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INTERNATIONAL STANDARD

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Electrical installations in ships –
Part 306: Equipment – Luminaires and lighting accessories

IEC 60092-306:2022-10 RLV(en)

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Part 306: Equipment – Luminaires and lighting accessories

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ELECTRICAL INSTALLATIONS IN SHIPS –

Part 306: Equipment – Luminaires and lighting accessories

FOREWORD

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IEC 60092-306 has been prepared by IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2009. This edition constitutes a technical revision.

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

a) additional technical and environmental requirements have been included;
b) Table 2 "Standard types of lamp holders" has been amended;
c) Subclause 4.3.2 has been amended with a new title "Distribution systems" and a reference to IEC 60092-201 has been added;
d) environmental requirements and tests, especially regarding shock and vibration have been changed, and references to IEC 60092-101 and IEC 60092-504 have been added;
e) requirements on coating thickness have been deleted, material requirements in 4.2.2 being sufficient;
f) the high voltage test has been amended with regard to electronic parts.

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

Draft	Report on voting
18/1786/FDIS	18/1790/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.

A list of all parts of the IEC 60092 series, published under the general title *Electrical installations in ships,* 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,
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INTRODUCTION

IEC 60092 (all parts) forms a series of international standards for electrical installations in sea-going ships, incorporating good practice and coordinating, as far as possible, existing rules.

These standards form a code of practical interpretation and amplification of the requirements of the International Convention for the Safety of Life at Sea, a guide for future regulations which may be prepared and a statement of practice for use by shipowners, shipbuilders and appropriate organizations.

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ELECTRICAL INSTALLATIONS IN SHIPS –

Part 306: Equipment – Luminaires and lighting accessories

1 Scope

This part of IEC 60092 applies to luminaires and lighting accessories for use in ships. It applies primarily to luminaires for illumination purposes.

~~NOTE Boats, submarines (except naval submarines), watercraft and floating equipment are ships to which this standard applies.~~

This document also applies to lighting accessories associated with the wiring and current consuming appliance of an installation.

This document does not apply to portable luminaires, navigation lights, search lights, daylight signalling lamps, signal lights including the relevant control and monitoring equipment and other lights used for navigation in channels, harbours, etc.

~~For navigation lights, see EN 14744, for search lights, see ISO 17884, for daylight signalling lamps, see ISO 25861.~~

Annex A provides EMC considerations for system integrators.

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 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

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

~~IEC 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*~~

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-52, *Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60079 (all parts), ~~*Equipment for*~~ *Explosive atmospheres*

IEC 60092-101, *Electrical installations in ships – Part 101: Definitions and general requirements*

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IEC 60092-201~~:1994~~, *Electrical installations in ships – Part 201: System design – General*

IEC 60092-352, *Electrical installations in ships – Part 352: Choice and installation of electrical cables*

IEC 60092-353, *Electrical installations in ships – Part 353: Power cables for rated voltages 1 kV and 3 kV*

IEC 60092-360, *Electrical installations in ships – Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables*

IEC 60092-401, *Electrical installations in ships – Part 401: Installation and test of completed installation*

IEC 60092-504, *Electrical installations in ships – Part 504: Automation, control and instrumentation*

IEC 60155, *Glow-starters for fluorescent lamps*

IEC 60238, *Edison screw lampholders*

IEC 60309 (all parts), *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes*

IEC 60332-1-2:2004, *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

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

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

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

IEC 60533, *Electrical and electronic installations in ships – Electromagnetic compatibility (EMC) – Ships with a metallic hull*

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

IEC 60684-2, *Flexible insulating sleeving – Part 2: Methods of test*

IEC 60695-7-2, *Fire hazard testing – Part 7-2: Toxicity of fire effluent – Summary and relevance of test methods*

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/TR 60721-4-6, *Classification of environmental conditions – Part 4-6: Guidance for the correlation and transformation of environmental condition classes of IEC 60721-3 to the environmental tests of IEC 60068 – Ship environment*~~

IEC 60754-1, *Test on gases evolved during combustion of materials from cables – Part 1: Determination of the ~~amount of~~ halogen acid gas content*

IEC 60838-1, *Miscellaneous lampholders – Part 1: General requirements and tests*

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IEC 60945, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61184, *Bayonet lampholders*

IEC 61300-3-2, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-2: Examination and measurements – Polarization dependent loss in a single-mode fibre optic device*

IEC 61347-2-1, *Lamp controlgear – Part 2-1: Particular requirements for starting devices (other than glow starters)*

IEC 61995-1, *Devices for the connection of luminaires for household and similar purposes – Part 1: General requirements*

IEC 61995-2, *Devices for the connection of luminaires for household and similar purposes – Part 2: Standard sheets for DCL*

IEC 62444, *Cable glands for electrical installations*[1]

IEC 62471:2006, *Photobiological safety of lamps and lamp systems*

IEC 62742, *Electrical and electronic installations in ships – Electromagnetic compatibility (EMC) – Ships with a non-metallic hull*

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

~~ISO 2409, *Paints and varnishes – Cross-cut test*~~

~~ISO 3882, *Metallic and other inorganic coatings – Review of methods of measurement of thickness*~~

ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 4892-3, *Plastics – Methods of exposure to laboratory light sources – Part 3: Fluorescent UV lamps*

~~ISO 9001, *Quality management systems – Requirements*~~

~~ISO 17884, *Ships and marine technology – Searchlights for high-speed craft*~~

~~ISO 25861 *Ships and marine technology – Navigation – Daylight signalling lamps*~~

~~Defence Standard 02-713, *Determination of the Toxicity Index of the Products of Combustion from Small Specimens of Materials*~~

EN 12206-1, *Paints and varnishes – Coating of aluminium and aluminium alloys for architectural purposes – Part 1: Coatings prepared from thermosetting coating powder*

~~[1] To be published.~~

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EN 13032-1, *Light and lighting – Measurement and presentation of photometric data of lamps and luminaires – Part 1: Measurement and file format*

EN 13438, *Paints and varnishes – Powder organic coatings for hot dip galvanized or sherardised steel products for construction purposes*

EN 13032-4, *Light and lighting – Measurement and presentation of photometric data of lamps and luminaires – Part 4: LED lamps, modules and luminaires*

~~EN 14744, *Inland navigation vessels and sea-going vessels – Navigation light*~~

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60598-1 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

3.1
luminaire
apparatus which distributes, filters or transforms the light transmitted from one or more lamps and which includes all the parts necessary for supporting, fixing and protecting the lamps, but not the lamps themselves, and where necessary, circuit auxiliaries together with the means for connecting them to the supply

[SOURCE: IEC 60598-1:2020, 1.2.1, modified – The note to entry has been deleted.]

3.2
lamp

~~source made in order to produce an optical radiation, usually visible~~

~~[IEV 845-07-03]~~

electric light source provided with at least one cap

Note 1 to entry: For products that have the same physical characteristics as electric lamps for general lighting, but that are built to emit optical radiation mainly in the IR or UV spectrum, the term "IR lamp" or "UV lamp" is often used.

Note 2 to entry: This entry was numbered 845-07-03 in IEC 60050-845:1987.

[SOURCE: IEC 60050-845:2020, 845-27-008, modified – In the term, the word "electric" has been deleted, as well as the second note to entry.]

3.3
lighting accessories
additional parts which are needed for mounting or for electrical connection and which are usually delivered together with the luminaire

EXAMPLE Ceiling rose, cable gland, plug, socket-outlet, fixing material.

3.4
continuous operation
operation for an unlimited period without interruption within the specified environmental conditions without the specified limits of temperature being exceeded

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4 Requirements on luminaires

4.1 General

Luminaires shall comply with the requirements of IEC 60598-1 and with the additional or divergent requirements included in this document. Luminaires in accordance with this document shall be suitable for continuous operation.

4.2 Mechanical requirements

4.2.1 Design

The design of luminaires shall comply with the requirements of IEC 60092-101 and with the following additional requirements.

a) ~~Luminaires shall have sufficient mechanical resistance for the intended use. The mechanical properties shall be in accordance with intended purpose and installation location. To meet the requirement of mechanical resistance, the equipment shall withstand the respective shock and vibration conditions given in the Tables 3 and 4.~~

   The equipment shall withstand the design parameters for vibration according to IEC 60092-101.

b) Luminaires shall be designed, dimensioned and equipped with mounting devices in such a way that they will present no hazard to persons, in particular during operation and maintenance work.

c) The minimum degrees of IP protection in accordance with IEC 60529 required in the different environmental conditions related to locations are given in IEC 60092-201~~:1994, Table 5~~.

d) Luminaires shall be so constructed as to provide for adequate dissipation of heat from lamps and related components. The temperature rise of terminals for connection of supply cables shall not exceed 40 °C above ambient temperature. The insulation material of internal parts shall be of a temperature class which corresponds to the maximum temperature within the luminaires.

e) The temperature of surface parts which can be touched during operation shall not exceed 60 °C. If this is not possible, for example in case of floodlights or discharge lamps, these luminaires shall be mounted in a way that they cannot be reached without the use of additional facilities.

f) Luminaires shall be constructed in such a way that they can be easily cleaned inside, if applicable.

g) ~~Lamps~~ Lighting units shall be easily replaceable, if applicable.

h) Luminaires used in hazardous areas shall comply with the ~~relevant part of~~ IEC 60079 series according to the type of protection. ~~Hazardous spaces of ships can be e. g. paint stores and battery rooms where, depending on ventilation arrangement, luminaires may be required to comply with relevant parts of IEC 60079.~~

i) Special consideration ~~shall~~ should be given to the design of luminaires for installation in areas where the ambient temperature is ≥ +45 °C or ≤ –25 °C.

4.2.2 Materials

In general, the requirements according to IEC 60092-101 shall be met. With respect to durability and resistance to environmental conditions, luminaires and lighting accessories shall meet the requirements specified in Clause 7. The materials shall additionally comply with the following requirements.

a) The materials used for the luminaires and their mounting parts shall be non-toxic and flame retardant. See 7.2 for design parameters.

b) Parts which require surface protection shall be designed in a way that functional and operational safety is ensured.

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c) Non-metallic external parts of luminaires, enclosures and attachments shall withstand the exposure to UV and visible radiation and shall be halogen-free.

~~d) External parts and housings of luminaires intended for outdoor installation shall be of metal.~~

d) If coating of the luminaires or parts or enclosures is necessary to achieve corrosion resistance, it shall be in accordance with EN 12206-1 in case of aluminium and aluminium alloy or in accordance with EN 13438 in case of steel.

e) Sulphur containing materials, for example for sealing purposes, shall not be used.

Tests for requirements a) and c) are stated in 7.2.3.

4.3 Electrical requirements

4.3.1 Electrical safety

Electrical safety shall be ensured by compliance with the tests specified in 7.3.

4.3.2 ~~Luminaires for use on IT power~~ Distribution systems

~~Luminaires intended to be operated on on-board power supply systems shall be designed in such a way that they may be operated on a power distribution system which is not earthed (IT-system). Switches in luminaires intended for use on IT-systems shall be bipolar. If fuses are included in the luminaire, they shall be installed in each line conductor.~~

The luminaires shall be capable of being operated on secondary distribution systems. The types of AC and DC distribution systems, nominal voltages and frequencies used on ships are specified in IEC 60092-201.

4.3.3 Electromagnetic compatibility

~~In general, the requirements stated in IEC 60533 shall be met. Luminaires specified for use in the bridge area and radio room shall meet the requirements stated in IEC 60945.~~

The requirements of IEC 60533 and IEC 62742 shall be met.

Requirements to harmonic distortion shall comply with IEC 61000-3-2.

NOTE 1 IEC 61000-3-2 is developed for low voltage grid. However, it can also be used for ship installations.

NOTE 2 There are no specific requirements to LED as the requirements are the same for all types of lighting equipment. The same is applicable for IEC 60533 which applies to all types of electrical/electronic equipment, including LED.

4.4 ~~Illumination technology~~ Photometric data

Photometric data in accordance with EN 13032-1 in general, and EN 13032-4 for LED, shall be provided by the manufacturer in electronic format suitable for further electronic design and calculation.

Lamps, luminaires and light systems shall be in accordance with IEC 62471:2006 and IEC TR 62778 risk group 0 and risk group 1. Risk groups 2 and 3 applications are acceptable under the condition that it is documented on board with safety instructions and operating instructions. Risk group 2 and 3 areas shall have markings with warning labels.

NOTE 1 For flashing lights and other intense pulsed light sources, IEC TR 62471-3 provides requirements.

NOTE 2 For image projectors, IEC 62471-5 provides requirements.

NOTE 3 LED lights can have a high blue light content and other high intense light spectra.

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4.5 Environmental conditions

4.5.1 General

Luminaires shall be so designed as to withstand the applicable environmental influences during storage and ship's operation. The recommendations of IEC TR 60721-4-6 should be taken into account. Guidance for environmental testing can be found in IEC 60068-1. The tests shall be carried out in accordance with 7.2.

~~For environmental tests, the recommendations of IEC/TR 60721-4-6 should be taken into account.~~

4.5.2 Design parameters

For inclination, motion and vibration, the requirements and tests for general applications given in IEC 60092-504 shall be met.

4.6 Discharge lamp luminaires

4.6.1 General

The requirements for discharge lamp luminaires with voltages above 250 V, given in IEC 60092-201, apply.

4.6.2 Special requirements ~~on discharge lamp luminaires~~

On discharge lamp luminaires, all ballasts, capacitors and other auxiliaries mounted separately from the luminaires shall be enclosed in an earthed metal casing.

Discharge lamps should be used only in fixed luminaires.

Discharge lamp installations shall be durably marked with the warning symbol given in ~~IEC 60598-1~~ Figure 1. The marking shall be of a suitable size.

~~Transformers should be located as close as possible to the luminaire installation but no more than 100 m apart from the luminaire's installation.~~

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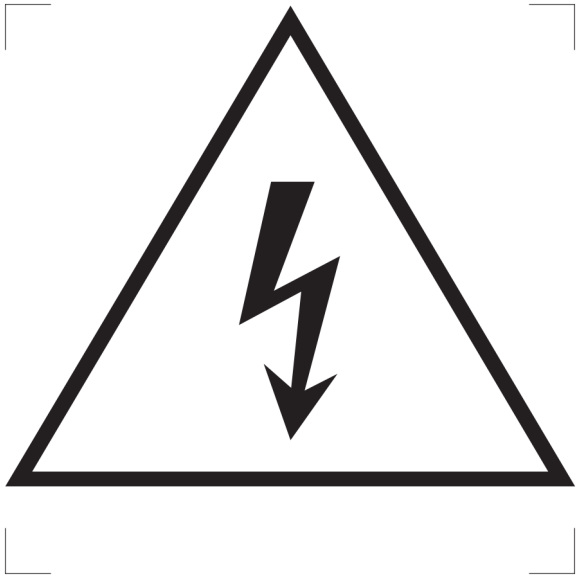

(IEC 60417-6042:2010-11)

Figure 1 – Warning symbol for discharge lamp installations

4.7 Component parts

Component parts of luminaires shall comply with their relevant standards and shall be in accordance with the requirements stated in 4.2 and the requirements stated in the documents given in Table 1.

Table 1 – Special requirements on component parts

Auxiliary, component, part	Requirement
Internal wiring, single core	Halogen-free, flame retardant and with low emission of smoke[a]
Starting devices (other than glow starters)	IEC 61347-2-1
Glow starters	IEC 60155
Devices for connection of luminaires (DCL)	IEC 61995-1 and IEC 61995-2
Cable glands	IEC 62444
[a] For details, see for example ~~HD 22.9 S2 [1] and HD 22.9 S2/A1 [2]~~ EN 50525-3-41 [1][2].	

4.8 Cables

Choice and installation of electrical cables ~~for external wiring~~ shall be carried out in accordance with IEC 60092-353, IEC 60092-360, IEC 60092-352 and IEC 60092-401, unless a specific requirement in this document is given.

4.9 Lampholders

Lampholders ~~allowed to be used in luminaires~~ shall comply with their relevant standard and shall be of a type listed in Table 2.

Lampholders shall be provided with effective means for locking the lamp in the holder.

[2] Figures in square brackets refer to the Bibliography.

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