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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

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

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FOREWORD

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International Standard IEC 60598-2-22 has been prepared by subcommittee 34D: Luminaires, of IEC technical committee 34: Lamps and related equipment.

This standard is to be read in conjunction with IEC 60598-1.

This consolidated version of IEC 60598-2-22 consists of the third edition (1997) [documents 34D/462/FDIS and 34D/464/RVD], its amendment 1 (2002) [documents 34D/748/FDIS and 34D/756/RVD] and its amendment 2 (2008) [documents 34D/883/FDIS and 34D/887/RVD].

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 3.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

Annexes A, B and C form an integral part of this standard.

Annex D is for information only.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication 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- withdrawn,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 section of IEC 60598-2 specifies requirements for emergency lighting luminaires for use with electrical light sources on emergency power supplies not exceeding 1 000 V.

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

This section also includes relevant requirements and tests that shall be conducted and complied with for control gears, as specified in IEC 60924, that incorporate additional facilities such as remote control devices, indicators, changeover devices, etc.

22.1.1 Normative references

The following referenced documents are indispensable for the application 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 indication devices and actuators*

IEC 60079, *Electrical apparatus for explosive gas atmospheres*

IEC 60155, *Glow-starters for fluorescent lamps*

IEC 60285, *Alkaline secondary cells and batteries – Sealed nickel-cadmium cylindrical rechargeable single cells*

IEC 60364-5-56, *Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 56: Safety services*

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

IEC 60742, *Isolating transformers and safety isolating transformers – Requirements*

IEC 60896-2, *Stationery lead-acid batteries – General requirements and test methods – Part 2: Valve regulated types*

IEC 60924, *D.C. supplied electronic ballasts for tubular fluorescent lamps – General and safety requirements*

IEC 60928, *Auxiliaries for lamps – A.C. supplied electronic ballasts for tubular fluorescent lamps – General and safety requirements*

IEC 61046, *D.C. or a.c. supplied electric step-down convertors for filament lamps – General and safety requirements*

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

ISO 3864, *Safety colours and safety signs*

22.2 General test requirements

The provisions of section 0 of IEC 60598-1 shall apply. The tests described in each appropriate section of IEC 60598-1 shall be carried out in the order listed in this section of IEC 60598-2.

When testing combined emergency luminaires according to the requirements of this section, the tests shall be limited to those parts of the luminaire which are involved with providing emergency lighting. The components and parts of the luminaires designed to provide only normal lighting shall be subjected to the tests according to the requirements of the relevant section of IEC 60598-2 (for example, if the luminaire is recessed, it shall be tested according to the requirements of the section dealing with recessed luminaires).

If some elements of an emergency luminaire are adjacent (within 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 section.

22.3 Definitions

For the purpose of this section, the definitions of section 1 of IEC 60598-1, in addition to the definitions of the relevant IEC lighting publications and the following definitions apply:

22.3.1
emergency lighting
lighting for use when the supply to the normal lighting fails; it 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
the 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. 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 battery, 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 units comprising a supply changeover system, a battery charging device and, where appropriate, a means for testing

NOTE For tubular fluorescent lamp luminaires, this unit may 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 lumen output
lumen output as claimed by the luminaire manufacturer 60 s (0,25 s for high-risk task-area lighting luminaires) after failure of the normal supply, and continuously to the end of rated duration of operation

22.3.15
rated duration of emergency operation
time, as claimed by the manufacturer, that 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. 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 that may be applied to a fully charged battery

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 case of a normal supply failure the luminaire does not change-over to emergency mode

22.4 Classification of luminaires

Emergency lighting luminaires shall be classified in accordance with the provisions of section 2 of IEC 60598-1 except that all emergency lighting shall be classified as suitable for direct mounting on normally flammable surfaces (F-marked).

Emergency lighting luminaires shall also be classified as specified in annex B.

22.5 Marking

The provisions of section 3 of IEC 60598-1 shall apply together with the requirements of 22.5.1 to 22.5.20 below.

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

22.5.2 Luminaires shall be clearly marked with details of their classification according to 22.4 (see annex B).

22.5.3 Luminaires shall be clearly marked with details of the correct replacement lamp in a position visible during lamp replacement. This ensures that the rated emergency lumen output can be achieved.

NOTE The information relating to correct lamp replacement may include the number, type, rated voltage and rated wattage, etc. Luminaires containing non-replaceable lamp(s) need not meet this subclause.

22.5.4 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.

22.5.5 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.

22.5.6 Test facilities to simulate normal supply failure, where provided, shall be clearly marked so that the marking is visible during routine testing.

22.5.7 Self-contained luminaires shall be clearly marked with the details of correct battery replacement including the battery type and rated voltage.

NOTE Luminaires containing non-replaceable battery need not meet this subclause.

For luminaires with non-replaceable batteries, such information shall be provided in a label to be observed during installation, according to 3.2b) of IEC 60598-1.

22.5.8 In self-contained luminaires, the batteries shall be marked with the year and month or year and week of manufacture and the correct battery disposal method to be followed.

NOTE For battery disposal marking information, see IEC 61429[1)].

Space shall be provided on the battery label to permit the marking, by the installer or commissioning engineer, of the date of commissioning of the battery.

22.5.9 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 type 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.

22.5.10 In the instruction leaflet supplied with the self-contained emergency luminaire, the manufacturer shall state that the replacement of the battery or of the whole luminaire (if having non-replaceable lamp(s) and/or battery) is needed when they no longer meet their rated duration of operation.

22.5.11 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.

22.5.12 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.

22.5.13 Not in use.

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

22.5.15 The manufacturer shall make available the photometric data in accordance with 22.16.

22.5.16 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.

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1) IEC 61429: 1995, *Marking of secondary cells and batteries with the international recycling symbol ISO 7000-1135.*

22.5.17 The marking required by 22.5.1 and 22.5.2 shall be in a position such that the information can be seen when the luminaire has been installed.

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

22.5.18 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 unauthorised disconnection".

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

22.5.20 *Compliance with the requirements of 22.5.1 to 22.5.19 is checked by inspection.*

22.6 Construction

The provisions of section 4 of IEC 60598-1 shall apply together with the requirements of 22.6.1 to 22.6.19 below.

22.6.1 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.

22.6.2 Lamp control gear for operating the emergency lamp(s) and control units incorporated into emergency luminaires shall comply with IEC 60924, IEC 60928 and IEC 61046.

Compliance is checked by the tests specified in the relevant sections of these standards.

22.6.3 The failure of any one luminaire connected to a circuit shall not affect other luminaires connected to the same circuit.

NOTE This requirement can be satisfied by means of a fuse, relay or other protective devices incorporated in each luminaire, or by protection against excessive fault currents being inherent in the design of the luminaire circuitry/components.

Compliance is checked by measurement and inspection.

22.6.4 For emergency luminaires, the mechanical strength tests given in 4.13 of IEC 60598-1 shall be applied with a minimum impact energy of 0,35 Nm to all external parts.

22.6.5 Whilst connected to a live supply, self-contained emergency luminaires shall have adequate separation between the normal supply and live parts in the circuit for battery charging. When there are exposed live parts, double insulation, reinforced insulation, earth screen or other equivalent techniques can be used.

Additionally, in the event of bare contacts in the battery charging circuit a safety isolating transformer shall be used. If a separating transformer is used as insulation between the normal supply and the battery charging circuit, the insulation in the battery charging circuit shall consist of at least basic insulation.

Compliance is checked by inspection and by the tests of 22.7 and 22.14

22.6.6 In centrally supplied combined emergency luminaires, electrical separation between normal and emergency supplies shall be ensured by double insulation, reinforced insulation, earthed screen or other equivalent means.

NOTE The use of basic insulation only, for both circuits, or double/reinforced insulation on the normal supply circuit fulfils this requirement. The connection of both circuits to a terminal block where the required creepage/clearances are obtained by leaving one terminal free, without the possibility of connection between the circuits, is also acceptable.

Compliance is checked by inspection.

22.6.7 Self-contained emergency luminaires shall have adjacent to them or incorporated in them a device for charging the battery from the normal supply and an indicator visible in normal use, for example a lamp, which shows the following conditions:

a) the battery is being charged;

b) circuit continuity exists through the tungsten filament of emergency lighting lamps where appropriate.

Where an electrical light source indicator is used, it shall comply with the colour requirements of IEC 60073 and be green. When a single indicator provides dual functions, either red or green is acceptable.

Compliance is checked by inspection.

22.6.8 Self-contained emergency luminaires shall incorporate a battery that meets the requirements of annex A and is designed for at least four years of normal operation. This battery shall be used only for emergency related functions within the luminaire or its satellite.

Compliance is checked by inspection and the tests of annex A.

22.6.9 Internal wiring and electronic circuits in self-contained emergency luminaires shall be protected from excessive discharge currents that may occur during fault conditions by incorporation of a safety device between the batteries and the electronic circuits.

Compliance is checked by inspection.

NOTE A test to check compliance with this requirement is under consideration.

22.6.10 In self-contained emergency luminaires there shall be no switch between the battery and emergency lighting lamps other than the changeover device.

Self-contained emergency luminaires and centrally supplied emergency luminaires shall not contain any manual or non-self-resetting switch isolating the emergency circuit(s) from the mains supply other than rest mode or inhibition mode testing facilities.

Compliance is checked by inspection.

22.6.11 In self-contained emergency luminaires the failure of one or more emergency lighting lamps shall not interrupt the charging current to the battery and shall not cause an overload that could impair the operation of the battery.

Compliance is checked by simulation of lamp failure during the test of 22.12.7.

22.6.12 All self-contained emergency luminaires utilizing lead-acid batteries, and self-contained emergency luminaires utilizing a battery of three or more nickel cadmium cells in series, shall be protected against polarity reversal of individual cells. This protection shall be achieved by the incorporation of an electrical system that limits further battery discharge to the current specified below in a) when the battery voltage has fallen to V_{min}, determined below in b).

a) For lead-acid batteries: $10^{-5} \times C_{20}$A where C_{20} is the battery capacity in ampere hours for a 20 h constant current discharge.

   For nickel-cadmium batteries: 0,0015 × C_5A where C_5 is the battery capacity in ampere hours for 5 h constant current discharge.

b) $V_{min} = X \cdot n$

   where n is the number of cells;

   – for lead acid batteries:

     X = 1,6 V for 1 h duration or less;

     X = 1,7 V for greater than 1 h duration;

   – for nickel-cadmium batteries:

     X = 0,8 V for all duration values.

The protection system shall prevent any further discharge of the batteries by a lamp or inverter, even where a battery voltage rise due to natural regeneration occurs, until the normal supply has been restored.

Compliance is checked by measuring the battery voltage and discharge current during the emergency mode cycle of the test given in 22.12.7. The battery voltage shall not fall below V_{min} and the discharge current shall not exceed that specified above.

22.6.13 The operation of a self-contained emergency luminaire in the emergency mode shall not be influenced by a short-circuit, a contact to earth or an interruption, in the wiring of the normal supply.

Compliance is checked by simulation of these supply wiring faults during the emergency mode cycle of the test given in 22.12.7. The luminaire shall function normally during the test.

22.6.14 Self-contained emergency luminaires with rest mode facility shall be provided with either a control device or a means of connection of a remote facility for changing from emergency mode to rest mode and vice versa.

Self-contained emergency luminaires intended for use with remote inhibiting facilities shall be provided with a means of connection to the remote inhibiting circuit.

Compliance is checked by inspection.

22.6.15 The operation of a self-contained emergency luminaire with a remote inhibiting facility in the emergency mode shall not be influenced by a short circuit or a contact to earth in the wiring to a remote control device.

Compliance is checked by simulation of these wiring faults in conjunction with the test of 22.6.13.

22.6.16 The operation of a remote control device for luminaires with rest mode or remote inhibiting facilities provided with the luminaire shall be independent of the battery of the luminaire and the normal mains supply.

Compliance is checked by inspection.