

INTERNATIONAL STANDARD



**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**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

Currently in preview, click for full version



IEC 62288

Edition 3.1 2024-11
CONSOLIDATED VERSION

INTERNATIONAL STANDARD



**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**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 47.020.70

ISBN 978-2-8327-0021-1

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	9
INTRODUCTION to Amendment 1	11
1 Scope.....	12
2 Normative references	12
3 Terms, definitions and abbreviated terms	13
3.1 Terms and definitions.....	13
3.2 Abbreviated terms.....	20
4 General requirements for all displays on the bridge of a ship	20
4.1 Relationship to IMO standards	22
4.2 Application of IEC 60945.....	22
4.2.1 Remark.....	22
4.2.2 General requirements	22
4.3 Arrangement of information.....	22
4.3.1 Consistency of layout and logical grouping	22
4.3.2 Consistent presentation of information.....	23
4.3.3 Separation of operational display area.....	23
4.4 Readability.....	23
4.4.1 Readability under all ambient light conditions	23
4.4.2 Legibility of alphanumeric data and text.....	26
4.4.3 Presentation of text and icons.....	26
4.5 Colours and intensity	27
4.5.1 Discrimination of colours – Requirement	27
4.5.2 Methods of test and required results.....	28
4.6 Symbols.....	28
4.6.1 Operational information	28
4.6.2 Electronic chart information	29
4.7 Colour coding	30
4.7.1 Colour coding for discrimination.....	30
4.7.2 Colour coding of information	30
4.7.3 Colour coding in combination with other attributes	30
4.7.4 Flashing of information	30
4.8 Integrity marking.....	31
4.8.1 Indication of source, validity and integrity status	31
4.8.2 Colour coding of validity and integrity	31
4.8.3 Indication of presentation failure.....	31
4.9 Alerts and indications.....	32
4.9.1 Operational status	32
4.9.2 List of alerts.....	32
4.9.3 Alert related information from multiple sources	32
4.9.4 Speech output for alarms and warnings	32
4.10 Presentation mode.....	32
4.10.1 Requirement.....	32
4.10.2 Methods of test and required results.....	33
4.11 User manuals, instructions and reference guides	33
4.11.1 Requirement.....	33
4.11.2 Methods of test and required results.....	33
5 Presentation of operational information	33

5.1	Application	33
5.2	Presentation of own ship information	33
5.2.1	Graphical representation of own ship – Requirement	33
5.2.2	Methods of test and required results	34
5.3	Presentation of chart information	34
5.3.1	Alteration of chart information	34
5.3.2	Colours and symbols for charted information	34
5.4	Presentation of radar information	35
5.4.1	Radar video images	35
5.4.2	Target trails	36
5.5	Presentation of target information	36
5.5.1	Providing target information	36
5.5.2	Consistent user interface for target information	37
5.5.3	Indication of exceeding target capacity	37
5.5.4	Presentation of repeated AIS reports	38
5.5.5	Filtering sleeping AIS targets	39
5.5.6	Activation of AIS targets	39
5.5.7	Graphical presentation of targets	40
5.5.8	Target selection	41
5.5.9	Indication of target derivation	42
5.5.10	Presentation of tracked radar target information	42
5.5.11	Presentation of reported AIS target information	43
5.5.12	Continual update of target information	44
5.5.13	Own ship's AIS information	44
5.5.14	Obscuring the operational display area	45
5.6	Operational alerts	45
5.6.1	Alert status	45
5.6.2	CPA/TCPA alarms	45
5.6.3	Acquisition/activation and warnings	46
5.6.4	Lost target warnings	46
5.7	AIS and radar target association	47
5.7.1	Requirement	47
5.7.2	Methods of test and required results	47
5.8	AIS presentation user selectors and their status indications	48
5.8.1	Requirement	48
5.8.2	Methods of test and required results	49
5.9	Target manoeuvre	50
5.9.1	Requirement	50
5.9.2	Methods of test and required results	50
5.10	Measurement	50
5.10.1	Measurement from own ship	50
5.10.2	Bearing and range measurements	50
5.11	Navigation tools	51
5.11.1	General requirements	51
5.11.2	Range rings	51
5.11.3	Variable range marker (VRM)	51
5.11.4	Bearing scale	52
5.11.5	Electronic bearing line (EBL)	53
5.11.6	Parallel index lines (PI)	54

5.11.7	Offset measurement of range and bearing	55
5.11.8	User cursor.....	56
5.12	AIS data link message processing capacity.....	57
5.12.1	General	57
5.12.2	Requirements	57
5.12.3	Methods of test and required results	57
5.13	AIS data report	57
5.13.1	General	57
5.13.2	AIS data report capacity	57
5.13.3	AIS data report display	58
5.13.4	Graphical presentation of AIS AtoN dimensions	61
5.14	AIS locating device	61
5.14.1	General	61
5.14.2	AIS locating device capacity	62
5.14.3	AIS locating device display	62
5.15	AIS ASM	64
5.15.1	General	64
5.15.2	Categories.....	65
5.15.3	AIS ASM capacity	67
5.15.4	AIS ASM display	69
5.16	Presentation of AIS synthetic target	71
5.16.1	Requirement.....	71
5.16.2	Methods of test and required results	72
5.17	Presentation of association of DSC received call with a displayed AIS object.....	73
5.17.1	Requirement.....	73
5.17.2	Methods of test and required results	73
5.18	AIS ASM information extending reported AIS target information	74
5.19	Received AIS safety related messages	75
5.19.1	Requirements	75
5.19.2	Methods of test and required results	76
5.20	Sent AIS safety related messages.....	77
5.20.1	Requirements	77
5.20.2	Methods of test and required results	77
6	INS, radar and chart displays	77
6.1	General.....	77
6.1.1	Application.....	77
6.1.2	Multifunction displays	77
6.1.3	Simultaneous display of radar and chart data	78
6.1.4	Range scales.....	78
6.1.5	Operational display area	79
6.1.6	Motion display modes	79
6.1.7	Orientation modes	79
6.1.8	Off-centring	80
6.1.9	Stabilisation modes	80
6.2	Radar displays	81
6.2.1	Application.....	81
6.2.2	Radar video image.....	81
6.2.3	Brightness of radar information	82
6.2.4	Display of chart information on radar	82

6.2.5	Priority of radar information	83
6.2.6	Display of map graphics	83
6.3	Chart displays	84
6.3.1	Application	84
6.3.2	Display of chart information	84
6.3.3	IMO ECDIS display categories	85
6.3.4	Adding or removing information from the display	85
6.3.5	Safety contour	86
6.3.6	Safety depth	86
6.3.7	Chart scale	86
6.3.8	Display of radar and target information	87
6.3.9	Display of additional information	87
6.4	Composite task-oriented presentations	88
6.4.1	User-configured presentations	88
6.4.2	Information associated with the task-at-hand	88
6.5	Single and simple operator actions	88
6.5.1	Applicability	88
6.5.2	Requirement	89
6.5.3	Methods of test and required results	89
6.6	User and default settings	89
6.6.1	General	89
6.6.2	User-settings	89
6.6.3	Default settings	90
7	Physical requirements	90
7.1	General	90
7.2	Display adjustment	90
7.2.1	Contrast and brightness	90
7.2.2	Magnetic interference	91
7.2.3	Temporal stability	91
7.2.4	Physical controls and status indicators	92
7.3	Screen size	92
7.3.1	Requirement	92
7.3.2	Method of test and required results	93
7.4	Multicoloured display equipment	93
7.4.1	Requirement	93
7.4.2	Method of test and required results	93
7.5	Screen resolution	94
7.5.1	Requirement	94
7.5.2	Method of test and required results	94
7.6	Screen viewing angle	94
7.6.1	Requirement	94
7.6.2	Methods of test and required results	94
Annex A (normative)	Presentation colours and symbols	95
A.1	Overview	95
A.2	Purpose	95
A.3	Use	95
A.4	Application	95
A.5	Navigation-related symbols	95

Annex B (normative) Guidelines for the presentation of navigation-related terminology and abbreviations	131
B.1 Overview.....	131
B.2 Purpose	131
B.3 Use of these guidelines.....	131
B.4 Application.....	131
B.5 Navigation related terminology and abbreviations	131
Annex C (informative) Guidance on display and dialogue design in IMO MSC/Circ.982.....	138
C.1 Overview.....	138
C.2 General.....	138
C.3 Requirements in IMO MSC/Circ.982 related to the display design	138
Annex D (informative) Guidance on testing	140
D.1 Methods of test	140
D.1.1 General	140
D.1.2 Observation.....	140
D.1.3 Inspection of documented evidence	140
D.1.4 Measurement.....	141
D.1.5 Analytical evaluation.....	141
D.2 Application of IEC 60945.....	141
D.2.1 Display equipment category.....	141
D.2.2 Technical performance	141
D.2.3 Pre-conditioning for environmental tests	142
D.2.4 Methods of test applied for IEC 60945.....	142
D.3 Compliance with requirements	143
D.4 Simulation.....	144
D.5 Electronic chart data.....	144
Annex E (normative) Operational controls and logical grouping.....	145
E.1 Overview.....	145
E.2 Logical grouping of data and control functions	145
E.3 Navigation related terminology and icons for common function controls (hot keys and shortcuts)	147
Annex F (normative) Icons for presentation of the state of an alert.....	161
Annex G (normative) Testing for colours, intensity and flicker	162
G.1 Testing for colours and intensity	162
G.1.1 General	162
G.1.2 Test personnel.....	163
G.1.3 Method of test.....	163
G.2 Testing for flicker	164
G.2.1 Overview	164
G.2.2 Analytic model.....	164
G.2.3 Decision criteria.....	166
Annex H (normative) Single and simple operator actions	168
H.1 General.....	168
H.2 Tables for single and simple operator actions	168
Annex I (normative) Default settings	170
I.1 General.....	170
I.2 ECDIS default settings.....	170
I.3 Radar default settings.....	172

Annex J (normative) Implementation details of AIS ASM.....	173
J.1 General.....	173
J.2 AIS ASM.....	173
Annex K (informative) Overview of AIS Messages.....	182
K.1 General.....	182
K.2 Use case guidance on AIS ASM.....	184
Annex L (informative) Overview of the use AIS AtoN status field bits	185
Bibliography.....	186
Table 1 – Ambient light conditions	24
Table 2 – Operational status of indications	32
Table 3 – User selectors for AIS presentation	48
Table 4 – AIS status indications.....	49
Table 5 – AIS data report capacity	58
Table 6 – AIS locating devices capacity	62
Table 7 – AIS ASM object capacity	67
Table 8 – Extended reported AIS target information from AIS ASM.....	74
Table A.1 – Own ship symbols.....	96
Table A.2 – Radar and AIS symbols.....	100
Table A.3 – Navigation symbols.....	116
Table A.4 – Navigation tools.....	121
Table A.5 – Other symbols.....	122
Table A.6 – Example of possible colour scheme	130
Table B.1 – List of standard terms and abbreviations.....	132
Table B.2 – List of standard units of measurement and abbreviations	137
Table C.1 – Paragraphs in MSC/Circ.982 associated with IEC 60945 requirements	138
Table C.2 – Other paragraphs in MSC/Circ.982 related to display design.....	139
Table C.3 – Other paragraphs in MSC/Circ.982 partially related to display design	139
Table D.1 – Methods of tests applied for IEC 60945	142
Table E.1 – Logical grouping for radar, ECDIS and INS applications (based on MSC.1/Circ.1609).....	146
Table E.2 – Examples of logical grouping for voluntary implementation.....	147
Table E.3 – General controls	148
Table E.4 – General navigation functions (based on MSC.1/Circ.1609).....	149
Table E.5 – Radar specific controls.....	152
Table E.6 – Control of chart display functions (based on MSC.1/Circ.1609)	153
Table E.7 – Control of chart functionality (based on MSC.1/Circ.1609)	158
Table E.8 – Database functions (based on MSC.1/Circ.1609)	158
Table E.9 – Route plan and monitoring functions (based on MSC.1/Circ.1609)	159
Table E.10 – Groups of functions (based on MSC.1/Circ.1609).....	159
Table G.1 – Values of predicted energy and special coefficients	167
Table H.1 – Access to functions, as defined before June 2019 (based on MSC.1/Circ.1609).....	168
Table H.2 – Access to functions (based on MSC.1/Circ.1609).....	169

Table H.3 – Access to group of functions (based on MSC.1/Circ.1609)	169
Table I.1 – ECDIS settings configured in response to "Default" selection (based on MSC.1/Circ.1609)	170
Table I.2 – Radar control settings configured in response to "Default" selection (based on MSC.1/Circ.1609)	172
Table J.1 – Details of AIS ASM	173
Table K.1 – AIS Messages	182
Table K.2 – AIS ASM Messages	183
Table L.1 – AIS AtoN status field	185

Currently in preview, click buy full version.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 62288 edition 3.1 contains the third edition (2021-12) [documents 80/1013/FDIS and 80/1017/RVD] and its amendment 1 (2024-11) [documents 80/1117/CDV and 80/1128/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

IEC 62288 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems. It is an International Standard.

This third edition cancels and replaces the second edition published in 2014. This edition constitutes a technical revision.

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

- a) Clause 4 has been revised to remove requirements for indications of alerts which are now given in IEC 62923-1;
- b) Clause 5 has been extensively revised to add new requirements for AIS, ASM and DSC presentation together with three new supporting annexes, Annex J, Annex K, Annex L;
- c) Annex A and Annex B have been revised to incorporate changes to IMO circular SN.1/Circ.243;
- d) Annex E has been revised to incorporate changes to IMO resolution MSC.191(79) and renamed as "Operational controls and logical grouping".
- e) two new annexes have been added, Annex H on operator actions and Annex I on default settings in support of IMO circular MSC.1/Circ.1609.

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

Draft	Report on voting
80/1013/FDIS	80/1017/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document and its amendment will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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

INTRODUCTION to Amendment 1

This amendment updates the interpretation of the bit encoding for reporting various cases of AtoN errors or failures to be compliant with the notes available in the IALA R-0126 Ed.2 published in December 2021. The amendment further corrects an inconsistency between Table L.1 of IEC 62288:2021 and Figure 4 section 4.8.4 of IALA Rec.R-0126:2021.

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

1 Scope

This document specifies the general requirements, methods of testing, and required test results, for the presentation of navigation-related information on shipborne navigational displays in support of IMO resolutions MSC.191(79) as amended by MSC.466(101) in June 2019, and where applicable MSC.302(87).

This document also supports the guidelines included in the related IMO Circulars MSC.1/Circ.1609 on the standardization of user interface design for navigation equipment and SN.1/Circ.243 as revised in June 2019 on the presentation of navigation related symbols, terms and abbreviations.

This document also specifies the presentation of AIS data reports and the AIS Application Specific Messages defined for international use in IMO SN.1/Circ.289 and intended to be received by a ship for display onboard.

NOTE All text in this document whose wording is identical to text contained in an IMO document is printed in *italics*. Reference to the document is noted at the beginning of the paragraph. The notation contains a prefix referring to the document and a suffix with the paragraph number from the document (for example, (MSC191/1); (SN243/1), etc.).

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 61174, *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 61966-4, *Multimedia systems and equipment – Colour measurement and management – Part 4: Equipment using liquid crystal display panels*

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

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

IHO S-52, *Specifications for chart content and display aspects of ECDIS*

IMO, *Seafarers' Training, Certification and Watchkeeping Code (STCW Code)*