

b) if $I_{emergency}$ from constant current controlgear is defined: PELSF = LDL × ($I_{emergency}$ / $I_{normal\ mode}$)
where LDL is the lumen output of the LED module under the condition corresponding to the operation in the luminaire (identical t_p) operated at the same current ($I_{normal\ mode}$).

22.3.29
battery manufacturer's declaration of design
document issued by the battery manufacturer that provides technical information necessary to evaluate the safe use of the battery and its operating regime in accordance with the requirements of this document

Note 1 to entry: Examples of the battery manufacturer's declaration of design for a lithium battery is given in IEC 61347-2-7.

22.3.30
rated capacity
capacity value of a battery determined under specified conditions and declared by the manufacturer

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

22.3.31
electric source for safety services
ESSS
energy source for self-contained emergency luminaire, intended to supply the emergency lighting luminaire in emergency mode

Note 1 to entry: The ESSS can also supply the luminaire in rest mode and inhibiting mode.

22.3.32
electric double-layer capacitor
EDLC

device that stores electrical energy using a double-layer in an electrochemical cell

22.4 General test requirements

The provisions of Section 0 of Part 1 shall apply. The tests described in each appropriate section of Part 1 shall be carried out in the order listed in this document.

When testing combined emergency luminaires in accordance with the requirements of this document, the tests shall cover those parts of the luminaire which are involved with providing emergency lighting taking into account the influence of all other luminaire parts and components. The components and parts of the luminaires designed to provide only normal lighting shall be subjected to the tests in accordance with the requirements of the relevant part of IEC 60598-2 (for example, if the luminaire is recessed, it shall be tested in accordance with the requirements of the part dealing with recessed luminaires).

If some elements of an emergency luminaire are adjacent (within a 1 m cable length) to the main part of the luminaire, all the elements of the luminaire, including the means of inter-connection, shall satisfy the relevant requirements of this document.

The additional requirements covering self-contained portable emergency luminaires are given in Annex E.

The photometric tests of Clause 22.17 shall be made on a separate sample luminaire.

Derating factors should be applied during the emergency lighting installation scheme design which is relevant to the application. These factors are normally defined by the relevant application standard.

22.5 Classification of luminaires

Emergency luminaires shall be classified in accordance with the provisions of Section 2 of Part 1 except that all emergency luminaires shall be classified as suitable for direct mounting on normally flammable surfaces.

Emergency luminaires shall also be classified as specified in Annex B.

22.6 Marking

The provisions of Section 3 of Part 1 shall apply together with the requirements of 22.6.1 to 22.6.20 below.

22.6.1 Luminaires shall be clearly marked with the rated supply voltage or voltage range(s).

22.6.2 Luminaires shall be clearly marked with details of their classification in accordance with Clause 22.5 (see Annex B).

22.6.3 Luminaires with replaceable lamps shall be clearly marked with details of the correct replacement lamp in a position visible during lamp replacement. This ensures that the emergency luminaire's rated luminous flux can be achieved.

NOTE The information relating to correct lamp replacement can include the number, type, rated voltage and rated wattage, etc.

22.6.4 Where appropriate, in addition to t_a marking, the range of ambient temperature shall be marked or given in the instruction leaflet supplied with the luminaire.

22.6.5 Emergency luminaires employing replaceable fuses and/or replaceable indicator lamps shall be marked with the details of fuse ratings and/or details of the indicator lamps.

22.6.6 For manual testing only, test facilities to simulate normal supply failure, where provided, shall be clearly marked so that the marking is visible during routine testing.

22.6.7 Self-contained luminaires shall be clearly marked with details about the nature of the ESSS it contains as follows.

22.6.7.1 Self-contained emergency luminaires with replaceable batteries shall be clearly marked with the details of the correct battery replacement. If the manufacturer indicates that the battery is only replaceable with a specific type, the battery technology (e.g. NiMH) and the type reference or the code of the replaceable battery shall be indicated. If the battery is replaceable with another type, the details shall include the battery technology (e.g. NiMH), rated voltage, capacity, temperature rating, and temperature classification.

Luminaires containing a non-replaceable battery(s) shall be marked to indicate that the battery is non-replaceable.

22.6.7.2 In self-contained luminaires with batteries, the batteries shall be marked with the year and month or year and week of manufacture.

In self-contained luminaires with replaceable batteries, space shall be provided on the battery label to allow the marking, by the installer or commissioning engineer, of the date of commissioning of the battery.

For luminaires with non-replaceable batteries, the space for marking the date of commissioning shall be provided on the battery or on a label visible during maintenance.

22.6.7.3 Self-contained emergency luminaires with an EDLC shall be clearly marked with the details for correct EDLC replacement. If the manufacturer indicates that the EDLC is only replaceable with a specific type, it shall indicate the type reference or the code of the replaceable EDLC. If the EDLC is replaceable with another type, the details shall include the type of EDLC (according to the applicable IEC standard), (e.g. rated voltage, capacity, temperature rating, temperature classification, dimensions).

Luminaires containing a non-replaceable EDLC shall be marked to indicate that the EDLC is non-replaceable.

22.6.8 Void.

22.6.9 Combined emergency luminaires shall be marked with details relating to correct lamp replacement for all lamps. If the lamps used in the emergency circuit and the normal supply circuit differ, the respective types shall be clearly identified.

Lampholders for emergency lighting lamps in combined luminaires shall be identified by a green dot, at least 5 mm in diameter, which shall be visible when replacing the lamp.

22.6.10 In the instruction leaflet supplied with the self-contained emergency luminaire, the manufacturer shall state that the replacement of the ESSS or of the whole luminaire (if equipped with a non-replaceable ESSS) is needed when they no longer meet their rated duration of operation after the corresponding recharge period.

All details for correct replacement of the ESSS shall be included in the instruction leaflet supplied with the self-contained emergency luminaire. If the manufacturer indicates that the ESSS is only replaceable with a specific type, the type reference or the code of the replaceable ESSS shall be indicated. If the ESSS is replaceable with another type, the instructions shall include: ESSS technology or type (battery, e.g. NiMH), applicable IEC standard (EDLC), rated voltage, capacity, temperature rating, temperature classification.

In addition, the instruction leaflet supplied with the self-contained emergency luminaire shall contain the substance of the following information: "The electric source for safety service is not a user serviceable item and shall only be replaced by the manufacturer service agent or a similar qualified person".

22.6.11 In the instruction leaflet supplied with the luminaire, the manufacturer shall give details of test facilities incorporated in the luminaire or appropriate instructions if these test facilities are supplied separately. The instructions shall include details of test procedures.

22.6.12 In the instruction leaflet supplied with the luminaire, the manufacturer shall give details of the connection leads to be used between a compound self-contained luminaire and an associated satellite luminaire. The maximum length of cables that limits the voltage drop to 3 % shall be specified.

22.6.13 Void.

22.6.14 In the instruction leaflet supplied with self-contained emergency luminaires, the manufacturer shall give details of any device which changes the mode of operation.

22.6.15 The manufacturer shall make available the photometric data in accordance with Clause 22.17.

22.6.16 Any normal preparation procedure for use of the luminaire shall be stated in the manufacturer's installation instructions. This preparation shall be carried out before type tests are made.

22.6.17 The marking required by 22.6.1, 22.6.2, 22.6.7.1 2nd paragraph, 22.6.7.3 2nd paragraph and 22.6.20 shall be in a position such that the information can be seen when the luminaire has been installed.

The marking in 22.6.5, 22.6.7.1 1st paragraph, 22.6.7.3 1st paragraph and 22.6.9 shall be visible during the maintenance of the relevant component.

NOTE For recessed luminaires, this information can be marked on the interior of the luminaire so that it is visible when the light controlling cover is removed.

22.6.18 The mounting instructions for luminaires intended for external plug and socket connections, without provisions to prevent accidental disconnection, shall be provided with the warning: "This luminaire is intended only for mounting in locations where the plug and socket are protected from unauthorized disconnection".

22.6.19 In the instruction leaflet supplied with the luminaire, the manufacturer shall specify if the lamp(s) and/or the ESSS is/are non-replaceable.

22.6.20 For emergency luminaires mounted on lighting track systems, they shall be marked to indicate that they are an emergency luminaire and shall not be adjusted by unauthorized persons. In the instruction leaflet supplied with the adjustable emergency track mounted luminaire, the manufacturer shall provide the photometric data.

22.6.21 In self-contained luminaires, the rated charge time, if lower than 24 h, can be declared in the instruction leaflet.

22.6.22 Where applicable, for self-contained luminaires, the manufacturer shall make available information for the allowed time for the luminaire to stay in rest mode or remote inhibiting mode after a full charging period, in order for the luminaire to provide at least 50 % of its rated duration of emergency operation.

The time shall be declared in the instruction leaflet supplied with the luminaire in days and calculated according to the procedure in IEC 61347-2-7:2011/AMD2:2021, 25.6.2.

NOTE 1 Examples of declared periods are 7, 30 or 90 days.

NOTE 2 The characteristics of rest mode and inhibiting mode are explained in Annex D.

22.6.23 *Compliance with the requirements of 22.6.1 to 22.6.22 is checked by inspection.*

22.7 Construction

The provisions of Section 4 of Part 1 shall apply together with the requirements of 22.7.1 to 22.7.23 below. In addition, emergency luminaires with automatic testing systems shall comply with the additional requirements of IEC 62034 as identified in Annex K of IEC 61347-2-7:2011 and Annex K of IEC 61347-2-7:2011/AMD1:2017.

22.7.1 In emergency luminaires, fluorescent lamps used to provide emergency lighting shall start in the emergency mode without the aid of glow starters as specified in IEC 60155. Such starters shall not be in circuit during the emergency mode. The emergency lighting shall not be provided by means of fluorescent lamps with built-in glow starters.

Compliance is checked by inspection.