

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**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**

**Matériels et systèmes de navigation et de radiocommunication maritimes –
Présentation des informations relatives à la navigation sur des affichages de
navigation de bord – Exigences générales, méthodes d'essai et résultats
d'essai exigés**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2021 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
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 It also gives information on projects, replaced and withdrawn publications.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 online collection - oc.iec.ch

Discover our powerful search engine and read freely all the publications provided. 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 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC online collection - oc.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**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**

**Matériels et systèmes de navigation et de radiocommunication maritimes –
Présentation des informations relatives à la navigation sur des affichages de
navigation de bord – Exigences générales, méthodes d'essai et résultats
d'essai exigés**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 47.020.70

ISBN 978-2-8322-1059-4

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD	9
1 Scope	11
2 Normative references	11
3 Terms, definitions and abbreviated terms	12
3.1 Terms and definitions	12
3.2 Abbreviated terms	19
4 General requirements for all displays on the bridge of a ship	19
4.1 Relationship to IMO standards	19
4.2 Application of IEC 60945	21
4.2.1 Remark	21
4.2.2 General requirements	21
4.3 Arrangement of information	21
4.3.1 Consistency of layout and logical grouping	21
4.3.2 Consistent presentation of information	22
4.3.3 Separation of operational display area	22
4.4 Readability	22
4.4.1 Readability under all ambient light conditions	22
4.4.2 Legibility of alphanumeric data and text	25
4.4.3 Presentation of text and icons	25
4.5 Colours and intensity	26
4.5.1 Discrimination of colours – Requirement	26
4.5.2 Methods of test and required results	27
4.6 Symbols	27
4.6.1 Operational information	27
4.6.2 Electronic chart information	28
4.7 Colour coding	29
4.7.1 Colour coding for discrimination	29
4.7.2 Colour coding of information	29
4.7.3 Colour coding in combination with other attributes	29
4.7.4 Flashing of information	29
4.8 Integrity marking	30
4.8.1 Indication of source, validity and integrity status	30
4.8.2 Colour coding of validity and integrity	30
4.8.3 Indication of presentation failure	30
4.9 Alerts and indications	31
4.9.1 Operational status	31
4.9.2 List of alerts	31
4.9.3 Alert related information from multiple sources	31
4.9.4 Speech output for alarms and warnings	31
4.10 Presentation mode	31
4.10.1 Requirement	31
4.10.2 Methods of test and required results	32
4.11 User manuals, instructions and reference guides	32
4.11.1 Requirement	32
4.11.2 Methods of test and required results	32
5 Presentation of operational information	32

5.1	Application	32
5.2	Presentation of own ship information	32
5.2.1	Graphical representation of own ship – Requirement	32
5.2.2	Methods of test and required results	33
5.3	Presentation of chart information	33
5.3.1	Alteration of chart information	33
5.3.2	Colours and symbols for charted information	33
5.4	Presentation of radar information	34
5.4.1	Radar video images	34
5.4.2	Target trails	35
5.5	Presentation of target information	35
5.5.1	Providing target information	35
5.5.2	Consistent user interface for target information	36
5.5.3	Indication of exceeding target capacity	36
5.5.4	Presentation of repeated AIS reports	37
5.5.5	Filtering sleeping AIS targets	38
5.5.6	Activation of AIS targets	38
5.5.7	Graphical presentation of targets	39
5.5.8	Target selection	40
5.5.9	Indication of target derivation	41
5.5.10	Presentation of tracked radar target information	41
5.5.11	Presentation of reported AIS target information	42
5.5.12	Continual update of target information	43
5.5.13	Own ship's AIS information	43
5.5.14	Obscuring the operational display area	44
5.6	Operational alerts	44
5.6.1	Alert status	44
5.6.2	CPA/TCPA alarms	44
5.6.3	Acquisition/activation and warnings	45
5.6.4	Lost target warnings	45
5.7	AIS and radar target association	46
5.7.1	Requirement	46
5.7.2	Methods of test and required results	46
5.8	AIS presentation user selectors and their status indications	47
5.8.1	Requirement	47
5.8.2	Methods of test and required results	48
5.9	Tactical manoeuvre	49
5.9.1	Requirement	49
5.9.2	Methods of test and required results	49
5.10	Measurement	49
5.10.1	Measurement from own ship	49
5.10.2	Bearing and range measurements	49
5.11	Navigation tools	50
5.11.1	General requirements	50
5.11.2	Range rings	50
5.11.3	Variable range marker (VRM)	50
5.11.4	Bearing scale	51
5.11.5	Electronic bearing line (EBL)	52
5.11.6	Parallel index lines (PI)	53

5.11.7	Offset measurement of range and bearing	54
5.11.8	User cursor.....	55
5.12	AIS data link message processing capacity.....	56
5.12.1	General	56
5.12.2	Requirements	56
5.12.3	Methods of test and required results	56
5.13	AIS data report	56
5.13.1	General	56
5.13.2	AIS data report capacity	56
5.13.3	AIS data report display	57
5.13.4	Graphical presentation of AIS AtoN dimensions	60
5.14	AIS locating device	60
5.14.1	General	60
5.14.2	AIS locating device capacity	61
5.14.3	AIS locating device display	61
5.15	AIS ASM	63
5.15.1	General	63
5.15.2	Categories.....	64
5.15.3	AIS ASM capacity	66
5.15.4	AIS ASM display	68
5.16	Presentation of AIS synthetic target	70
5.16.1	Requirement.....	70
5.16.2	Methods of test and required results	71
5.17	Presentation of association of DSC received call with a displayed AIS object.....	72
5.17.1	Requirement.....	72
5.17.2	Methods of test and required results	72
5.18	AIS ASM information extending reported AIS target information	73
5.19	Received AIS safety related messages	74
5.19.1	Requirements	74
5.19.2	Methods of test and required results	75
5.20	Sent AIS safety related messages.....	76
5.20.1	Requirements	76
5.20.2	Methods of test and required results	76
6	INS, radar and chart displays	76
6.1	General.....	76
6.1.1	Application.....	76
6.1.2	Multifunction displays	76
6.1.3	Simultaneous display of radar and chart data	77
6.1.4	Range scales.....	77
6.1.5	Operational display area	78
6.1.6	Motion display modes	78
6.1.7	Orientation modes	78
6.1.8	Off-centring	79
6.1.9	Stabilisation modes	79
6.2	Radar displays	80
6.2.1	Application.....	80
6.2.2	Radar video image.....	80
6.2.3	Brightness of radar information	81
6.2.4	Display of chart information on radar	81

6.2.5	Priority of radar information	82
6.2.6	Display of map graphics	82
6.3	Chart displays	83
6.3.1	Application	83
6.3.2	Display of chart information	83
6.3.3	IMO ECDIS display categories	84
6.3.4	Adding or removing information from the display	84
6.3.5	Safety contour	85
6.3.6	Safety depth	85
6.3.7	Chart scale	85
6.3.8	Display of radar and target information	86
6.3.9	Display of additional information	86
6.4	Composite task-oriented presentations	87
6.4.1	User-configured presentations	87
6.4.2	Information associated with the task-at-hand	87
6.5	Single and simple operator actions	87
6.5.1	Applicability	87
6.5.2	Requirement	88
6.5.3	Methods of test and required results	88
6.6	User and default settings	88
6.6.1	General	88
6.6.2	User-settings	88
6.6.3	Default settings	89
7	Physical requirements	89
7.1	General	89
7.2	Display adjustment	89
7.2.1	Contrast and brightness	89
7.2.2	Magnetic interference	90
7.2.3	Temporal stability	90
7.2.4	Physical controls and status indicators	91
7.3	Screen size	91
7.3.1	Requirement	91
7.3.2	Method of test and required results	92
7.4	Multicoloured display equipment	92
7.4.1	Requirement	92
7.4.2	Method of test and required results	92
7.5	Screen resolution	93
7.5.1	Requirement	93
7.5.2	Method of test and required results	93
7.6	Screen viewing angle	93
7.6.1	Requirement	93
7.6.2	Methods of test and required results	93
Annex A (normative)	Presentation colours and symbols	94
A.1	Overview	94
A.2	Purpose	94
A.3	Use	94
A.4	Application	94
A.5	Navigation-related symbols	94

Annex B (normative) Guidelines for the presentation of navigation-related terminology and abbreviations	130
B.1 Overview.....	130
B.2 Purpose	130
B.3 Use of these guidelines.....	130
B.4 Application.....	130
B.5 Navigation related terminology and abbreviations	130
Annex C (informative) Guidance on display and dialogue design in IMO MSC/Circ.982.....	137
C.1 Overview.....	137
C.2 General.....	137
C.3 Requirements in IMO MSC/Circ.982 related to the display design	137
Annex D (informative) Guidance on testing	139
D.1 Methods of test	139
D.1.1 General	139
D.1.2 Observation.....	139
D.1.3 Inspection of documented evidence	139
D.1.4 Measurement.....	140
D.1.5 Analytical evaluation.....	140
D.2 Application of IEC 60945.....	140
D.2.1 Display equipment category.....	140
D.2.2 Technical performance	140
D.2.3 Pre-conditioning for environmental tests	141
D.2.4 Methods of test applied for IEC 60945.....	141
D.3 Compliance with requirements	142
D.4 Simulation.....	143
D.5 Electronic chart data.....	143
Annex E (normative) Operational controls and logical grouping.....	144
E.1 Overview.....	144
E.2 Logical grouping of data and control functions	144
E.3 Navigation related terminology and icons for common function controls (hot keys and shortcuts).....	146
Annex F (normative) Icons for presentation of the state of an alert.....	160
Annex G (normative) Testing for colours, intensity and flicker	161
G.1 Testing for colours and intensity	161
G.1.1 General	161
G.1.2 Test personnel.....	162
G.1.3 Method of test.....	162
G.2 Testing for flicker	163
G.2.1 Overview	163
G.2.2 Analytic model.....	163
G.2.3 Decision criteria.....	165
Annex H (normative) Single and simple operator actions	167
H.1 General.....	167
H.2 Tables for single and simple operator actions	167
Annex I (normative) Default settings	169
I.1 General.....	169
I.2 ECDIS default settings.....	169
I.3 Radar default settings.....	171

Annex J (normative) Implementation details of AIS ASM	172
J.1 General.....	172
J.2 AIS ASM	172
Annex K (informative) Overview of AIS Messages	181
K.1 General.....	181
K.2 Use case guidance on AIS ASM.....	183
Annex L (informative) Overview of the use AIS AtoN status field bits	184
Bibliography.....	185
Table 1 – Ambient light conditions	23
Table 2 – Operational status of indications	31
Table 3 – User selectors for AIS presentation	47
Table 4 – AIS status indications	48
Table 5 – AIS data report capacity	57
Table 6 – AIS locating devices capacity	61
Table 7 – AIS ASM object capacity	66
Table 8 – Extended reported AIS target information from AIS ASM	73
Table A.1 – Own ship symbols	95
Table A.2 – Radar and AIS symbols.....	99
Table A.3 – Navigation symbols.....	115
Table A.4 – Navigation tools	120
Table A.5 – Other symbols.....	121
Table A.6 – Example of possible colour scheme	129
Table B.1 – List of standard terms and abbreviations.....	131
Table B.2 – List of standard units of measurement and abbreviations	136
Table C.1 – Paragraphs in MSC/Circ.982 associated with IEC 60945 requirements	137
Table C.2 – Other paragraphs in MSC/Circ.982 related to display design.....	138
Table C.3 – Other paragraphs in MSC/Circ.982 partially related to display design	138
Table D.1 – Methods of tests applied for IEC 60945	141
Table E.1 – Logical grouping for radar, ECDIS and INS applications (based on MSC.1/Circ.1609).....	145
Table E.2 – Examples of logical grouping for voluntary implementation.....	146
Table E.3 – General controls	147
Table E.4 – General navigation functions (based on MSC.1/Circ.1609).....	148
Table E.5 – Radar specific controls.....	151
Table E.6 – Control of chart display functions (based on MSC.1/Circ.1609)	152
Table E.7 – Control of chart functionality (based on MSC.1/Circ.1609)	157
Table E.8 – Database functions (based on MSC.1/Circ.1609)	157
Table E.9 – Route plan and monitoring functions (based on MSC.1/Circ.1609)	158
Table E.10 – Groups of functions (based on MSC.1/Circ.1609).....	158
Table G.1 – Values of predicted energy and special coefficients	166
Table H.1 – Access to functions, as defined before June 2019 (based on MSC.1/Circ.1609).....	167
Table H.2 – Access to functions (based on MSC.1/Circ.1609).....	168

Table H.3 – Access to group of functions (based on MSC.1/Circ.1609)	168
Table I.1 – ECDIS settings configured in response to "Default" selection (based on MSC.1/Circ.1609)	169
Table I.2 – Radar control settings configured in response to "Default" selection (based on MSC.1/Circ.1609)	171
Table J.1 – Details of AIS ASM	172
Table K.1 – AIS Messages	181
Table K.2 – AIS ASM Messages	182
Table L.1 – AIS AtoN status field	184

Currently in preview, click buy full vers.

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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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 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,
- replaced by a revised edition, or
- amended.

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.

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)*