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**Maritime navigation and radiocommunication equipment and systems –
Integrated navigation systems (INS) –
Part 2: Modular structure for INS – Operational and performance requirements,
methods of testing and required test results**

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**Matériels et systèmes de navigation et de radiocommunication maritimes –
Systèmes de navigation intégrés (INS) –
Partie 2: Structure modulaire des systèmes de navigation intégrés – Exigences
opérationnelles et de fonctionnement, méthodes d'essai et résultats d'essai
exigés**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – INTEGRATED NAVIGATION SYSTEMS (INS) –

Part 2: Modular structure for INS – Operational and performance requirements, methods of testing and required test results

FOREWORD

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International Standard IEC 61924-2 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

This second edition cancels and replaces the first edition published in 2012, of which it constitutes a technical revision.

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

- a) addition of a requirement for INS to provide capability for Maritime Safety Information to comply with requirements of the International Maritime Organization;

- b) modification of Clause 8 (Alert management) and associated annexes to align it with IEC 62923-1 concerning bridge management;
- c) modifications to Annex D to incorporate newer recommendations of the International Maritime Organization.

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

FDIS	Report on voting
80/977/FDIS	80/970/RVC

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 in the IEC 61924 series, published under the general title *Maritime navigation and radiocommunication equipment and systems – Integrated navigation systems (INS)*, 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,
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MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – INTEGRATED NAVIGATION SYSTEMS (INS) –

Part 2: Modular structure for INS – Operational and performance requirements, methods of testing and required test results

1 Scope

This part of IEC 61924 specifies the minimum requirements for the design, manufacture, integration, methods of testing and required test results for an integrated navigation system (INS) to comply with the International Maritime Organization (IMO) requirements of Resolution MSC.252(83), as amended by Resolution MSC.452(99). In addition, it takes account of IMO Resolution A.694(17) to which IEC 60945 is associated. When a requirement in this document is different from IEC 60945, the requirement of this document takes precedence.

For bridge alert management, IMO Resolution MSC.302(87) supersedes IMO Resolution MSC.252(83). Accordingly, this document incorporates references to IEC 62923-1 and IEC 62923-2 which are associated with Resolution MSC.302(87) for requirements and tests, where applicable. This document indicates which requirements and associated tests of MSC.252(83) have been superseded by MSC.302(87).

NOTE All text of this document whose wording is identical to that in IMO Resolution MSC.252(83), as amended by MSC.452(99), is printed in *italics* and the Resolution and paragraph number indicated between brackets.

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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 60945:2002, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61162-1:2016, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

IEC 61162-2, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 2: Single talker and multiple listeners, high-speed transmission*

IEC 61162-450, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 450: Multiple talkers and multiple listeners – Ethernet interconnection*

IEC 61174:2015, *Maritime navigation and radiocommunication equipment and systems – Electronic chart display and information system (ECDIS) – Operational and performance requirements, methods of testing and required test results*

IEC 62065:2014, *Maritime navigation and radiocommunication equipment and systems – Track control systems – Operational and performance requirements, methods of testing and required test results*

IEC 62288, *Maritime navigation and radiocommunication equipment and systems – Presentation of navigation-related information on shipborne navigational displays – General requirements, methods of testing and required test results*

IEC 62388:2013, *Maritime navigation and radiocommunication equipment and systems – Shipborne radar – Performance requirements, methods of testing and required test results*

IEC 62616, *Maritime navigation and radiocommunication equipment and systems – Bridge navigational watch alarm system (BNWAS)*

IEC 62923-1:2018, *Maritime navigation and radiocommunication equipment and systems – Bridge alert management – Part 1: Operational and performance requirements, methods of testing and required test results*

ISO 11674, *Ships and marine technology – Heading control systems*

IMO A.694(17), *General requirements for shipborne radio equipment forming part of the Global maritime distress and safety system (GMDSS) and for electronic navigational aids*

IMO/ICAO, *International Aeronautical and Maritime Search and Rescue Manual (IAMSAR Manual) Volume 3*

IMO MSC/Circ.982, *Guidelines on ergonomic criteria for bridge equipment and layout*

IMO MSC.191(79), *Performance standards for presentation of navigation-related information on shipborne navigational displays*

IMO MSC.232(82), *Revised performance standards for Electronic Chart Display and Information Systems (ECDIS)*

IMO MSC.252(83), *Performance Standards for Integrated Navigation Systems (INS)*

IMO MSC.452(99), *Amendments to the revised performance standards for integrated navigation systems (INS) (Resolution MSC.252(83))*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes 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>

3.1.1

accuracy

degree of conformance between the estimated or measured parameter value at a given time and its true parameter value at that time

3.1.2

added value

functionality and information, which are provided by the INS, in addition to the requirements of the performance standard for the individual equipment

3.1.3

aid to navigation

AtoN

device or system external to a vessel intended to assist a navigator to determine position or safe course, or to warn of hazards to navigation

3.1.4

AIS ASM

AIS application specific messages that are included in IEC 62288

3.1.5

alarm

condition requiring immediate attention and action by the bridge team, to maintain the safe navigation of the ship

3.1.6

alert

announcement of abnormal situations and conditions requiring attention

Note 1 to entry: Alerts are divided in four priorities: emergency alarms, alarms, warnings and cautions. An alert provides information about a defined state change in connection with information about how to announce this event in a defined way to the system and the operator.

3.1.7

alert announcement

visual and, where applicable, acoustical presentation of alerts

3.1.8

alert history list

accessible list of past alerts

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3.1.9

alert management

concept for the harmonized regulation of the monitoring, handling, distribution and presentation of alerts on the bridge

3.1.10

announcement

visual and/or audible signal issued to the user by the system

3.1.11

automatic control functions

functions that include automatic heading, and/or track and/or speed control or other navigation related automatic control functions

3.1.12

backup

use of data, function and/or hardware of similar type and quality

3.1.13

Category A alert

alert where graphical, for example radar, ECDIS, information at the task station directly assigned to the function generating the alert is necessary, as decision support for the evaluation the alert related condition

3.1.14

Category B alert

alerts where no additional information for decision support is necessary besides the information which can be presented at the central alert management HMI

3.1.15**caution****lowest-priority alert**

awareness of a condition which does not warrant an alarm or warning condition, but still requires attention out of the ordinary consideration of the situation or of given information

3.1.16**collision avoidance**

navigational task of detecting and plotting other ships and objects to avoid collisions

3.1.17**configuration in use**

sub-systems (e.g. sensors and sources, MFD workstations, automatic control function, etc.) selected for use and tasks (e.g. collision avoidance, route monitoring, etc.) selected operative in each MFD

Note 1 to entry: This is a subset of the available configuration which is a subset of the complete system configuration.

3.1.18**conning position**

place on the bridge with a commanding view and which is used by navigators when commanding, manoeuvring and controlling a ship

3.1.19**consistent common reference point****CCRP**

location on own ship, to which all horizontal measurements such as target range, bearing, relative course, relative speed, closest point of approach (CPA) or time to closest point of approach (TCPA) are referenced, typically the conning position of the bridge

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3.1.20**consistent common reference system****CCRS**

sub-system or function of an INS for acquisition, processing, storage, surveillance and distribution of data and information providing identical and obligatory reference to sub-systems and subsequent functions within an INS and to other connected equipment, if available

Note 1 to entry: Examples of reference are: coordinate system, time zone, chart datum and depth datum.

3.1.21**degraded condition**

reduction in system functionality resulting from failure

3.1.22**detected hazard**

hazard identified by a sensor (for example, radar or echo sounder) or reported by a communication device (for example AIS or NAVTEX) and which is available to the INS

3.1.23**entry field**

location on a display for the input of data by the operator

Note 1 to entry: The requested information is usually alphanumeric.

3.1.24**essential functions**

indispensable functions to be available as required for the relevant operational use

3.1.25

essential information

indispensable information to be available as required for the relevant functions

3.1.26

expected precision

deviation between the measured value and the true value that is normally not exceeded by a typical system

3.1.27

external safety related messages

data received from outside of the ship concerning the safety of navigation, through equipment listed in SOLAS chapter V and/or Maritime Safety Information (MSI) messages

Note 1 to entry: Sources of MSI are NAVTEX (IEC 61097-6), other IMO-recognized equipment accommodating other providers of GMDSS terrestrially-based services and recognized mobile satellite service enhanced group calling system (IEC 61097-4 and IEC 61097-16).

3.1.28

failure analysis

logical, systematic examination of an item, including its diagrams or formulas, to identify and analyse the probability, causes and consequences of potential and real failures

3.1.29

fallback

use of data, function or hardware of degraded quality in relation to the failed one, for example dead reckoning for position information, heading control in case of a failure of track control

3.1.30

functionality

ability to perform an intended function

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Note 1 to entry: The activity of performing a function normally employs a system of displays, controls and instrumentation.

3.1.31

hazard

objects or conditions potentially dangerous to navigation, possibly leading to grounding or collision, that may be detected by a sensor, reported by a communication device, retrieved from a database or manually input to the INS

3.1.32

human factor

workload, capabilities and limits of a user trained according to the regulations of the IMO

3.1.33

human machine interface

HMI

part of a system an operator interacts with

Note 1 to entry: The interface is the aggregate of means by which the users interact with a machine, device, and system (the system). The interface provides means for input, allowing the users to control the system and output, allowing the system to inform the users.

3.1.34

indication

display of regular information and conditions, not part of alert management

3.1.35**integrated navigation system****INS**

composite navigation system which performs at least the following tasks: collision avoidance, route monitoring thus providing "added value" for the operator to plan, monitor and safely navigate the progress of the ship

Note 1 to entry: *The INS allows meeting the respective parts of SOLAS regulation V/19 and supports the proper application of SOLAS regulation V/15.*

3.1.36**inspection**

visual check of equipment or documentation

3.1.37**integrity**

ability of the INS to provide the user with information within the specified accuracy in a timely, complete and unambiguous manner, and alerts within a specified time when the system should be used with caution or not at all

3.1.38**integrity monitoring**

ability of a system to provide the user with information within the specified accuracy in a timely, complete and unambiguous manner, and to present warnings and indications within a specified time when the system should be used with caution or not at all

3.1.39**known hazard**

hazard retrieved from a database (including navigational charts and nautical publications) or manually input and which is available to the INS

<https://standards.iteh.ai/catalog/standards/sist/e3b6fa88-c49a-4207-93bb-ce64ecfc2943/iec-61924-2-2021>

3.1.40**latency**

time interval between an event and its result, including time for reception, processing, transmission and display

3.1.41**leg**

ship's intended ground track between two waypoints

3.1.42**man-over-board mode****MOB**

display mode for operations and actions of a ship after a man-over-board accident happened (release of safety equipment, e.g., life buoy and life belt, performance of a return manoeuvre etc.)

3.1.43**Maritime Safety Information****MSI**

navigational and meteorological warnings, meteorological forecasts and other urgent safety-related messages broadcast to ships

Note 1 to entry: MSI is promulgated using NAVTEX and EGC services (see IMO MSC.468(101)).

3.1.44**manufacturer**

organisation responsible for the production of all or some of the parts of the INS, including the responsibility that these parts meet their appropriate international standards