BS IEC 60092-201:2019

BSI Standards Publication

Electrical installations in ships

Part 201: System design – General

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National foreword

This British Standard is the UK implementation of IEC 60092-201:2019. It supersedes BS IEC 60092-201:1994, which is withdrawn.

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.

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Electrical installations in ships – Part 201: System design – General

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ELECTRICAL INSTALLATIONS IN SHIPS –

Part 201: System design – General

FOREWORD

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International Standard IEC 60092-201 has been prepared by IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units.

This fifth edition cancels and replaces the fourth edition, published in 1994. It constitutes a technical revision.

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

a) a new subclause regarding studies and calculations has been added;
b) a new subclause regarding documentation has been added;
c) the clause regarding distribution systems has been rewritten;
d) a clause regarding system earthing has been added;
e) the clause regarding sources of electrical power has been rewritten;
f) the clause regarding distribution system requirements has been rewritten;

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g) the clause regarding cables has been deleted and transferred to IEC 60092-401;

h) a new subclause regarding electric and electrohydraulic steering gear has been added.

NOTE IEC 60092-204, *Electrical installations in ships – Part 204: System design – Electric and electrohydraulic steering gear*, has been withdrawn.

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

FDIS	Report on voting
18/1673/FDIS	18/1674/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 "http://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.

A bilingual version of this publication may be issued at a later date.

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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 co-ordinating as far as possible existing rules.

These standards form a code of practical interpretation and amplification of the requirements of the International Convention on 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 201: System design – General

1 Scope

This document is applicable to the main features of system design of electrical installations for use in ships.

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

IEC 60092-202, *Electrical installations in ships – Part 202: System design – Protection*

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

IEC 60364-1, *Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions*

IEC/IEEE 80005 (all parts), *Utility connections in port*

IMO, *International Convention for the Safety of Life at Sea (SOLAS):1974*, *consolidated edition 2009*

3 Terms and definitions

For the purpose of this document, the following terms and definitions 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 General

3.1.1
dead ship
condition where the entire machinery installation, including the power supply, is out of operation and where auxiliary services such as compressed air, starting current from batteries etc., for bringing the main propulsion into operation and for the restoration of the main power supply, are not available

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3.1.2
arc-flash hazard
dangerous condition associated with the release of energy caused by an electric arc

[SOURCE: IEEE Std 1584TM:2002, 3.1.2]

3.1.3
availability
state of an item of being able to perform its required function

[SOURCE: IEC 60050-603:1986, 603-05-04]

3.1.4
function
elementary operation performed by the system which, in conjunction with other elementary operations (system functions), enables the system to perform a task

3.1.5
main steering gear
machinery, rudder actuators, steering gear power units and ancillary equipment and the means of applying torque to the rudder stock (e.g. tiller or quadrant) necessary for effecting movement of the rudder for the purpose of steering the ship under normal service conditions

3.1.6
auxiliary steering gear
equipment, other than any part of the main steering gear, necessary to steer the ship in the event of failure of the main steering gear but not including the tiller, quadrant or components serving the same purpose

3.1.7
electric steering gear
power-operated steering gear where an electric motor applies torque to the rudder stock through mechanical means only

3.1.8
electrohydraulic steering gear
power-operated steering gear where a hydraulic pump, driven by an electric motor, applies torque to the rudder stock through hydraulic and mechanical means

3.1.9
steering gear power unit
a) in the case of electric steering gear, an electric motor and its associated electrical equipment;

b) in the case of electrohydraulic steering gear, an electric motor and its associated electrical equipment and connected pump

3.1.10
steering gear control system
equipment by which orders are transmitted from the navigating bridge to the steering gear power units

Note 1 to entry: Steering gear control systems include transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables, etc.

3.1.11
high voltage
HV
set of voltage levels in excess of low voltage

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[SOURCE: IEC 60050-601:1985, 601-01-27, modified – The words "in a general sense" have been deleted, as well as entry 2 of the definition.]

3.1.12
low voltage
LV
set of voltage levels used for the distribution of electricity and whose upper limits are generally accepted to be 1 000 V AC and 1 500 V DC

[SOURCE: IEC 60050-601:1985, 601-01-26, modified – The words "for alternating current" have been replaced by "AC and 1 500 V DC".]

3.1.13
voltage drop
change of the voltage between two given terminals of an electric circuit due to the change of the operating conditions

[SOURCE: IEC 60050-151:2001, 151-15-09]

3.2 Distribution system

3.2.1
branch
electrical line intended for connecting a current-consuming installation to the distribution network

3.2.2
branch system
assembly of branches

3.2.3
meshed network
ring-main
set of conductors that connect feeding points (nodes) and form a closed circuit

3.2.4
diversity factor
demand factor
ratio of the estimated total load of a group of consumers under their normal working conditions to the sum of their nominal ratings

3.2.5
power supply ship high voltage interface
interface between HV shore connection and the ship's primary distribution system

Note 1 to entry: Located at the ship-shore connection switchboard.

3.2.6
essential services
services essential for propulsion and steering, and safety of the ship, which are made up of "primary essential services" and "secondary essential services"

[SOURCE: IACS SC134]

3.2.7
primary essential services
services that need to be in continuous operation to maintain propulsion and steering

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[SOURCE: IACS SC134]

3.2.8
secondary essential services
services that need not necessarily be in continuous operation to maintain propulsion and steering but which are necessary for maintaining the vessel's safety

[SOURCE: IACS SC134]

3.2.9
load shedding
automatic disconnection of users

Note 1 to entry: Where the load consists of essential services and non-essential services, consideration shall be given to an arrangement which will automatically exclude non-essential services when any one generator becomes overload by power or current. This load shedding may be carried out in one or more stages, according to the overload ability of the generating sets.

3.2.10
primary distribution system
system having an electrical connection with the main source of electrical power

3.2.11
secondary distribution system
system having no electrical connection with the main source of electrical power, e.g. isolated therefrom by a double-wound transformer, static convertor including galvanic separation or motor-generator

3.2.12
hull return system
system in which insulated conductors are provided for connection to one pole or phase of the supply, the hull of the ship or other permanently earthed structure being used for effecting connections to the other pole or phase

3.3 DC systems of distribution

3.3.1
two-wire DC system
DC system comprising two conductors only, between which the load is connected

3.3.2
three-wire DC system
DC system comprising two conductors and a middle wire, the supply being taken from the two outer conductors or from the middle wire and either outer conductor, the middle wire carrying only the difference-current

3.4 AC systems of distribution

NOTE 1 AC systems are normally designed as an earthed system (TN) or an unearthed system (IT)

NOTE 2 In some countries, "unearthed systems" are also defined as "isolated systems".

3.4.1
single-phase two-wire AC system
single-phase AC system comprising two conductors only, between which the load is connected

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3.4.2
single-phase three-wire AC system
single-phase AC system comprising two conductors and a neutral wire, the supply being taken from the two outer conductors or from the neutral wire and either outer conductor, the neutral wire carrying only the difference-current

3.4.3
three-phase three-wire system
system comprising three conductors connected to a three-phase supply

3.4.4
three-phase four-wire system
system comprising four conductors of which three are connected to a three-phase supply and the fourth to a neutral point in the source of supply

3.5 Sources of electrical power

3.5.1
dead-ship condition
condition under which the main propulsion, boilers and ship auxiliaries are not in operation owing to the absence of power and no stored energy for starting the propulsion plant, and the main source of electrical power, is available

3.5.2
main source of electrical power
source intended to supply electrical power for distribution to all services necessary for maintaining the ship in normal operational and habitable condition

3.5.3
emergency source of electrical power
source of electrical power intended to supply the emergency switchboard in the event of failure of the supply from the main source of electrical power

4 Safety aspects

4.1 General

Electrical installations in ships shall be such that:

– services essential for safety shall be maintained under emergency conditions;
– the safety of passengers, crew and ship from electrical hazards shall be ensured;
– the requirements with respect to safety in this publication shall be at least in accordance with this publication;
– the IMO resolutions and SOLAS regulations are met as far as is applicable.

The choice of materials and components of construction, as well as the design, location and ship installation, are to be made in accordance with the environmental, maintenance and operating conditions in order to ensure the continued function of the equipment during all normal and reasonably foreseeable abnormal operating and fault conditions and to reduce the risk of:

- injury to crew and passengers;
- damage to the equipment the system is contained within, or adjacent equipment and systems;
- damage to adjacent equipment and systems;
- damage to the ship.

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