

Electrical installations in ships —

Part 507: Pleasure craft

ICS 47.020.60; 47.080

National foreword

This British Standard is the UK implementation of EN 60092-507:2000.

The UK participation in its preparation was entrusted to Technical Committee JPEL/18, Electrical installations of ships and of mobile and fixed offshore units.

A list of organizations represented on this committee can be obtained on request to its secretary.

National Annex NA provides recommendations for the galvanic isolation of pleasure craft or small vessels connecting to a LV a.c. shore supply conforming to BS 7671:2008+A1:2011.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Foreword

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Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annex ZA is normative and annexes A and B are informative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60092-507:2000 was approved by CENELEC as a European Standard without any modification.

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INTRODUCTION

This part of IEC 60092 incorporates and coordinates, as far as possible, existing requirements for electrical installations relevant to pleasure craft as published in other parts of the IEC 60092 series, the publications of ISO technical committee 188 and the IEC 60364 series.

ELECTRICAL INSTALLATIONS IN SHIPS –

Part 507: Pleasure craft

1 Scope

This part of IEC 60092 specifies requirements for the design, construction and installation of electrical systems in pleasure craft. It applies to pleasure craft for inland waters and to seagoing pleasure craft.

The standard applies to the following types of electrical system in pleasure craft which have a length of 24 m to 50 m, or which have a gross registered tonnage not exceeding 500 grt:

- a) single-phase alternating current systems which operate at a nominal voltage not exceeding 250 V;
- b) three-phase alternating current systems which operate at a nominal voltage not exceeding 500 V;
- c) direct current systems which operate at a nominal voltage not exceeding 50 V.

The standard also applies to three-phase alternating current systems which operate at a nominal voltage not exceeding 500 V, in pleasure craft which have a length of less than 24 m.

NOTE 1 For alternating current systems having voltages exceeding 250 V single-phase or 500 V three-phase, and for direct current systems exceeding 50 V, and for craft larger than 500 grt or with a length greater than 50 m, other standards within the IEC 60092 series apply.

NOTE 2 Attention is drawn to the Recreational Craft Directive 94/25/EC of the European Parliament and of the Council, dated 16 June 1994.

NOTE 3 For pleasure craft less than 24 m in length, the following standards apply:

- for direct current installations which operate at a nominal voltage not exceeding 50 V: ISO 10133;
- for alternating current installations which operate at a nominal voltage not exceeding 250 V single-phase: ISO 13297.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60092. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60092 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

IEC 60050 (all parts), *International Electrotechnical Vocabulary*

IEC 60065:1998, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60079 (all parts), *Electrical apparatus for explosive gas atmospheres*

IEC 60092 (all parts), *Electrical installations in ships*

IEC 60092-101:1994, *Electrical installations in ships – Part 101: Definitions and general requirements*

IEC 60092-301:1980, *Electrical installations in ships – Part 301: Equipment – Generators and motors*

IEC 60092-302:1997, *Electrical installations in ships – Part 302: Low-voltage switchgear and controlgear assemblies*

IEC 60092-303:1980, *Electrical installations in ships – Part 303: Equipment – Transformers for power and lighting*

IEC 60092-306:1980, *Electrical installations in ships – Part 306: Equipment – Luminaires and accessories*

IEC 60092-307:1980, *Electrical installations in ships – Part 307: Equipment – Heating and cooking appliances*

IEC 60092-350:1988, *Electrical installations in ships – Part 350: Low-voltage shipboard power cables – General construction and test requirements*

IEC 60092-352:1997, *Electrical installations in ships – Part 352: Choice and installation of cables for low-voltage power systems*

IEC 60228:1978, *Conductors of insulated cables*

IEC 60309-2:1997, *Plugs, socket-outlets and couplers for industrial purposes – Part 2: Dimensional interchangeability requirements for pin and contact-tubes accessories*

IEC 60332-1:1993, *Tests on electric cables under fire conditions – Part 1: Tests on a single vertical insulated wire or cable*

IEC/TR2 60332-3:1992, *Tests on electric cables under fire conditions – Part 3: Tests on bunched wires or cables*

IEC 60364 (all parts), *Electrical installations of buildings*

IEC 60364-7-709:1994, *Electrical installations of buildings – Part 7: Requirements for special installations or location – Section 709: Marinas and pleasure craft*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60533: —, *Electromagnetic compatibility of electrical and electronic installations in ships* ¹⁾

IEC 60536:1976, *Classification of electrical and electronic equipment with regard to protection against electric shock*

IEC 60724:1984, *Guide to the short-circuit temperature limits of electric cables with a rated voltage not exceeding 0,6/1,0 kV*

IEC 60742:1983, *Isolating transformers and safety isolating transformers – Requirements*

¹⁾ To be published.

IEC 60898:1995, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations*

IEC 60934:1993, *Circuit breakers for equipment (CBE)*

IEC 60945:1996, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 60947 (all parts), *Low-voltage switchgear and controlgear*

IEC 61140:1997, *Protection against electric shock – Common aspects for installation and equipment*

3 Definitions

For the purpose of this part of IEC 60092, the terms and definitions given in IEC 60050, IEC 60092-101 as well as the following definitions apply.

3.1

safety extra-low voltage

voltage which does not exceed 50 V a.c. r.m.s. or 50 V d.c. between conductors, or between any conductor and earth, in a circuit isolated from higher-voltage circuits

NOTE 1 For a.c. circuits, the isolation from higher-voltage circuits can be by means such as a safety isolating transformer or convertors with separate windings.

NOTE 2 Consideration should be given to the reduction of the limit of 50 V under certain conditions such as wet surroundings or exposure to heavy seas or where direct contact with live parts is involved.

NOTE 3 The voltage limit should not be exceeded either at full load or no-load, but it is assumed, for the purpose of this definition, that any transformer or convertor is operated at its rated supply voltage.

NOTE 4 Information about protection by safety extra-low voltage (SELV) is given in IEC 60364-4-41.

3.2

final circuit

portion of a wiring system extending beyond the final overcurrent protection device [IEC 60092-101:1994, definition 1.3.17 modified]

3.3

essential services

services essential for the propulsion and steering of the pleasure craft and services to ensure minimum comfortable conditions of habitability

NOTE Examples of essential services are as follows:

- a) engine-starting air compressors;
- b) fire extinguishing systems;
- c) bilge pumps;
- d) fuel pumps;
- e) bilge level detection;
- f) circulating and cooling water pumps;
- g) fire detection and alarm systems;
- h) fire pump;
- i) lubricating oil pumps;
- j) navigation lights and special purpose lights where required by statutory regulations;
- k) essential lighting systems for areas normally accessible to personnel and to passengers;
- l) fuel and heating pumps;

- m) steering gear;
- n) engine and heating ventilation systems;
- o) navigation and communication systems;
- p) alarm systems;
- q) sound signal appliances;
- r) control and instrumentation systems;
- s) power sources for supplying the above services.

3.4

flame-retardant material

material which does not transmit flame and does not continue burning longer than specified during the test defined in 2.28.2 of IEC 60092-101

NOTE IEC 60332-1 is the relevant standard for testing cables under fire conditions.

3.5

clearance

shortest distance in air between two conductive parts

3.6

creepage distance

shortest distance along the surface of the insulating material between two conductive parts

3.7

exposed conductive part

conductive part of electrical equipment, which can be touched and which is not normally live, but which may become live under fault conditions

4 General requirements and conditions

4.1 Ratings

Conductors, switchgear and accessories shall be suitable for expected environmental and operational conditions and shall sustain anticipated overloads and transient current induced by motor start-up without damage, tripping or overheating.

4.2 Generators

The craft's electrical power may be provided by a generator or batteries having sufficient capacity to supply the essential services at the same time (see note to 3.3). When a generator is used, the generator(s) shall be capable of supplying the essential services and simultaneously be capable of charging the batteries to 80 % charge within 10 h. Such batteries shall be provided to enable operation of the craft's emergency lights, navigation lights and the VHF or SSB radio installation (if fitted), in the event of a generator failure. Such batteries shall have sufficient capacity to operate the navigation lights and radio for 3 h continuously in the event of failure of the generator(s). The continuity of supply should not be impaired by load-produced harmonic distortion or high load charges.

4.3 Ambient air and cooling water temperature

Electrical installations on craft intended solely for use in waters outside the tropical belt shall be suitable for an ambient air temperature of 45 °C maximum and –5 °C minimum and a primary cooling water temperature of 30 °C minimum.

NOTE When craft are expected to operate within the tropical belt special consideration should be given to the suitability of the electrical installation for the ambient air temperature and cooling water temperature.

4.4 Inclination of craft

Electrical equipment shall operate satisfactorily under normal conditions with the craft at the following inclinations from normal:

- for all craft:
 - rolling: up to $\pm 22,50^\circ$;
 - pitching: $\pm 7,50^\circ$; and
- for sailing craft only: at a constant heel $\pm 45^\circ$.

NOTE In principle, electrical equipment should be capable of operating as designed with the vessel in the maximum expected heel and pitch during normal operation.

4.5 Materials

Electrical equipment shall be constructed of flame-retardant, oil-resistant, moisture-resistant and UV-resistant materials which are not subject to deterioration either in the atmosphere, temperatures or UV-radiation to which they are likely to be exposed.

4.6 Voltage and frequency variations

Equipment shall function under the normal voltage and frequency variations and harmonic distortion which can occur in the distribution system in normal operation.

4.6.1 AC systems

Unless otherwise stated, equipment shall function at variations of

- frequency: $\pm 5 \%$;
- voltage: $\begin{matrix} + 6 \\ - 10 \end{matrix} \%$;
- single harmonic distortion: $< 3 \%$;
- total harmonic distortion: $< 5 \%$.

4.6.2 DC systems

At the minimum d.c. voltage, the essential services shall function and the normal life of the battery shall not be impaired.

At the maximum d.c. voltage, the gassing voltage of the battery shall not be exceeded for a long period.

4.7 Electrical apparatus for explosive gas atmospheres

Electrical equipment which is intended for use in explosive gas atmospheres or which is installed where flammable gases, vapours or explosive dusts are liable to accumulate, such as in spaces containing petrol-powered machinery, petrol fuel tank(s), or joint fitting(s) or other connections(s) between components of a petrol system, and in compartments or lockers containing LPG cylinders and/or pressure regulators, shall conform to the IEC 60079 series.

NOTE 1 Installation of electrical equipment in such locations should be avoided if possible.

NOTE 2 For craft which are less than 24 m in length, ISO 8846 applies.

4.8 Electrical fittings and cables attached to structures of another metal

If electrical fittings are attached to structures of another metal, for instance aluminium, suitable precautions shall be taken to prevent galvanic corrosion.

4.9 Equipment enclosure and location

Electrical equipment shall have enclosures suitable for the location in which the equipment is installed (see clause 8). Ventilation shall be adequate to maintain the ambient temperature at or below the maximum at which the equipment is designed to operate. Enclosures for electrical equipment shall be mechanically strong and rigid, and mounted so that the equipment will not be affected by the distortion, vibration or movement of the craft's structure that occur during normal operation of the craft.

4.10 Magnetic compasses

Conductors and equipment shall be placed at such a distance from the compass, or shall be so screened, that the interfering external magnetic field is negligible, causing a compass deviation of no more than 30' when the circuits are switched on or off under maximum load.

4.11 Electromagnetic compatibility

Electrical equipment for seagoing pleasure craft shall conform to IEC 60533 and IEC 60945.

Electrical equipment for small pleasure craft for inland waters shall conform to annex B or to the requirements for electromagnetic compatibility given in the relevant EN product standard (see notes 1 and 2).

NOTE 1 Electrical equipment for small inland-water pleasure craft which are to be placed on the EU market should conform to the requirements for electromagnetic compatibility given in the relevant EN product standard. If no relevant product standard exists, the equipment should conform to annex B. Table B.1 is based on the generic standards EN 50081-1 and EN 50082-1 and enables compliance with this standard to be achieved when using residential, commercial and light industrial equipment from the EU market.

NOTE 2 If a craft destined for the EU market falls within the scope of the EU Council Directive on Marine Equipment (1996), compliance with IEC 60533 and IEC 60945 is mandatory.

4.12 Emergency services

The following battery-operated emergency services shall be provided:

- emergency lights to assist escape from all enclosed spaces and to illuminate the disembarkation positions and the craft's navigation station;
- navigation lights;
- VHF and SSB radio.

NOTE Emergency battery supplies should be arranged so that an accident in any one space does not result in the loss of electrical power to circuits serving any safety, emergency lighting or communication equipment (see also 5.9).