IEC 60092-504

Edition 4.0 2016-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electrical installations in ships – Part 504: Automation, control and instrumentation

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Installations électriques à bord des navires – Partie 504: Automatisation, commande et instrumentation

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ELECTRICAL INSTALLATIONS IN SHIPS –

Part 504: Automation, control and instrumentation

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International Standard IEC 60092-504 has been prepared by IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units.

This fourth edition cancels and replaces the third edition published in 2001. This edition constitutes a technical revision.

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

a) the part title has been changed, the term "Automation" was added;
b) the contents of the corrigendum of January 2011 have been included;
c) a new subclause 5.1 "General" with general requirements for type testing has been added;
d) Table 1 contents aligned with current version of document IACS Req. 1991/Rev. 5, 2006;
e) the revised IMO Resolution A.1021(26), Code on alerts and indicators:2009 has been taken into account;

f) IMO Resolution MSC.302(87) has been taken into account. As a consequence, the term “alert” has been used where the generic term applies. This concerns, in particular, the text in 8.4 and 9.3;

g) a new subclause 8.2.4: The revised IMO Resolution MSC.145(77), Performance standards for water level detectors on bulk carriers:2003 has been taken into account;

h) subclause 9.1 about fire detection and alarm systems has been completely revised, IMO Resolution MSC.98(73) (FSS Code) with amendment MSC.292(87): 2010 has been taken into account;

i) a new subclause 9.2 “Bilge systems” has been added;

j) the subclauses 9.4 “Automatic control installations for electrical power supply” and 9.5 “Automatic starting installations for electrical motor-driven auxiliaries” have been completely revised;

k) Clause 10 “Computer based systems” has been completely revised;

l) a new subclause 10.3.6 about wireless data communication has been added;

m) a new subclause 10.5 about remote access has been added.

The text of this standard is based on the following documents:

FDIS	Report on voting
18/1539/FDIS	18/1545/RVD

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

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

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A list of all parts of the IEC 60092 series, under the general title *Electrical installations in ships,* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

INTRODUCTION

IEC 60092 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 ship owners, shipbuilders and appropriate organizations.

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ELECTRICAL INSTALLATIONS IN SHIPS –

Part 504: Automation, control and instrumentation

1 Scope

This part of IEC 60092 specifies electrical, electronic and programmable equipment intended for automation, control, monitoring, alert, and safety and protection systems for use in ships.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary (IEV)* (available at www.electropedia.org)

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

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

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

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

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

IEC 60092-101:1994, *Electrical installations in ships – Part 101: Definitions and general requirements*
IEC 60092-101:1994/AMD1:1995

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

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

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

IEC 60092-501, *Electrical installations in ships – Part 501: Special features – Electric propulsion plant*

IEC 60092-502, *Electrical installations in ships – Part 502: Tankers – Special features*

IEC 60447, *Basic and safety principles for man-machine interface, marking and identification – Actuating principles*

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

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measuring techniques – Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

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IEC 61355-1, *Classification and designation of documents for plants, systems and equipment – Part 1: Rules and classification tables*

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IEC 62443 (all parts), *Industrial communication networks – Network and system security*

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ABS publication, *Guidance notes on the application of ergonomics to marine systems (2014-02)*

CISPR 16-1-1, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*

CISPR 16-2-1, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements*

EN 54 (all parts), *Fire detection and fire alarm systems*

IMO Resolution A.1021(26):2009, *Code on alerts and Indicators*

IMO Resolution MSC.302(87):2010, *Adoption of performance standards for bridge alert management (BAM)*

IMO Resolution A.813(19):1995, *General Requirements for Electromagnetic Compatibility (EMC) for all Electrical and Electronic Ship's Equipment*

IMO Resolution MSC.98(73):2000, *Adoption of the international code for fire safety systems (FSS Code)*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050 as well as the following apply.

3.1
accuracy
quality which characterizes the closeness of a measured value to the corresponding true value

3.2
administration
Government of the State whose flag the ship is entitled to fly

[SOURCE: SOLAS, Chapter I, Regulation 2, Definition (b)]

3.3
availability
ability of an item to be in a state to perform a required function under given conditions at a given time interval, assuming that the required external resources are provided

3.4
centralized control
control of all operations of a controlled system from one central control position

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3.5
computer based system
system that consists of one or more programmable electronic devices with their connections, peripherals and software necessary to carry out automatically specified functions

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Note 1 to entry: The following types of programmable devices could form part of a computer system: main-frame, mini-computer, micro-processor-based computer, programmable logic controller.

3.6
control functions
functions intended to regulate the behaviour of equipment or systems

3.7
control position
control station
group of control devices by which an operator can control the performance of a machine, apparatus, process or assembly of machines and apparatus

Note 1 to entry: A control position will generally enable an operator to verify the achievement of the desired conditions by means of an appropriate monitoring system

3.8
dependability
extent to which a system can be relied upon to perform its intended functions under defined operational and environmental conditions

3.9
essential services
functions necessary for the propulsion, steering and safety of the ship and its personnel

3.10
failsafe
design property of an item which prevents its failures from resulting in critical faults

Note 1 to entry: The safe state, according to the application, will be predetermined in terms of priority for the safety of the ship and may generally be taken as the least critical one for the main components and auxiliaries of, for example, the propulsion/manoeuvring plant.

[SOURCE IEC 60050-821: 1998, 821-01-10, modified – a note has been added.]

3.11
function
elementary operation performed by the system which, in conjunction with other elementary operations (system functions), enables the system to perform a task

3.12
integrity
capability of a system to satisfactorily perform the required functions under all the stated conditions within a stated period of time

3.13
machinery control room
room or spaces where centralized controls and measuring and monitoring equipment for main equipment and essential auxiliary machinery are located together with the appropriate means of communication

3.14
maintainability
ability of an item under given conditions of use, to be retained in, or restored to, a state in which it can perform a required function, when maintenance is performed under given conditions and using stated procedures and resources

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Note 1 to entry: The term "maintainability" is also used as a measure of maintainability performance.

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3.15
monitoring functions
functions intended to collect data from equipment and systems for the purpose of display and recording

3.16
protection functions
functions intended to prevent damage to equipment or systems in the event of a fault

3.17
reliability (performance)
ability of an item to perform a required function under given conditions for a given time interval

Note 1 to entry: It is generally assumed that the item is in a state to perform this required function at the beginning of the time interval.

Note 2 to entry: Generally, reliability performance is quantified using appropriate measures. In some applications, these measures include an expression of reliability performance as a probability, which is also called reliability.

[SOURCE: IEC 60050-312:2001, 312-07-06, modified – notes 1 and 2 have been added.]

3.18
protection and safety functions
functions intended to prevent harm or danger to personnel and protect equipment/systems

3.19
software
computer programs, procedures, rules and associated documentation of a digital information processing system pertaining to the operation and including application (user) program, middleware and operating system (firmware) program