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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL AND ELECTRONIC INSTALLATIONS IN SHIPS – ELECTROMAGNETIC COMPATIBILITY (EMC) – SHIPS WITH A METALLIC HULL

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions and deletions are displayed in red, with deletions being struck through.
International Standard IEC 60533 has been prepared by IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units.

This third edition cancels and replaces the second edition, published in 1999. This edition constitutes a technical revision.

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

– Introduction has been supplemented;
– scope and title have been modified to limit the application of the standard to installations in ships with metallic hulls only;
– the normative references have been updated;
– further explanation for in-situ testing has been given in 5.1;
– numbering of CISPR-Standards in Tables 1, 2 and 3 has been updated;
– title of Annex B has been changed;
– requirements on cable routing in Annex B have been amended;
– new Annex C EMC test report has been added.

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

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

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

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

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

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.
INTRODUCTION

Electrical installations of ships with electric and/or electronic systems need to operate under a wide range of environmental conditions.

The control of undesired electromagnetic emission ensures that no other device on board will be unduly influenced by the equipment under consideration. Suitable limits are specified.

On the other hand, the equipment needs to function without degradation in the normal electromagnetic environment. The limit values for immunity, specified in this International Standard, have been chosen under this assumption. Equipment which is tested and installed in accordance with this International Standard meets the relevant IMO requirements. Special risks, for instance lightning strikes, transients from the operation of circuit breakers and electromagnetic radiation from radio transmitters are also covered.

Complex electric and/or electronic systems require EMC planning in all phases of design and installation, considering the electromagnetic environment, any special requirements and the equipment performance.

This third edition of IEC 60533 is applicable to electromagnetic compatibility of all electrical and electronic installations in ships with metallic hull.

It is based on the assumption that the ship is constructed in such a way that metallic hull and structure parts will significantly attenuate electromagnetic disturbance from the outer deck environment to the inner deck environment and vice versa.
1 Scope

This International Standard specifies minimum requirements for emission, immunity and performance criteria regarding electromagnetic compatibility (EMC) of electrical and electronic equipment for ships with metallic hull. It assists in meeting the requirements of IMO resolution A.813 (see annex A). Additional or divergent requirements for ships with non-metallic hull will be given in a future International Standard (IEC 62742).

Equipment which is tested and installed in accordance with this standard meets the relevant IMO requirements.

This International Standard assists in meeting the relevant EMC requirements as stated in SOLAS 74, Chapter IV, Regulation 6 and Chapter V, Regulation 17. Reference to this International Standard is made in IMO Resolution A.813(19).

NOTE 1 The normative part of this International Standard has been prepared as a product family EMC standard.

NOTE 2 Effects on human beings are not the subject of this standard.

This International Standard further gives guidelines and recommendations on the measures to achieve EMC in the electrical and electronic installations of the following equipment groups:

a) group A: maritime navigation and radio communication and navigation equipment and systems;
b) group B: power generation and conversion equipment;
c) group C: equipment operating with pulsed power;
d) group D: switchgear and control systems controlgear;
e) group E: intercommunication and signal processing equipment and control systems;
f) group F: non-electrical items and equipment;
g) group G: integrated systems.

The basic EMC standard for groups A and C is IEC 60945. The EMC requirements according to IEC 60945 apply additionally for

- bridge mounted equipment;
- equipment in close proximity to receiving antennas;
- equipment capable of interfering with the safe navigation of the ship and with radio communication.

NOTE This standard does not specify unsafe operation. Effects on humans, like exposure to electromagnetic fields, and basic safety requirements such as protection against electric shock and dielectric strength tests for equipment are not within the scope of this International Standard.
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(161): International Electrotechnical Vocabulary (IEV) — Chapter 161: Electromagnetic compatibility

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

IEC 60092-101: Electrical installations in ships — Part 101: Definitions and general requirements

IEC 60092-201: Electrical installations in ships — Part 201: System design — General

IEC 60092-504: Electrical installations in ships — Part 504: Special features — Control and instrumentation

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

IEC 61000-1-1: Electromagnetic compatibility (EMC) — Part 1: General — Section 1: Application and interpretation of fundamental definitions and terms

IEC 61000-4-1: Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 1: Overview of immunity tests, Basic EMC Publication

IEC 61000-4-2, Electromagnetic compatibility (EMC) — Part 4-2: Testing and measurement techniques — Electrostatic discharge immunity test, Basic EMC Publication

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, 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

IEC 61000-4-16, Electromagnetic compatibility (EMC) — Part 4-16: Testing and measurement techniques — Test for immunity to conducted common mode disturbances in the frequency range 0 Hz to 150 kHz
Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161 and the following apply. Generic definitions can also be found in IEC 60050(161) and in IEC 61000-1.

Additional definitions, not included in IEC 60050(161) but nevertheless necessary for the application of the different tests, are given in the Basic EMC publications.

3.1 electromagnetic compatibility  
EMC  
ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment


3.2 electromagnetic influence  
effect of electromagnetic quantities on electrical and electronic circuits, equipment, systems or humans

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