



80/963/CD

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IEC TC 80 : MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS

SECRETARIAT:

United Kingdom

SECRETARY:

Mr Kim Fisher

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 18

PROPOSED HORIZONTAL STANDARD:

☐

Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☐ SAFETY

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

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

NOTE FROM TC/SC OFFICERS:

This draft reports on the work of MT5 subsequent to the circulation of 80/953/CD. There is further work to do concerning the display of Application Specific Messages (ASM).

An 8 week commenting period is requested in order to progress the work.

CONTENTS

CONTENTS	2
FOREWORD	2
1 Scope	2
2 Normative references	2
3 Terms, definitions and abbreviated terms	3
3.1 Terms and definitions	3
3.2 Abbreviated terms	10
4 General requirements for all displays on the bridge of a ship	10
4.1 Relationship to IMO standards	10
4.2 Application of IEC 60945	11
4.2.1 Remark	11
4.2.2 General requirements	11
4.3 Arrangement of information	11
4.3.1 Consistency of layout and logical grouping	11
4.3.2 Consistent presentation of information	12
4.3.3 Separation of operational display area	12
4.4 Readability	13
4.4.1 Readability under all ambient light conditions	13
4.4.2 Legibility of alphanumeric data and text	15
4.4.3 Presentation of text and icons	15
4.5 Colours and intensity	16
4.5.1 Discrimination of colours – Requirement	16
4.5.2 Methods of test and required results	17
4.6 Symbols	17
4.6.1 Operational information	17
4.6.2 Electronic chart information	18
4.7 Colour coding	19
4.7.1 Colour coding for discrimination	19
4.7.2 Colour coding of information	19
4.7.3 Colour coding in combination with other attributes	19
4.7.4 Flashing of information	20
4.8 Integrity marking	20
4.8.1 Indication of source, validity and integrity status	20
4.8.2 Colour coding of validity and integrity	20
4.8.3 Indication of presentation failure	20
4.9 Alerts and indications	21
4.9.1 Operational status	21
4.9.2 List of alerts	21
4.9.3 Alert related information from multiple sources	21
4.10 Presentation mode	21
4.10.1 Requirement	21
4.10.2 Methods of test and required results	22
4.11 User manuals, instructions and reference guides	22
4.11.1 Requirement	22
4.11.2 Methods of test and required results	22
5 Presentation of operational information	22

5.1	Application	22
5.2	Presentation of own ship information	22
5.2.1	Graphical representation of own ship – Requirement	22
5.2.2	Methods of test and required results	23
5.3	Presentation of chart information	23
5.3.1	Alteration of chart information	23
5.3.2	Colours and symbols for charted information	23
5.4	Presentation of radar information	24
5.4.1	Radar video images	24
5.4.2	Target trails	25
5.5	Presentation of target information	25
5.5.1	Providing target information	25
5.5.2	Consistent user interface for target information	26
5.5.3	Indication of exceeding target capacity	26
5.5.4	Presentation of relayed or repeated AIS reports	27
5.5.5	Filtering sleeping AIS targets	28
5.5.6	Activation of AIS targets	28
5.5.7	Graphical presentation of targets	29
5.5.8	Target selection	30
5.5.9	Indication of target derivation	30
5.5.10	Presentation of tracked radar target information	31
5.5.11	Presentation of reported AIS target information	31
5.5.12	Continual update of target information	32
5.5.13	Own ship's AIS information	33
5.5.14	Obscuring the operational display area	33
5.6	Operational alerts	33
5.6.1	Alert status	33
5.6.2	CPA/TCPA alarms	34
5.6.3	Acquisition/activation zones warnings	34
5.6.4	Lost target warnings	35
5.7	AIS and radar target association	35
5.7.1	Requirement	35
5.7.2	Methods of test and required results	35
5.8	AIS presentation user selectors and their status indications	36
5.8.1	Requirement	36
5.8.2	Methods of test and required results	37
5.9	Trial manoeuvre	37
5.9.1	Requirement	37
5.9.2	Methods of test and required results	38
5.10	Measurement	38
5.10.1	Measurement from own ship	38
5.10.2	Bearing and range measurements	38
5.11	Navigation tools	39
5.11.1	General requirements	39
5.11.2	Range rings	39
5.11.3	Variable range marker (VRM)	39
5.11.4	Bearing scale	40
5.11.5	Electronic bearing line (EBL)	41
5.11.6	Parallel index lines (PI)	42

5.11.7	Offset measurement of range and bearing	43
5.11.8	User cursor.....	44
5.12	AIS data-link message processing capacity.....	45
5.12.1	Requirements	45
5.12.2	Methods of test and required results	45
5.13	AIS data report	45
5.13.1	General	45
5.13.2	AIS data report capacity	45
5.13.3	AIS data report display	46
5.14	AIS ASM	47
5.14.1	General	47
5.14.2	AIS ASM capacity.....	48
5.14.3	AIS ASM display.....	48
5.15	Presentation of AIS synthetic position	50
5.15.1	Requirement.....	50
5.15.2	Methods of test and required results	50
5.16	Presentation of association of DSC received call with a displayed AIS object.....	51
5.16.1	Requirement.....	51
5.16.2	Methods of test and required results	52
5.17	AIS ASM information extending reported AIS target information	52
5.18	AIS safety-related messages	53
5.18.1	Requirements	53
5.18.2	Methods of test and required results	54
6	INS, Radar and chart displays	54
6.1	General.....	54
6.1.1	Application.....	54
6.1.2	Multifunction displays	54
6.1.3	Simultaneous display of radar and chart data	55
6.1.4	Range scales.....	55
6.1.5	Operational display area.....	56
6.1.6	Motion display modes	56
6.1.7	Orientation modes	56
6.1.8	Off-centring	57
6.1.9	Stabilisation modes	57
6.2	Radar displays.....	58
6.2.1	Application.....	58
6.2.2	Radar video image.....	58
6.2.3	Brightness of radar information.....	58
6.2.4	Display of chart information on radar	59
6.2.5	Priority of radar information	60
6.2.6	Display of map graphics	60
6.3	Chart displays.....	61
6.3.1	Application.....	61
6.3.2	Display of chart information	61
6.3.3	IMO ECDIS display categories.....	61
6.3.4	Adding or removing information from the display.....	62
6.3.5	Safety contour	63
6.3.6	Safety depth	63
6.3.7	Chart scale	63

6.3.8	Display of radar and target information	63
6.3.9	Display of additional information	64
6.4	Composite task-oriented presentations	64
6.4.1	User-configured presentations	64
6.4.2	Information associated with the task-at-hand	65
6.5	Single and simple operator actions	65
6.5.1	Applicability	65
6.5.2	Requirement	65
6.5.3	Methods of test and required results	66
6.6	User and default settings	66
6.6.1	General	66
6.6.2	User-settings	66
6.6.3	Default settings	66
7	Physical requirements	67
7.1	General	67
7.2	Display adjustment	67
7.2.1	Contrast and brightness	67
7.2.2	Magnetic interference	68
7.2.3	Temporal stability	68
7.2.4	Physical controls and status indicators	68
7.3	Screen size	69
7.3.1	Requirement	69
7.3.2	Method of test and required results	69
7.4	Multicoloured display equipment	70
7.4.1	Requirement	70
7.4.2	Method of test and required results	70
7.5	Screen resolution	70
7.5.1	Requirement	70
7.5.2	Method of test and required results	70
7.6	Screen viewing angle	71
7.6.1	Requirement	71
7.6.2	Methods of test and required results	71
Annex A (normative)	Presentation colours and symbols	72
A.1	Overview	72
A.2	Purpose	72
A.3	Scope	72
A.4	Application	72
A.5	Navigation-related symbols	72
Annex B (normative)	Guidelines for the presentation of navigation-related terminology and abbreviations	109
B.1	Overview	109
B.2	Purpose	109
B.3	Scope of these guidelines	109
B.4	Application	109
B.5	Navigation related terminology and abbreviations	109
Annex C (informative)	Guidance on display and dialogue design in MSC/Circ.982	116
C.1	Overview	116
C.2	General	116
C.3	Requirements in MSC/Circ.982 related to the display design	116

Annex D (informative) Guidance on testing	118
D.1 Methods of test derived from ISO 9241-12	118
D.1.1 General	118
D.1.2 Observation	118
D.1.3 Inspection of documented evidence	118
D.1.4 Measurement.....	119
D.1.5 Analytical evaluation.....	119
D.2 Application of IEC 60945.....	119
D.2.1 Display equipment category.....	119
D.2.2 Technical performance	119
D.2.3 Pre-conditioning for environmental tests	120
D.2.4 Methods of test derived from ISO 9241-12 applied for IEC 60945	120
D.3 Compliance with requirements	122
D.4 Simulation.....	122
D.5 Electronic chart data	122
Annex E (normative) Operational controls and logical grouping.....	123
E.1 Overview	123
E.2 Logical grouping of data and control functions	123
E.3 Navigation related terminology and icons for common function controls (Hot keys and shortcuts).....	125
Annex F (normative) Icons for presentation of the state of an alert.....	138
Annex G (normative) Testing for colours, intensity and flicker	139
G.1 Testing for colours and intensity	139
G.1.1 General	139
G.1.2 Test personnel.....	140
G.1.3 Method of test	140
G.2 Testing for flicker	141
G.2.1 Overview	141
G.2.2 Analytic model	141
G.2.3 Decision criteria.....	143
Annex H (normative) Single and simple operator actions	145
H.1 General.....	145
H.2 Tables for single and simple operator actions	145
Annex I (normative) Default settings	147
I.1 General.....	147
I.2 ECDIS default settings.....	147
I.3 Radar default settings.....	149
Annex J (normative) Implementation details of AIS ASM.....	151
J.1 General.....	151
J.2 AIS ASM	151
Annex K (informative) Overview of AIS Messages.....	158
Annex L (informative) Overview of the use AIS AtoN status field bits	161
Bibliography.....	162
Table 1 – Ambient light conditions	13
Table 2 – Operational status of indications (based on MSC191/5.7.1).....	21
Table 3 – User selectors for AIS presentation	36

Table 4 – AIS status indications (based on MSC191/6.4.9)	37
Table 5 – AIS data report capacity	45
Table 6 – AIS ASM capacity.....	48
Table 7 – Extended reported AIS target information from AIS ASM	53
Table A.1 – Own ship symbols	73
Table A.2 – Radar and AIS symbols.....	77
Table A.3 – Navigation symbols.....	93
Table A.4 – Navigation tools	99
Table A.5 – Other symbols.....	100
Table A.6 – Example of possible colour scheme	108
Table B.1 – List of standard terms and abbreviations	110
Table B.2 – List of standard units of measurement and abbreviations	115
Table C.1 – Paragraphs in MSC/Circ.982 associated with IEC 60945 requirements	116
Table C.2 – Other paragraphs in MSC/Circ.982 related to display design.....	116
Table C.3 – Other paragraphs in MSC/Circ.982 partially related to display design	117
Table D.1 – Methods of test applied for IEC 60945	120
Table E.1 – Logical grouping for radar, ECDIS and INS applications (based on MSC.1/Circ.1609)	123
Table E.2 – Examples of logical grouping for voluntary implementation.....	124
Table E.3 – General controls	125
Table E.4 – General navigation functions (based on MSC.1/Circ.1609).....	126
Table E.5 – Radar specific controls.....	129
Table E.6 – Control of Chart display functions (based on MSC.1/Circ.1609)	130
Table E.7 – Control of chart functionality (based on MSC.1/Circ.1609)	135
Table E.8 – Database functions (based on MSC.1/Circ.1609)	135
Table E.9 – Route plan and monitoring functions (based on MSC.1/Circ.1609)	135
Table E.10 – Groups of functions (based on MSC.1/Circ.1609).....	136
Table G.1 – Values of predicted energy and special coefficients	144
Table H.1 – Access to functions, as defined before June 2019 (based on MSC.1/Circ.1609)	145
Table H.2 – Access to functions (based on MSC.1/Circ.1609).....	145
Table H.3 – Access to group of functions (based on MSC.1/Circ.1609)	146
Table I.1 – ECDIS settings configured in response to "Default" selection (based on MSC.1/Circ.1609)	147
Table I.2 – Radar control settings configured in response to "Default" selection (based on MSC.1/Circ.1609)	149
Table J.1 – Details of AIS ASM	151
Table K.1 – AIS Messages.....	158
Table K.2 – AIS ASM Messages	159
Table L.1 – AIS AtoN Status field.....	161

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

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

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

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

- new requirements have been added for AIS, ASM and DSC presentation in Clause 5 together with three new supporting annexes, Annex J, Annex K, Annex L
- Annex A and Annex B have been revised to incorporate changes to IMO SN.1/Circ.243
- Annex E has been revised to incorporate changes to IMO resolution MSC.191(79) and renamed as Operational controls and logical grouping

- 55 • two new annexes have been added, Annex H on operator actions and Annex I on default
56 settings in support of IMO circular MSC.1/Circ.1609.

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

FDIS	Report on voting
80/XXX/FDIS	80/XXX/RVD

58
59 Full information on the voting for the approval of this standard can be found in the report on
60 voting indicated in the above table.

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

62 The committee has decided that the contents of this publication will remain unchanged until
63 the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data
64 related to the specific publication. At this date, the publication will be

- 65 • reconfirmed,
66 • withdrawn,
67 • replaced by a revised edition, or
68 • amended.

69

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 document using a colour printer.

70

**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 International Standard 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).

The standard 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.

NOTE All text in this standard 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, 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 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 62065, *Maritime navigation and radiocommunication equipment and systems – Track control systems – Operational and performance requirements, methods of testing and required test results*

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: Performance requirements, methods of testing and required test results*

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

IHO S-52 Annex A, *IHO ECDIS presentation library*

IMO A.694(17):1991, *General requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids*

IMO MSC.191(79):2004, *Performance standards for the presentation of navigation related information on shipborne navigational displays*

IMO MSC.192(79):2004, *Performance standards for radar equipment*

IMO MSC.232(82):2006, *Revised performance standards for electronic chart display and information systems (ECDIS)*

IMO SN.1/Circ.243/Rev.2:2019+Corr.1, *Guidelines for the presentation of navigation related symbols, terms and abbreviations*

IMO SN.1/Circ.289:2010, *Guidance on the use of AIS application-specific messages*

IMO MSC.252(83):2007, *Performance standards for integrated navigation systems (INS)*

IMO MSC.302(87):2010, *Performance standards for bridge alert management (BAM)*

IMO MSC.466(101):2019, *Amendments to the Performance standards for the presentation of navigation related information on shipborne navigational displays (IMO MSC.191(79):2004)*

IMO MSC.1/Circ.1609:2019, *Guidelines for the standardization of user interface design for navigation equipment*

IMO A.1021(26):2009, *Code on Alerts and Indications*

VESA-2001-6, *Flat Panel Display Measurements (FPDM)*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms, definitions and abbreviated terms apply.

3.1 Terms and definitions

3.1.1

activated AIS target

(MSC191/A) *target representing the automatic or manual activation of a sleeping target for the display of additional graphically presented information*

3.1.2

automatic identification system

AIS

system which complies with the requirements set forth in Annex 3 to IMO Resolution MSC.74(69)

3.1.3

AIS Application Specific Message

AIS ASM

AIS Messages 6, 8, 25 or 26, excluding AIS Synthetic Positions

150 Note 1 to entry: This document addresses only AIS ASM defined for international use in IMO SN.1/Circ.289.
151 Various Administrations have implemented application specific messages not defined in IMO SN.1/Circ.289, but are
152 catalogued by IALA at <https://www.iala-aism.org/asm/>

153 Note 2 to entry: See Annex J

154 **3.1.4**

155 **AIS data report**

156 Information derived from AIS Aids to Navigation (AtoN), AIS Search and Rescue Transmitters
157 (SART), EPIRB-AIS, AIS MOB, AIS SAR Aircraft and AIS Base Stations reports

158 Note 1 to entry: AIS MOB means information derived from a DSC Class M device capable of reporting using AIS
159 burst transmissions

160 Note 2 to entry: See Annex J

161 **3.1.5**

162 **AIS locating devices**

163 AIS-SART, EPIRB-AIS and MOB-AIS stations that transmit AIS Messages 1 and 14 using the
164 burst transmissions as described in ITU-R M.1371

165 **3.1.6**

166 **AIS safety-related messages**

167 AIS Messages 12 or 14

168 **3.1.7**

169 **AIS synthetic position**

170 object generated from an AIS Message 6, 8, 25 or 26: when FI=17 VTS-generated/synthetic
171 target; or when FI=22 or FI=23 Area Notice with “Sub-areas” set to “0” circle or point and
172 “Area shape” set to “0” and “Radius” set to “0” and “Notice Description” set to a value in range
173 from 64 to 74

174 Note 1 to entry: AIS Synthetic positions are generated by shore-based information systems (for example VTS)
175 and transmitted through AIS base stations.

176 Note 2 to entry: “Notice Description” set to a value in the range from 64 to 73 represents vessel distress
177 situations and set to a value 74 represents person distress situation. These messages may or may not have an
178 associated GMDSS Distress Alert.

179 **3.1.8**

180 **AIS target (or reported AIS target)**

181 (MSC191/A) *target generated from an AIS position report message* from a ship, vessel or
182 craft, based on AIS Message 1, 2, 3 or 18

183 Note 1 to entry: MMSI number within an AIS message identifies the type of source as a ship, vessel or craft, see
184 ITU-R M.585-8 Annex 1, Sections 1 and 5.

185 Note 2 to entry: AIS Class A uses Messages 1, 2 and 3. AIS Class B use Message 18.

186 **3.1.9**

187 **alarm**

188 (MSC.302/A) *a high-priority alert. Condition requiring immediate attention and action by the*
189 *bridge team, to maintain the safe navigation of the ship*

190 **3.1.10**

191 **alert**

192 (MSC.302/A) *announcement of abnormal situations and conditions requiring attention. Alerts*
193 *are divided in four priorities: emergency alarms, alarms, warnings and cautions. An alert*
194 *provides information about a defined state change in connection with information about how*
195 *to announce this event in a defined way to the system and the operator*

3.1.11**associated target**

(MSC191/A) *target simultaneously representing a tracked radar target and a reported AIS target having similar parameters (for example, position, course, speed, etc.) and which comply with an association algorithm*

3.1.12**brilliance**

adjustment of luminance of a display for ambient light

EXAMPLE Control of backlight for LCD (liquid crystal display).

3.1.13**caution**

(MSC.302/A) *lowest priority of an 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*

3.1.14**consistent common reference point****CCRP**

(MSC191/A) *location on own ship, to which all horizontal measurements such as own ship position, heading, and 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 ship*

Note 1 to entry: An alternative location (or multiple locations) may be used, as necessary, where clearly indicated or distinctively obvious, for example, the origin of the reference axis of the ship.

3.1.15**composite presentation**

integrated presentation that is derived from the simultaneous display of information from two or more navigational systems or from other pieces of equipment

3.1.16**dangerous target**

(MSC191/A) *tracked radar or reported AIS target with a predicted CPA and TCPA that violates values preset by the user. The respective target is marked by a “dangerous target” symbol*

3.1.17**dead-reckoned position****DR**

position extrapolated from the last accepted position update, based on present course and speed, and updated on a time interval selected by the operator

3.1.18**display base**

(MSC191/A) *level of information which cannot be removed from the ECDIS display, consisting of information which is required at all times in all geographic areas and all circumstances. It is not intended to be sufficient for safe navigation*

3.1.19**display equipment**

device capable of representing information visually

3.1.20**doubtful integrity**

state when integrity cannot be verified

3.1.21**DSC received call**

information generated from a received DSC message

3.1.22**electronic chart display and information system****ECDIS**

system which complies with the requirements set forth in IMO Resolution MSC.232(82)

3.1.23**electronic chart information**

one or more electronic chart databases

EXAMPLE ENC.

3.1.24**electronic navigational chart****ENC**

(MSC191/A) *database standardised as to content, structure and format according to IHO S-57 and its Appendix B.1 and issued by, or on the authority of, a Government*

3.1.25**emergency alarm**

(MSC.302/A) *highest priority of an alert. Alarms which indicate immediate danger to human life or to the ship and its machinery exists and require immediate action*

3.1.26**estimated position****EP**

position extrapolated from the last accepted position update, based on present course and speed (STW), including effects of wind, tide, current, and updated on a time interval selected by the operator

3.1.27**fix**

position of own ship determined, without reference to any former position, by the common intersection of two or more LOPs

3.1.28**heading**

(MSC191/A) *horizontal direction in which the bow of a ship is actually pointing at any instant, expressed as an angular displacement from north*

3.1.29**icon**

graphical symbol with a particular meaning used to convey information independent of language

Note 1 to entry: Icons may be used for visual identification or reinforcement of a textual description, to invoke a function, or to open an object when selected with the cursor.

3.1.30**important indication**

(MSC191/A) *marking of an operational status of displayed information which needs special attention, for example, information with low integrity or invalid information*

Note 1 to entry: The important indication is not part of alert classification.

3.1.31**indication**

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

3.1.32**integrated navigation system****INS**

system which complies with the requirements set forth in IMO Resolution MSC.252(83) as amended by IMO Resolution MSC.452(99)

3.1.33**integrity**

property of information as being within the specified accuracy in a timely, complete and unambiguous manner

3.1.34**line of position****LOP**

plotted line on which own ship is located determined by observation or measurement of the range or bearing to an aid to navigation or other charted element

3.1.35**lost target**

(MSC191/A) tracked radar or reported *target* for which the system is no longer receiving *valid position* data

Note 1 to entry: The target is *represented* by a "lost target" symbol.

3.1.36**maritime safety information****MSI**

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

[SOURCE: IMO SOLAS IV/2]

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

3.1.37**menu**

area of the display that is allocated to a structured list of options for the selection and entry of operational parameters, data and commands

3.1.38**multifunction display**

single visual display unit that can present, either simultaneously or through a series of selectable pages, information from multiple systems or equipment

Note 1 to entry: A multifunction display may typically be part of an INS (for example, providing dedicated presentation modes conforming to both radar and ECDIS presentation requirements), and may replace their individual display units.

3.1.39**operational display area**

(MSC191/A) *area of the display used to graphically present electronic chart and/or radar information, excluding the user dialogue area. On the chart display this is the area of the chart presentation. On the radar display this is the area encompassing the radar video image*

3.1.40**past positions**

(MSC191/A) *time-spaced marks* on the past track of own ship, or a tracked radar or reported AIS target

3.1.41**permanent**

property of information as existing for a long time (or forever) without change

3.1.42**persistent**

property of information as existing continuously

3.1.43**radar**

system which complies with the requirements set forth in IMO Resolution MSC.192(79)

3.1.44**radar echo**

returned radar signal (i.e. "paint") appearing in the radar video image

3.1.45**radar video image**

set of displayed information constructed from radar echoes processed by anti-clutter means and other tools

Note 1 to entry: For example, scan-to-scan correlation.

3.1.46**readily available**

property of information as being directly accessible

Note 1 to entry: For example, in a top-level menu, from a screen function, or an icon, etc.

3.1.47**selected target**

(MSC191/A) *target selected manually or automatically for the display of detailed alphanumeric data, information and text in a separate user dialogue area. The target is represented by a "selected target" symbol*

3.1.48**simple operator action**

(MSC252/A1) *procedure achieved by no more than two hard-key or soft-key actions, excluding any necessary cursor movements, or voice actuation using programmed codes or equivalent alternative means*

3.1.49**single operator action**

(MSC252/A1) *procedure achieved by no more than one hard-key or soft-key action, excluding any necessary cursor movements, or voice actuation using programmed codes*

3.1.50**sleeping AIS target**

(MSC191/A) AIS target indicating the presence of a vessel equipped with AIS in a certain location. The target is represented by a “sleeping target” symbol indicating the vessel's orientation. No additional information is presented until the AIS target is activated

3.1.51**standard display**

(MSC191/A) level of information that should be shown when a chart is first displayed on ECDIS. The level of the information it provides for route planning or route monitoring may be modified by the user according to the user's needs

3.1.52**target tracking system**

system which complies with the requirements set forth in IMO Resolution MSC.192(79)

3.1.53**task-at-hand**

specific navigation-related activity performed by a user

Note 1 to entry: For example, route planning, route monitoring, target tracking, collision avoidance, etc.

3.1.54**tracked radar target**

object, fixed or moving, which is tracked by a radar or target tracking function

3.1.55**trial manoeuvre**

(MSC191/A) facility used to assist the user to perform a simulated manoeuvre for navigation and collision avoidance purposes, by displaying the predicted future status of all tracked radar and reported AIS targets as a result of the simulated manoeuvres

3.1.56**user-added electronic chart information**

electronic chart information manually entered by the user for presentation

Note 1 to entry: For example, navigational notes, safety zones of interest, local notices to mariners, etc.

3.1.57**user-configured presentation**

(MSC191/A) auxiliary presentation configured by the user for a specific task-at-hand. The presentation may include radar and/or electronic chart information, in combination with other navigational or ship related data

3.1.58**user dialogue area**

(MSC191/A) area of the display consisting of data fields and/or menus that is allocated to the interactive presentation and entry or selection of operational parameters, data, information, text and commands mainly in alphanumeric form

3.1.59**validity**

property of information as conforming to specified criteria, and the marking of such information as being “valid” or “invalid” (i.e. “good” or “no good”) for its intended use

3.1.60**warning**

(MSC.302/A) alert for condition requiring immediate attention, but no immediate action by the bridge team. Warnings are presented for precautionary reasons to make the bridge team

419 *aware of changed conditions which are not immediately hazardous, but may become so if no*
420 *action is taken*

421 **3.2 Abbreviated terms**

422 DAC Designated Area Code (Source ITU-R M.585)

423 FI Function Identifier [Source ITU-R M.585]

424 MID Maritime Identity Digits [Source ITU-R M.585]

425 VTS Vessel Traffic Services (Source SOLAS V/12)

426 **4 General requirements for all displays on the bridge of a ship**

427 **4.1 Relationship to IMO standards**

428 (MSC191/1) IMO resolution MSC.191(79) *harmonizes the requirements for the presentation of*
429 *navigation-related information on the bridge of a ship to ensure that all navigational displays*
430 *adopt a consistent human machine interface philosophy and implementation.*

431 (MSC191/1) IMO resolution MSC.191(79) *supplements and, in the case of a conflict, takes*
432 *priority over, the presentation requirements of the individual performance standards adopted*
433 *by the IMO for relevant navigational systems and equipment and covers the presentation of*
434 *navigation-related information by equipment for which Performance Standards have not been*
435 *adopted by the IMO.*

436 This document supplements and, in the case of a conflict, takes priority over, the presentation
437 requirements of the individual testing standards for relevant navigational systems and
438 equipment and covers the presentation of navigation-related information by equipment for
439 which testing standards are not available.

440 (MSC302/3.6) *In case of conflict with alert requirements of existing performance standards,*
441 *the present Performance standards (MSC.302(87)) will take precedence.*

442 NOTE In case of conflict for alert presentation related issues the priority of IMO performance standards is from
443 the highest MSC.302(87), MSC.252(83), MSC.191(79), after which all performance standards are equal.

444 (MSC191/2) IMO resolution MSC.191(79) as amended by IMO resolution MSC.466(101)
445 *specifies the presentation of navigational information on the bridge of a ship, including the*
446 *consistent use of navigational terms, abbreviations, colours and symbols, as well as other*
447 *presentation characteristics.*

448 (MSC191/2) IMO resolution MSC.191(79) *also addresses the presentation of information*
449 *related to specific navigational tasks by recognising user selected presentations in addition to*
450 *presentations required by the relevant individual performance standards adopted by the IMO.*

451 This standard further addresses the guidelines for the presentation of navigation-related
452 symbols, terms and abbreviations in Safety of Navigation circular SN/Circ.243.

453 (MSC191/3) This standard *is applicable to any display equipment associated with the*
454 *navigational systems and equipment for which individual performance standards have been*
455 *adopted by the IMO. It addresses the stand-alone displays for radar, ECDIS, multifunction*
456 *displays and composite presentations that integrate information derived from two or more*
457 *systems. This standard also addresses display equipment associated with navigational*
458 *systems and equipment for which individual performance standards have not been adopted by*
459 *the IMO.*

460 (MSC191/3) *The general principles and the physical characteristics specified in Clauses 3.2*
461 *and 6.5, respectively, of this standard are applicable to all displays on the bridge of a ship.*

Some requirements set forth in MSC.191(79) duplicate requirements set forth in other IMO documents or in the IEC standards further specifying the methods of test and required test results for those requirements (for example, IEC 60945, IEC 61174, IEC 61993-2, IEC 62388, etc.). Where this standard duplicates a requirement in another standard, the method(s) of test for that requirement may refer to the other standard. Manufacturers may offer relevant test data from compliance tests to other standards as evidence of compliance with appropriate tests of this standard.

AIS messages are defined in ITU-R M.1371. In this document the AIS messages are divided between AIS targets, AIS data reports, AIS synthetic positions, AIS safety-related messages and AIS ASM. See Annex K. For AIS ASMs this document addresses only the internationally defined AIS ASMs in IMO SN.1/Circ.289 and that are intended to be received by a ship and intended to be displayed onboard.

Additional guidance on display and dialogue design from MSC/Circ.982 is listed by reference in Annex C.

4.2 Application of IEC 60945

4.2.1 Remark

If display equipment is permitted to be monochrome, then the colour-related requirements specified in 4.5.1, 4.7.1, 4.7.2, 4.7.3 and 4.8.2 will not apply.

4.2.2 General requirements

4.2.2.1 Requirement

(MSC191/3) *In addition to the general requirements set forth in IMO Resolution A.694(17) and further specified in IEC 60945, display equipment shall meet the requirements set forth in IMO Resolution MSC.191(79) and further specified in this standard, as applicable.*

4.2.2.2 Methods of test and required results

See Annex D for guidance in the application of IEC 60945 for testing.

4.3 Arrangement of information

4.3.1 Consistency of layout and logical grouping

4.3.1.1 Requirement

(MSC191/5.1.1 as amended by MSC466) *The presentation of information shall be consistent within the user interface with respect to screen layout and arrangement of information, for example, with respect to concepts, terminology, labelling and interaction paradigms used across the application and from screen to screen and/or from page to page. Data and control functions shall be logically grouped according to their function or the task-at-hand, see Annex E. Annex E.2 defines groups of related navigational information. Priority information essential to the task-at-hand shall be identified for each application (for example, radar, ECDIS, etc.), permanently or persistently displayed, as appropriate for the application, and presented to the user in a prominent manner by, for example, use of position (for example, screen location), size and colour.*

(MSC/Circ.1609/Appendix 3/1) *Annex E.2 defines groups of related navigational information that shall be displayed together on the user interface, to enable the user to quickly locate and react to essential navigation information, if available on the screen. Logical grouping in Annex E.2 applies to radar equipment, ECDIS and minimum INS functions. Logical grouping in Annex E.2 may be applied to other electronic navigation equipment and navigation sensors where applicable, to improve standardization and usability.*

(MSC/Circ.1609/Appendix 3/2) Annex E.2 *does not specify where the groups of information should appear on the screen, or the order in which the individual information elements should be grouped. The groups of related navigational information presented on the user interface are not limited to the information listed in Annex E.2. The groups in Annex E.2 may be extended by associated information. These groupings apply to both mandatory and non-mandatory information.* Within an individual group it is not required to display all information, only to group it, if displayed.

4.3.1.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by analytical evaluation that the arrangement, logical grouping, operation and identification of controls, screen displays and indications are in accordance with Annex E and IEC 60945:2002, 4.2.1.2 through 4.2.1.5;
- b) confirm by analytical evaluation that the concepts, terminology, labelling and interaction paradigms, screen layout and arrangement of information is consistent from screen to screen and/or page to page;
- c) confirm by analytical evaluation that priority information essential to the task-at-hand is identified and permanently or persistently displayed in a prominent manner, as appropriate, for each application.

4.3.2 Consistent presentation of information

4.3.2.1 Requirement

(MSC191/5.1.2) *The presentation of information shall be consistent with respect to:*

- *numerical values* (for example, position, speed, distance, time, etc.);
- *units*;
- *meaning* of information (for example, using the terms and abbreviations in Annex B);
- *sources* of information (for example, using the terms and abbreviations in Annex B);
- *validity* of information (see also 4.8.1 and 4.8.2); *and*
- *integrity* of information, if available (see also 4.8.1 and 4.8.2).

(See also IEC 60945:2002, 4.2.1.5)

4.3.2.2 Methods of test and required results

Confirm by observation that numerical values and their units, the meaning and source(s) of information, and the validity and integrity of information are presented in a consistent manner.

4.3.3 Separation of operational display area

4.3.3.1 Requirement

(MSC191/5.1.3) *The presentation of information shall be clearly separated into one or more operational display areas (for example radar, chart) and one or more user dialogue areas (for example, menus, data, control functions).*

4.3.3.2 Methods of test and required results

Confirm by observation that the presentation is clearly separated into one or more operational display areas and one or more user dialogue areas.

4.4 Readability

4.4.1 Readability under all ambient light conditions

4.4.1.1 Requirement

(MSC191/5.2.1) *The presentation of alphanumeric data, text, symbols and other graphical information (for example, chart information, radar echoes or a radar video image, etc.) shall support readability from typical user positions (i.e. with respect to reading distance) under all ambient light conditions likely to be experienced on the bridge of a ship (for example, day, dusk and night), and with due consideration to the night vision of the officer of the watch. (See also 4.5.1 and 7.2.1)*

Table 1 characterizes light levels for the ambient light conditions day, dusk and night.

Table 1 – Ambient light conditions

Ambient condition	Light level
Day	200 cd/m ² ± 50 %
Dusk	10 cd/m ² ± 50 %
Night	Darkness (i.e. where the display is the predominant light source)
NOTE Natural daylight is preferred for the day and dusk conditions.	

NOTE 1 The “Day” colour table provided in the IHO ECDIS Presentation Library uses a white background that may not support readability under all light conditions and may be a risk to safety of navigation for some navigational systems and equipment, including radar. Readability may be achieved by using the black background in the “Dusk” or “Night” colour tables provided in the IHO ECDIS Presentation Library and adjusting brightness and contrast, if provided, for use under all light conditions.

Display equipment shall provide a luminance of at least 85 cd/m² measured at the centre of the display when set to the maximum brightness setting. The white luminance level of the display shall be adjustable down to 1 cd/m² ± 20 % and may be extinguishable below that point.

If provided, dimming below 0,8 cd/m² as white level shall continue to ensure readability of alerts (alarms, warnings and cautions) while readability of all other items is not required.

NOTE 2 General requirements for illumination are described in IEC 60945.

Transflective and reflective displays shall provide adjustable self illumination suitable for all ambient light conditions likely to be experienced on the bridge of a ship (day, dusk and night) and with due consideration to the night vision of the officer of the watch. It shall be adjustable to produce display luminance at least from 1 cd/m² to 5 cd/m² under night conditions.

The luminance across the operational display area shall not have a variance of more than 30 % from the brightest point to the dimmest point.

NOTE 3 Variance is determined by the equation: $1 - \left(\frac{L_{\min}}{L_{\max}} \right)$

where

L_{\min} is the minimum luminance and

L_{\max} is the maximum luminance measured across the operational display area, or the entire screen depending on the application.

It shall be possible to display alphanumeric data, text, symbols (see 4.6) and other graphical information using a lighter foreground (for instance character, symbol, etc.) against a dark

background of high contrast, emitting as little light as possible at night. The brightest elements of the presentation shall be restricted to points and thin lines.

If display equipment is intended to present symbols for charted information (see 4.6.2), it shall provide a means or method for the user to verify that the colour black is visually distinguishable against a background set to dark grey and vice-versa.

NOTE 4 The IHO ECDIS Presentation Library provides "black-adjust" symbols BKAJ1 and BKAJ2, for the colours black and grey, respectively.

If display equipment is not intended to present symbols for charted information (see 4.6.2), it shall maintain that any colours used are visually distinguishable against the background.

NOTE 5 Visually distinguishable is at least luminance ratio 1:2 when using instrumental verification.

It is important to avoid affecting the night vision of the officer of the watch by excessive glow from displays on the bridge at night. The display shall be capable of providing a contrast of 100:1 between the 1 cd/m² white level and the black background.

NOTE 6 The white level may be created using a standardized method (i.e. RGB values or the CIE 1931 colour coordinates (x, y and L) for white) specified by the manufacturer or, if no manufacturer specification is available, using the RGB values 255, 255, 255.

4.4.1.2 Methods of test and required results

Set up the display equipment for measurements of luminance, contrast and colour according to the guidelines of IEC 61966-4 or the VESA Flat Panel Display Measurement (FPDM), see VESA-2001-6 standard. Before measurements are taken, power up the display equipment and allow it to stabilize for the period of time specified by the manufacturer, as follows.

- a) Confirm by observation at the manufacturer's recommended viewing distance that alphanumeric data, text, symbols and other graphical information including alerts are readable under the ambient light conditions described in Table 1.
- b) For direct view displays (for example CRT (cathode ray tube), LCD (liquid crystal display) with backlight, etc.) confirm by measurement using a test image with a white square at the centre of the operational display area (to be provided by the manufacturer) that the brightness can be varied from a minimum level of at most 1 cd/m² to a maximum level of at least 85 cd/m² measured under dark condition. Confirm by measurement that the values for brightness used for the setup are stable after the stabilisation period defined by the manufacturer. Confirm by measurement in the night ambient condition that the contrast ratio between the 1 cd/m² white level and the black background is 100:1, minimum.
- c) For transfective and reflective displays, confirm by measurement using a test image with a white square at the centre of the operational display area (to be provided by the manufacturer) that the brightness can be adjustable at least from 1 cd/m² to 5 cd/m² under conditions of night ambient illumination to a maximum level of at least 85 cd/m² under conditions of daylight ambient illumination. Confirm by measurement that the values for brightness used for the setup are stable after the stabilisation period defined by the manufacturer. Confirm by measurement in the night ambient condition that the contrast ratio between the 1 cd/m² white level and the black background is 100:1, minimum. The ambient illumination levels shall be as specified in Table 1.

NOTE This test image is not generated internally by the display equipment.

- d) Confirm by observation that alphanumeric data, text, symbols and other graphical information including alerts can be presented using a lighter foreground against a dark background.
- e) Confirm by measurement that when the display equipment is set to maximum brightness, the luminance does not vary across the operational display area by more than 30 % from the brightest point to the dimmest point.
- f) Confirm by observation that the brightest elements of the presentation in the night ambient light condition described in Table 1 are points and thin lines.

- g) Where display equipment is intended to present symbols for charted information confirm by observation for each ambient light condition that the user can verify that the colour black is visually distinguishable against a background set to dark grey, and vice-versa.
- h) Where display equipment is not intended to present symbols for charted information confirm by observation for each ambient light condition that any colours used are visually distinguishable against background.
- i) If dimming below 0,8 cd/m² as white level is provided then confirm by observation after 10 min adaptation period to night ambient light condition by the observer that at least the alerts (alarms, warnings, cautions) are readable and different alert levels are distinguishable from each other.

4.4.2 Legibility of alphanumeric data and text

4.4.2.1 Requirement

(MSC191/5.2.2) *Alphanumeric data and text shall be presented using a clearly legible non-italic, sans-serif font. The font size shall be appropriate for the viewing distance from user positions (i.e. with respect to reading distance and viewing angles) likely to be experienced on the bridge of a ship.*

The character height in millimetres shall be not less than 3,5 times the nominal viewing distance in metres. The manufacturer's documentation shall identify the nominal viewing distance for the display equipment.

4.4.2.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by observation that alphanumeric data and text is presented using non-italic, sans-serif font;
- b) confirm by measurement that the character height (i.e. the distance between the top and bottom edges of the smallest capital letter used in the presentation) in millimetres is not less than 3,5 times the nominal viewing distance in metres.

4.4.3 Presentation of text and icons

4.4.3.1 Requirement

(MSC191/5.2.3 as amended by MSC466) *Text shall be presented using simple unambiguous language that is easy to understand (for example, standard marine terminology or text that provides clear meaning by its context). Navigational terms and abbreviations shall be presented using the nomenclature set forth in Annex B and Annex E.3.*

(MSC191/5.2.4 as amended by MSC466) *When icons are used, their purpose shall be intuitively recognized by appearance, placement, and grouping as defined in Annex E.3.*

Circ.1609/Appendix 2/1 Annex E.3 identifies commonly-used functions on navigation equipment and for each function specifies the associated terminology, abbreviation and (where appropriate) icons. These terms, abbreviations and icons, if available, shall be used for the display of navigation-related information, to promote consistency of presentation across navigational equipment.

For functions listed in Annex E.3

- a) (Circ.1609/Appendix 2/2) *Where icons, terms and/or abbreviations are used, they shall meet the requirements of Annex E.3. Where a standard term, abbreviation, or icon is not available, another icon, term or abbreviation may be used, but these shall not conflict with those listed in the Annex E.3.*

- b) (Circ.1609/Appendix 2/3) *The icons specified may indicate a status, may execute a specific function (hot key), or may provide access to a group of related functions (shortcut).*
- c) (Circ.1609/Appendix 2/4) *Only the shape of the icon is specified; Annex E.3 does not specify a colour scheme for icons, except for the icons depicted in colour in Table E.6 which shall follow the IHO colour scheme or similar.*
- d) (Circ.1609/Appendix 2/5) *Where appropriate and practical, a brief explanation of the purpose of an icon shall be easily obtainable by the user. This functionality shall be able to be turned off easily by the user.*

Icons used for the presentation of alerts shall be presented according to Annex F.

4.4.3.2 Methods of test and required results

The methods of test and the required results for text are as follows:

- a) confirm by analytical evaluation that text is presented using simple unambiguous language;
- b) confirm by observation that navigational terms and abbreviations are presented using the nomenclature in Annex B and in Annex E.3;
- c) confirm by inspection of documented evidence that other terminology or abbreviations, if used, are explained in the operator's manual.

The methods of test and the required results for icons are as follows:

- a) for icons not specified in Annex E.3 or Annex F confirm by analytical evaluation that icons and their purpose can be intuitively recognized by appearance, placement, and grouping;
- b) confirm by observation that shape of icons used for data and control function are presented according to Annex E.3;
- c) confirm by observation that colours of icons specified in Table E.6 follows the IHO colour scheme or similar;
- d) confirm by observation that icons used for the presentation of alerts are presented according to Annex F (see also 5.6.1.2).

4.5 Colours and intensity

4.5.1 Discrimination of colours – Requirement

(MSC191/5.3.1) *The colours used for the presentation of alphanumeric data, text, symbols and other graphical information shall provide sufficient contrast for discrimination and identification against the background under all ambient light conditions likely to be experienced on the bridge of a ship (for example, day, dusk and night) and with due consideration to the night vision of the officer of the watch.*

(MSC191/5.3.2) *The colours and brightness shall take into account the ambient light conditions of day, dusk and night. The presentation shall support night viewing by showing lighter foreground information on a dark non-reflecting background.*

(MSC191/5.3.3) *The background colour and contrast shall be chosen to allow displayed information to be easily discriminated without degrading the colour coding aspects of the presentation.*

Display equipment may use a range of tones of basic colours, provided they are identifiable and visually distinguishable from each other. Colours used for the presentation of information in the user dialogue areas shall not detract from the presentation of information in the operational display area.

If display equipment is intended to present symbols for charted information, it shall use colours that comply with or are based upon the colours specified for the IHO ECDIS Presentation Library in IHO S-52 and its Appendices, or an equivalent set of colour tables, as far as practical.

NOTE The “Day” colour table provided in the IHO ECDIS Presentation Library uses a white background that may not support readability under all light conditions and may be a risk to safety of navigation for some navigational systems and equipment, including radar. Readability may be achieved by using the black background in the “Dusk” or “Night” colour tables provided in the IHO ECDIS Presentation Library and adjusting brightness and contrast, if provided, for use under all light conditions.

4.5.2 Methods of test and required results

The person conducting this test shall have passed the minimum colour vision and acuity tests required for users by IMO STCW Code Part B and have adapted to night viewing for 10 min before checking the night display.

- a) Confirm by observation that the colours used for the presentation of alphanumeric data, text, symbols and other graphical information provide sufficient contrast for identification and discrimination against the background under the ambient light conditions described in Table 1.
- b) Confirm by observation that the colours used for the presentation of alphanumeric data, text, symbols and other graphical information support night viewing by showing lighter foreground information on a dark non-reflecting background.
- c) Confirm by observation that the colours used for the presentation of alphanumeric data, text, symbols and other graphical information are identifiable and visually distinguishable from each other.
- d) Confirm by observation that the colours used in the user dialogue areas do not detract from the presentation of information in the operational display area.
- e) Where display equipment is intended to present symbols for charted information, confirm by analytical evaluation that the colours used conform to the IHO specified colours in the IHO ECDIS Presentation Library, or equivalent, as far as practical (see Clause G.1 for additional guidance).

4.6 Symbols

4.6.1 Operational information

4.6.1.1 Requirement

(MSC191/5.4.1) *Symbols used for the presentation of operational information other than chart information shall comply with or be based upon the symbols set forth in Annex A.*

(SN-Circ.243/1/3) *Where a standard symbol is not available, another symbol may be used, but this symbol shall not conflict with the symbols listed in Annex A or in the ECDIS presentation library. (For additional guidance, see also ISO 80416-4.)*

Colours used for the presentation of operational information shall be discriminated from the colours used for the presentation of the radar image, target trails, additional processed radar information and electronic chart information.

For symbols for which the size is not specified by this document following applies: A symbol shall subtend at least 5 mm/m (17 min of arc) at the nominal viewing distance. Where accurate colour identification of a symbol is required by an individual equipment standard then, in the absence of size requirements in that standard, the symbol shall subtend at least 8,7 mm/m (30 min of arc) at the nominal viewing distance. The use of spectrally extreme blue ($v' < 0,2$) shall be avoided for images subtending less than 35 mm/m (2° of arc) of viewing distance.

Annex A specifies standardized symbols including the size at viewing distance of 1 m. Where the manufacturer declares a different viewing distance, the symbol size shall be measured according to the factor of the viewing distance (e.g. a symbol of 5 mm at 1 m viewing distance shall be 7.5 mm if the declared viewing distance is 1.5 m).

4.6.1.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by inspection of documented evidence that the symbols used to present operational information are presented in accordance with Annex A;
- b) confirm by measurement that the largest dimension of the symbol is at least 5 mm/m (17 min of arc) at the nominal viewing distance, and includes at least 16 pixels;
- c) where accurate colour identification is required for a symbol, confirm by measurement that the largest dimension of the symbol is at least 8,7 mm/m (30 min of arc) at the nominal viewing distance, and includes at least 29 pixels.

4.6.2 Electronic chart information

4.6.2.1 Requirement

(MSC191/5.4.2) *Symbols used for the presentation of vector format electronic chart information* shall comply with or be based upon the symbols specified for the IHO ECDIS Presentation Library in IHO S-52 and its Appendices, or an equivalent symbol set, as far as practical.

NOTE Some symbols provided in the IHO ECDIS Presentation Library may not be suitable for the display of electronic chart information on radar or in a composite presentation based upon radar. IHO S-52 and its Appendices allow minor deviations to symbology. It provides a framework and guidelines for chart symbolization from which manufacturers can derive a customized symbol set.

If symbols that deviate from the IHO ECDIS Presentation Library are used for the presentation of any chart information, then they shall:

- be legible;
- be certain and unambiguous in their meaning;
- be of sufficient size to support the nominal viewing distance (see also 4.4.2);
- have the same general shape as IHO ECDIS Presentation Library symbols used for the same or similar purpose(s).

Symbols added to the ECDIS Presentation Library shall not be confused with IHO ECDIS Presentation Library symbols.

4.6.2.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by inspection of documented evidence that the symbols used to present chart information are presented in accordance with IHO S-52 and its Appendices;
- b) where symbols deviate from the IHO ECDIS Presentation Library, confirm by observation that they:
 - 1) are legible;
 - 2) are certain and unambiguous in their meaning;
 - 3) are of sufficient size to support the nominal viewing distance;
 - 4) have the same general shape as IHO ECDIS Presentation Library symbols used for the same or similar purposes;
- c) confirm by observation that symbols added to the ECDIS Presentation Library cannot be confused with IHO ECDIS Presentation Library symbols.

4.7 Colour coding

4.7.1 Colour coding for discrimination

4.7.1.1 Requirement

(MSC191/5.5.1) If *colour coding is used for discrimination or conspicuousness of alphanumeric text, symbols and other graphical information all colours in each colour table shall clearly differ from one another* (see also 4.5.1).

4.7.1.2 Methods of test and required results

Confirm by observation that the colours within each colour table clearly differ from one another.

4.7.2 Colour coding of information

4.7.2.1 Requirement

(MSC191/5.5.2) If *colour coding is used*, then *the colour red shall be used for the coding of alert related information* for alarm and emergency alarm conditions unless otherwise specified by the IMO (for example in tables 7.1.1 and 7.1.2 of the IMO A.1021(26) Code on Alerts and Indications).

If colour coding is used and if the colour red is used for other purposes than for the coding of alert related information for alarm and emergency alarm conditions, its purpose (e.g. for the indication of port vs starboard, colour of a buoy, colour of a light, etc.) shall be sufficiently clear.

4.7.2.2 Methods of test and required results

If colour coding is used, confirm by inspection of documented evidence or by observation that the colour red is used to indicate an alarm or emergency alarm condition unless otherwise specified by the IMO or unless the purpose is sufficiently clear.

4.7.3 Colour coding in combination with other attributes

4.7.3.1 Requirement

(MSC191/5.5.3). If *colour coding is used it shall be used in combination with other symbol attributes, such as size, shape and orientation*.

A specific implementation shall not rely solely on a single saturated colour. If the display equipment technology relies on the separate transmission of primary colours, the presentation of alerts shall be visible and identifiable even after the failure of any one primary colour input to the display.

4.7.3.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by inspection of documented evidence or by observation that the colour coding is always combined with another symbol attribute;
- b) where the display equipment technology relies on the separate transmission of primary colours, confirm by observation that alerts remain identifiable even after transmission of each of the primary colours is disabled one at a time.

4.7.4 Flashing of information

4.7.4.1 Requirement

(MSC191/5.5.4) *Flashing of information shall be reserved for indicating the state of unacknowledged alerts.*

4.7.4.2 Methods of test and required results

Confirm by observation that flashing of information is only used for unacknowledged alerts.

4.8 Integrity marking

4.8.1 Indication of source, validity and integrity status

4.8.1.1 Requirement

(MSC191/5.6.1) *The source, validity, and where possible, the integrity of information shall be indicated. Invalid information or information with low integrity shall be clearly marked qualitatively and/or quantitatively (see important indication). Invalid information or information with low integrity may be quantitatively indicated by displaying absolute or percentage values.*

4.8.1.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by observation that the source of information can be indicated;
- b) confirm by observation that the validity of information is indicated;
- c) confirm by observation that the integrity of information is indicated, where available. Where integrity is indicated quantitatively, confirm by observation that either absolute values or percentage values are displayed.

4.8.2 Colour coding of validity and integrity

4.8.2.1 Requirement

(MSC191/5.6.2) *If colour coding is used, then information with low or doubtful integrity shall be qualitatively marked by using the colour as defined in Table 2, and invalid information shall be qualitatively marked by using the colour as defined in Table 2.*

4.8.2.2 Methods of test and required results

If colour coding is used, the methods of test and the required results are as follows:

- a) confirm by observation that the colour as defined in Table 2 is used to indicate information with low or doubtful integrity;
- b) confirm by observation that the colour as defined in Table 2 is used to indicate invalid information.

4.8.3 Indication of presentation failure

4.8.3.1 Requirement

(MSC191/5.6.3) *In many cases, information on the display does not change frequently enough to make presentation failure immediately obvious to the user. In order to show that the screen is being refreshed, a means or method shall be provided to immediately make the user aware of a presentation failure on an operational display (for example, "picture freeze").*

A conspicuous periodically time varying element shall be provided as a prominent indication of normal screen refresh (for example two alternating dots, etc.).

4.8.3.2 Methods of test and required results

Confirm by observation that a conspicuous periodically time-varying indication is provided in all presentation modes.

4.9 Alerts and indications

4.9.1 Operational status

4.9.1.1 Requirement

(MSC191/5.7.1) *The operational status of information (indications) shall be indicated as in Table 2 unless otherwise specified by the IMO (for example in tables 7.1.1 and 7.1.2 of the Code on Alerts and Indications, 2009):*

For alerts the equipment shall comply with IEC 62923-1.

Table 2 – Operational status of indications (based on MSC191/5.7.1)

Status	Visual Indication	Audible Signal
<i>Invalid information</i>	Yellowish orange	<i>Silence</i>
<i>Information with low integrity</i>	<i>Yellow</i>	<i>Silence</i>
<i>Important Indications</i>	<i>Yellow</i>	<i>Silence</i>
<i>Indication</i>	No special requirement	<i>Silence</i>
<i>Normal State</i>	<i>Optionally Green</i>	<i>Silence</i>

4.9.1.2 Method of test and required results

Confirm by inspection of documented evidence that indications are presented in accordance with Table 2 and that the equipment complies with IEC 62923-1.

4.9.2 List of alerts

See IEC 62923-1 for the requirements and tests regarding the list of active alerts.

NOTE Resolution MSC.302 and derived IEC 62923-1 have superseded the requirement: (MSC191/5.7.2) *A list of alerts shall be provided based on the sequence of occurrence. Additional indication of priority, as set by the user, shall be provided on displays that present alerts from multiple sources. Alerts that have been acknowledged and are no longer relevant shall be deleted from the list of alerts, but may be retained in an alert history list.*

4.9.3 Alert related information from multiple sources

See IEC 62923-1 for the requirements and tests.

NOTE Resolution MSC.302 and derived IEC 62923-1 have superseded the requirement: (MSC191/5.7.3) *If a single display is used to present alert related information from multiple navigational systems and equipment, then the presentation of alerts and indications shall be consistent for the display of: the time of alert occurrence, the cause of the alert, the source of the alert, and the status of the alert (for example, acknowledged, not acknowledged).*

4.10 Presentation mode

4.10.1 Requirement

(MSC191/5.8) *If displays are capable of presenting information in different modes, then there shall be a clear indication of the modes in use, for example:*

- *orientation* (north-up, course-up, head-up);
- *stabilisation* (ground-stabilised, sea-stabilised);
- *motion* (true, relative); *and*
- *chart projection* (Mercator, gnomonic, etc.).

923 NOTE The indication of chart projection is only required when electronic chart information is presented. It can be
924 provided to the user on request.

925 **4.10.2 Methods of test and required results**

926 Confirm by observation that the presentation modes in use are clearly indicated.

927 **4.11 User manuals, instructions and reference guides**

928 **4.11.1 Requirement**

929 (MSC191/5.9) *The user manual and instructions and reference guides shall be available in the*
930 *English language at least. The user manual or reference guide shall include a list of all terms,*
931 *abbreviations, symbols, icons and their explanations presented by the system or equipment.*
932 *(See also Annex A, Annex B and Annex E.)*

933 **4.11.2 Methods of test and required results**

934 The methods of test and the required results are as follows:

- 935 a) confirm by observation that user manual, instructions and reference guide are available in
936 the English language;
- 937 b) confirm by inspection of documented evidence that the user manual and/or reference
938 guide includes a list of all terms, abbreviations, symbols, icons and their explanations
939 used by the system.

940 **5 Presentation of operational information**

941 **5.1 Application**

942 The provisions of this clause are applicable to displays on the bridge of a ship that provide
943 functionality as described in the following subclauses.

944 **5.2 Presentation of own ship information**

945 **5.2.1 Graphical representation of own ship – Requirement**

946 (MSC191/6.1.1) *When a graphical representation of own ship is provided, it shall be possible*
947 *for the user to select either a true scaled ship's outline or a simplified symbol as set forth in*
948 *Annex A. The size of the ship's true scaled outline or the simplified symbol in the graphical*
949 *presentation shall be the true scale size of the ship or 6 mm, at a nominal viewing distance of*
950 *1 m, whichever is greater.*

951 The manufacturer should adjust the symbol sizes to properly account for the nominal viewing
952 distance of the display equipment.

953 Display equipment may (unless stipulated as mandatory in an equipment standard) provide
954 the capability to automatically switch from the ship's true scaled outline to the simplified
955 symbol when the beam of own ship's true scale outline is less than 3 mm, and vice versa. The
956 true scaled outline shall not be used when the heading is not known in a gyro/THD-stabilized
957 mode. The user shall always have the capability to select the simplified symbol in lieu of the
958 scaled ship's outline.

959 (MSC191/6.1.2) *A heading line, and where appropriate a velocity vector, shall be associated*
960 *with own ship symbol and shall originate at the position of the consistent common reference*
961 *point (CCRP) as set forth in Annex A.*

962 The combination of the heading line and beam line (the minimised symbol) may be used as an
963 alternative to the simplified symbol and may be selectable as such. Display equipment may
964 provide the capability to automatically switch from the ship's true scaled outline to the heading

and beam line when the beam of own ship's true scale outline is less than 3 mm, and vice versa.

5.2.2 Methods of test and required results

Where display equipment provides a graphical representation of own ship:

- a) confirm by observation that the system provides a ship's true scaled outline and a simplified symbol in accordance with Annex A;
- b) confirm by observation that the display equipment provides the user with the capability to select the representation of own ship as either the ship's true scaled outline or the simplified symbol;
- c) confirm by measurement that the size of the ship's outline is correct for the scale of the display;
- d) confirm by observation that the simplified symbol is automatically selected when the beam of the ship's true scaled outline is less than 3 mm, and vice versa;
- e) confirm by observation that the display equipment provides a heading line in accordance with Annex A;
- f) confirm by observation that the display equipment provides a velocity vector in accordance with Annex A.

Note that the minimised symbol may be used as alternative to the simplified symbol.

5.3 Presentation of chart information

5.3.1 Alteration of chart information

5.3.1.1 Requirement

It shall not be possible to alter the electronic chart information, except by update.

5.3.1.2 Methods of test and required results

Confirm by observation that it is not possible to alter the electronic chart information.

5.3.2 Colours and symbols for charted information

5.3.2.1 Requirement

(MSC191/6.2.1) *The presentation of official electronic chart information that is issued by, or on the authority of a government authorized hydrographic office, or other relevant government institution or agency (for example, ENC), shall comply with or be based upon the colours and symbols specified for the IHO ECDIS Presentation Library in IHO S-52 and its Appendices, or an equivalent colour and symbol set, as far as is practicable.*

(MSC191/6.2.2) *The presentation of proprietary electronic chart information shall comply with or be based upon the colours and symbols specified for the IHO ECDIS Presentation Library in IHO S-52 and its Appendices, or an equivalent colour and symbol set, as far as practical. There shall be a clear indication when the presentation is not in accordance with IHO standards.*

(MSC191/6.2.3) *The presentation of user-added electronic chart information shall comply with or be based upon the colours and symbols specified for the IHO ECDIS Presentation Library in IHO S-52 and its Appendices, or an equivalent colour and symbol set, as far as practical.*

NOTE Some colours and symbols provided in the IHO ECDIS Presentation Library or otherwise specified by IHO in S-52 and its Appendices may not be suitable for the display of electronic chart information on radar or in a composite presentation based upon radar. IHO S-52 and its Appendices allow minor deviations to symbology. It

1007 provides a framework and guidelines for chart symbolization from which manufacturers can derive a customized
1008 symbol set.

1009 (MSC191/6.2.4) *If electronic chart information derived from different scales appears in the*
1010 *presentation, the scale boundary shall be clearly indicated* as defined in the IHO ECDIS
1011 Presentation Library in IHO S-52 and its Appendices.

1012 **5.3.2.2 Methods of test and required results**

1013 The methods of test and the required results are as follows:

- 1014 a) verify by observation that the presentation of official and user-added electronic chart
1015 information, as applicable, is in accordance with 4.5.1 and 4.6.2;
- 1016 b) where the presentation of proprietary electronic chart information is not in accordance with
1017 4.5.2, confirm by observation that an indication is provided;
- 1018 c) when electronic chart information derived from different scales (for example, adjacent
1019 ENC cells) is displayed confirm by observation that a scale boundary is presented
1020 between the scales.

1021 **5.4 Presentation of radar information**

1022 **5.4.1 Radar video images**

1023 **5.4.1.1 Requirement**

1024 (MSC191/6.3.1) *Radar video images shall be displayed by using a basic colour that provides*
1025 *optimum contrast. Radar echoes shall be clearly visible when presented on top of a chart*
1026 *background. The relative strength of radar echoes may be differentiated by tones of the same*
1027 *basic colour. The colours may be different for operation under different ambient light*
1028 *conditions* (day, dusk and night) likely to be experienced on the bridge of a ship, and with due
1029 consideration to the night vision of the officer of the watch.

1030 Additional processed radar information that is not a part of the radar video image may be
1031 discriminated from the radar video by tones of the basic colour used to present the image.
1032 Alternatively, it may be differentiated by tones of other basic colours.

1033 For radar displays a dark non-reflecting background shall be used. The colour used for the
1034 radar image shall provide contrast against the background and shall be clearly visible when
1035 presented over a chart background.

1036 NOTE The colour tables specified by IHO and provided in IHO ECDIS Presentation Library include a "Day" table
1037 based on a white background that may not support readability under daylight conditions and may be a risk to safety
1038 of navigation for some navigational systems and equipment, including radar. Readability under daylight conditions
1039 may be achieved by using the black background in the "Dusk" or "Night" colour tables provided in IHO ECDIS
1040 Presentation Library and adjusting brightness and contrast, if provided.

1041 If the colour red is used for the radar video image, then it shall be distinguishable from other
1042 uses of the colour red, for example, alarms including dangerous targets.

1043 If electronic chart information overlays radar information (i.e. a radar video image), or a radar
1044 image overlays chart information, then the overlay may be displayed as transparent or
1045 opaque. If a transparent overlay is used, then it may be variable so that the underlying
1046 information is visible through the overlay. If an opaque chart overlay is used, then the colour
1047 fill of area objects shall be excluded. Optionally, the colour fill of point objects may also be
1048 excluded. In either case, the background of the radar image shall be the same basic colour as
1049 the chart's water surfaces.

1050 If display equipment provides facilities for the overlay of radar information that are
1051 independent of a shipborne radar system (for example, by a separate radar scan converter),
1052 then the facilities should comply with the relevant clauses of IEC 62388.

5.4.1.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by observation under each of the ambient light conditions described in Table 1, that radar information is presented using a contrasting colour against the background and that the background shall be dark for radar displays;
- b) confirm by observation that radar information is clearly visible when presented on top of a chart background for the ambient light conditions described in Table 1.

5.4.2 Target trails

5.4.2.1 Requirement

(MSC191/6.3.2) If display equipment provides *target trails*, then they shall *be distinguishable from radar echoes and clearly visible under all ambient light conditions* (day, dusk and night) likely to be experienced on the bridge of a ship, and with due consideration to the night vision of the officer of the watch. Target trails may be differentiated by tones of the basic colour used for the radar video image. Alternatively, they may be distinguished by tones of another basic colour.

If display equipment provides target trails, then there shall be an indication of trail time and motion stabilisation *mode*.

5.4.2.2 Methods of test and required results

Where target trails are provided:

- a) confirm by observation that they are distinguishable from radar echoes and clearly visible under the ambient light conditions described in Table 1;
- b) confirm by observation that the trail time and motion stabilization mode are indicated.

5.5 Presentation of target information

5.5.1 Providing target information

5.5.1.1 Requirement

(MSC191/6.4.1.1) *Target information may be provided by a radar target tracking system and/or by the AIS.*

A radar target tracking system detects and tracks radar targets. Other navigational systems may provide remote presentation of tracked radar targets. These systems shall present reported radar targets in accordance with Annex A.

If display equipment provides facilities for radar target detection and tracking that are independent of a shipborne radar system, then the facilities should comply with the relevant clauses of IEC 62388.

Any navigational system or equipment may provide remote presentation of reported AIS targets. These systems shall present reported AIS targets in accordance with Annex A.

An AIS target may be repeated or VTS-generated (see 5.5.4.1). In such case the presentation shall be as for reported AIS target in accordance with Annex A.

5.5.1.2 Methods of test and required results

The methods of test and the required results are as follows:

1092 a) where display equipment provides the capability to connect to a radar target tracking
1093 system, confirm by observation that the presentation is in accordance with Annex A;

1094 b) where display equipment provides the capability to connect to an AIS: confirm by
1095 observation that the presentation is in accordance with Annex A.

1096 **5.5.2 Consistent user interface for target information**

1097 **5.5.2.1 Requirement**

1098 (MSC191/6.4.1.3) *As far as practical, the user interface and data format for operating and*
1099 *presenting tracked radar target information and reported AIS target information shall be*
1100 *consistent.*

1101 **5.5.2.2 Methods of test and required results**

1102 Confirm by observation that the presentation of tracked radar target information and reported
1103 AIS target information is consistent.

1104 **5.5.3 Indication of exceeding target capacity**

1105 **5.5.3.1 Requirement**

1106 (MSC191/6.4.2.1) *There shall be an indication when the target tracking and/or reported target*
1107 *processing/display capacity is about to be exceeded* unless otherwise specified in individual
1108 equipment standard (for example as a caution).

1109 (MSC191/6.4.2.2) *There shall be an indication when the target tracking and/or reported target*
1110 *processing/display capacity have been exceeded* unless otherwise specified in individual
1111 equipment standard (for example as a warning).

1112 Target tracking means the capability of a target tracking system to track targets. Reported
1113 targets means targets reported by AIS. The manufacturer shall declare the processing and
1114 display capacity of the equipment separately for tracked and reported targets (i.e. 4 values of
1115 capacity).

1116 NOTE A definition of minimum target capacities is given in IEC 62388.

1117 Processing capacity means the number of targets that it is possible to process simultaneously
1118 by the equipment. Display capacity means the number of targets that it is possible to display
1119 at same time. Processing capacity may be higher than display capacity. If the manufacturer
1120 declared processing capacity is higher than the manufacturer declared display capacity there
1121 shall be separate indications, or alerts if specified by individual equipment standard, for
1122 exceeding both display and processing capacities.

1123 NOTE Equipment can provide functionality to select or filter displayed targets. This could lead to a situation in
1124 which processing capacity is about to be exceeded or exceeded while the display capacity is not.

1125 The user manual shall describe the consequences to the target processing or target
1126 displaying when the capacity for processing or displaying has been reached.

1127 **5.5.3.2 Methods of test and required results**

1128 There are two methods of test depending on the capability of the equipment.

1129 a) Where display equipment provides the capability to connect to a radar target tracking
1130 system:

1131 1) confirm by observation that it provides an indication, or an alert (e.g. a caution) if
1132 specified by individual equipment standard, that the tracked radar target display
1133 capacity is about to be exceeded, for example, when the number of tracked radar
1134 targets presented exceeds 95 % of the display capacity;

- 2) confirm by observation that it provides an indication, or an alert (e.g. a warning) if specified by individual equipment standard, that the tracked radar target display capacity has been exceeded when the number of tracked radar targets presented exceeds 100 % of the display capacity;
- 3) if processing capacity is higher than display capacity, confirm by observation that it provides that the tracked radar target processing capacity is about to be exceeded, for example, when the number of tracked radar targets processed exceeds 95 % of the processing capacity;
- 4) if processing capacity is higher than display capacity, confirm by observation that it provides an indication, or an alert (e.g. a warning) if specified by individual equipment standard, that the tracked radar target processing capacity has been exceeded when the number of tracked radar targets processed exceeds 100 % of the processing capacity.

b) Where display equipment provides the capability to connect to an AIS:

- 1) confirm by observation that it provides an indication, or an alert (e.g. a caution) if specified by individual equipment standard, that the reported AIS target display capacity is about to be exceeded, for example, when the number of reported AIS targets presented exceeds 95 % of the display capacity;
- 2) confirm by observation that it provides an indication, or an alert (e.g. a warning) if specified by individual equipment standard, that the reported AIS target display capacity has been exceeded when the number of reported AIS targets presented exceeds 100 % of the display capacity;
- 3) if processing capacity is higher than display capacity, confirm by observation that it provides an indication, or an alert (e.g. a caution) if specified by individual equipment standard, that the reported AIS target processing capacity is about to be exceeded, for example, when the number of reported AIS targets processed exceeds 95 % of the processing capacity;
- 4) if processing capacity is higher than display capacity, confirm by observation that it provides an indication, or an alert (e.g. a warning) if specified by individual equipment standard, that the reported AIS target processing capacity has been exceeded when the number of reported AIS targets processed exceeds 100 % of the processing capacity.

Confirm by inspection of the user manual that it contains a description of the consequences to the target processing or target displaying when the capacity for processing or displaying has been reached.

5.5.4 Presentation of relayed or repeated AIS reports

5.5.4.1 Requirement

AIS Base Stations and AIS Repeater Stations may relay or repeat AIS information and target reports with a lower update rate than transmitted from the sending vessel and with latency that is significant and variable.

If both relayed and direct AIS reports are received for the same target, the relayed reports shall not be processed for display of AIS target or information.

If multiple relayed AIS reports are received for the same target, only the report with the lowest repeat count shall be processed for display of AIS target or information.

5.5.4.2 Methods of test and required results

The methods of test and the required results are as follows:

- Confirm by analytical evaluation and using the AIS simulator to produce AIS reports for a nearby AIS target moving at 24 kn and relayed AIS reports for this target with delayed and

1183 reduced update rate (for example: delayed by 30 s with a 10 s update rate), that the
1184 relayed data is not displayed.

- 1185 • Confirm by analytical evaluation and using the AIS simulator to produce two or more
1186 relayed AIS reports for a target with delayed and reduced update rate (for example:
1187 delayed by 30 s with a 10 s update rate), that only data from lowest repeat count is
1188 displayed.

1189 **5.5.5 Filtering sleeping AIS targets**

1190 **5.5.5.1 Requirement**

1191 (MSC191/6.4.3.1) *It shall be possible to filter the presentation of sleeping AIS targets (for*
1192 *example, by target range, CPA/TCPA, AIS target class A/B, or proximity to or otherwise*
1193 *related to a monitored route, etc.).*

1194 Criteria for filtering shall only include sleeping class A or sleeping class B when combined
1195 with one or more other factors, for example including CPA/TCPA, Speed, Range or Course.

1196 If display equipment provides facilities for the calculation of CPA/TCPA that are independent
1197 of a shipborne radar target tracking system, then the facilities should comply with the relevant
1198 clauses of IEC 62388.

1199 (MSC191/6.4.3.2) *If a filter is applied, then there shall be a clear and permanent or persistent*
1200 *indication, as appropriate for the application. The filter criteria in use shall be readily available*
1201 *to the user.*

1202 (MSC191/6.4.3.3) *It shall not be possible to remove individual AIS targets from the*
1203 *presentation.*

1204 **5.5.5.2 Methods of test and required results**

1205 The methods of test and the required results are as follows:

- 1206 a) confirm by observation that the user can filter the presentation of sleeping AIS targets;
- 1207 b) confirm by observation that the user can filter the presentation of AIS data reports;
- 1208 c) confirm by observation that an indication is provided when sleeping targets are filtered
1209 from the presentation;
- 1210 d) confirm by observation that the indication remains while the filter is active;
- 1211 e) confirm by analytical evaluation that the filter criteria in use is readily available;
- 1212 f) confirm by observation that the user cannot remove individual AIS targets from the
1213 presentation.

1214 **5.5.6 Activation of AIS targets**

1215 **5.5.6.1 Requirement**

1216 (MSC191/6.4.4.1) *If zones for the automatic activation of AIS targets are provided, they shall*
1217 *be the same as for automatic radar target acquisition, if available. Any user defined zones (for*
1218 *example, acquisition/activation zones) in use shall be presented in graphical form with their*
1219 *relevant symbols set forth in Annex A.*

1220 (MSC191/6.4.4.2) *In addition, sleeping AIS targets shall be automatically activated when they*
1221 *meet user defined parameters (for example, target range, activation zones, CPA/TCPA or AIS*
1222 *target class A/B).*

1223 Automatic activation is independent of AIS target filtering. If means are provided for automatic
1224 activation of AIS targets, then means for disabling that function shall be provided and the
1225 disable status shall be indicated.

1226 If display equipment provides facilities for the calculation of CPA/TCPA that are independent
1227 of a shipborne radar target tracking system, then the facilities should comply with the relevant
1228 clauses of IEC 62388.

1229 NOTE Manufacturers can consider mitigation against automatic activation of AIS targets that are suspected from a
1230 rogue or malicious report; or would represent a known target assisting in the navigation of own vessel, such as a
1231 manoeuvring tug.

1232 **5.5.6.2 Methods of test and required results**

1233 Where display equipment provides zones for the automatic activation of AIS targets:

- 1234 a) confirm by observation that the zones are the same as for automatic radar target
1235 acquisition, if provided;
- 1236 b) confirm by observation that the zones are presented in accordance with Annex A;
- 1237 c) confirm by observation that it is possible to disable automatic activation and that the
1238 disabled status is indicated;
- 1239 d) confirm by observation that both filtered and displayed sleeping AIS targets entering a
1240 zone are automatically activated when they meet user defined criteria.

1241 **5.5.7 Graphical presentation of targets**

1242 **5.5.7.1 Requirement**

1243 (MSC191/6.4.5.1) *Targets shall be presented with their relevant symbols as set forth in*
1244 *Annex A.*

1245 (MSC191/6.4.5.2) *Reported AIS targets shall be graphically presented either as sleeping or*
1246 *activated. Where no separate symbol is defined for the active and sleeping states the*
1247 *reported AIS target shall be graphically presented with the single symbol type available in the*
1248 *Annex A (e.g. AIS-SART, AIS SAR aircraft).*

1249 (MSC191/6.4.5.3) *The course and speed of a tracked radar target or an activated reported*
1250 *AIS target shall be indicated by a vector that clearly shows the predicted motion. The vector*
1251 *time (i.e. length) shall be consistent for presentation of any target regardless of its source.*

1252 (MSC191/6.4.5.4) *The presentation of vector symbols shall be consistent irrespective of the*
1253 *source of information. The presentation mode shall be clearly and permanently or persistently*
1254 *indicated, as appropriate for the application, including for example,*

- 1255 • *True/Relative motion,*
- 1256 • *vector time, and*
- 1257 • *stabilisation.*

1258 (MSC191/6.4.5.5) *The orientation of the AIS target symbol shall indicate its heading (HDG). If*
1259 *the heading information is not received, the orientation of the AIS symbol shall be aligned to*
1260 *the reported course over ground (COG). If neither heading nor course over ground (COG) is*
1261 *available, the orientation of the AIS symbol shall be aligned towards top of the operational*
1262 *display area. If available, the turn or rate of turn (ROT) indicator and/or the path prediction*
1263 *shall indicate the manoeuvre of an activated AIS target.*

1264 (MSC191/6.4.5.6) *Own ship's CCRP shall be used for alignment of tracked radar target*
1265 *symbols and reported AIS target symbols with other information on the same display.*

1266 (MSC191/6.4.5.7) *On large scale, low range displays, a means or method to present a true*
1267 *scale outline of an activated AIS target shall be provided in accordance with Annex A.*

1268 (MSC191/6.4.5.8) *It shall be possible to display the past positions of activated AIS targets.*

1269 The user manual shall describe the length in time or in number of the past positions available
1270 for each target.

1271 **5.5.7.2 Methods of test and required results**

1272 The methods of test and the required results are as follows:

- 1273 a) confirm by observation that targets are presented with their relevant symbols according to
1274 Annex A;
- 1275 b) confirm by observation that reported AIS targets are graphically presented as sleeping or
1276 activated targets in accordance with Annex A;
- 1277 c) confirm by observation that the predicted motion of tracked radar targets and activated
1278 reported AIS targets is clearly indicated by a vector;
- 1279 d) confirm by observation that the vector time (i.e. length) is consistent for all targets;
- 1280 e) confirm by observation that the presentation of vector symbols are consistent irrespective
1281 of the source of information;
- 1282 f) verify that the presentation mode is clearly indicated in accordance with 4.10.1;
- 1283 g) confirm by observation that the vector time is clearly indicated;
- 1284 h) confirm by observation that the orientation of the AIS target symbol clearly indicates its
1285 heading. Change the heading information to 'not available' for one reported AIS target and
1286 confirm by observation that the orientation of the AIS symbol is aligning to the reported
1287 COG;
- 1288 i) confirm by observation that the turn or rate of turn (ROT) flag and/or the path prediction
1289 indicates the manoeuvre of an activated AIS target changing course;
- 1290 j) confirm by analytical evaluation that own ship's CCRP is used to align tracked radar target
1291 symbols and reported AIS target symbols with other information on the same display;
- 1292 k) confirm by observation that on large scale, low range displays, a means or method to
1293 present a true scaled outline of an activated AIS target is provided;
- 1294 l) confirm by observation that it is possible to display the past positions of activated AIS
1295 targets for the length as described in the user manual.

1296 **5.5.8 Target selection**

1297 **5.5.8.1 Requirement**

1298 (MSC191/6.4.6.1) *A target selected for the display of its alphanumeric information shall be*
1299 *identified by the relevant symbol set forth in Annex A. If more than one target is selected for*
1300 *data display, the symbols and the corresponding target data shall be clearly identified.*

1301 **5.5.8.2 Methods of test and required results**

1302 The methods of test and the required results are as follows:

- 1303 a) confirm by observation that a selected target is identified in accordance with Annex A;
- 1304 b) confirm by observation that if more than one target is selected, the symbols and
1305 corresponding target information is clearly identified in accordance with Annex A.

1306 **5.5.9 Indication of target derivation**

1307 **5.5.9.1 Requirement**

1308 (MSC191/6.4.6.2) *There shall be a clear indication to show that target information is derived*
1309 *from radar or AIS or from a combination of these.*

5.5.9.2 Methods of test and required results

Confirm by analytical evaluation that there is a clear indication of the source of target information.

5.5.10 Presentation of tracked radar target information**5.5.10.1 Requirement**

(MSC191/6.4.6.3) *For each selected tracked radar target the following information shall be presented in alphanumeric form:*

- *source(s) of target information,*
- *measured range of target,*
- *measured bearing of target,*
- *predicted target range at the closest point of approach (CPA),*
- *predicted time to CPA (TCPA),*
- *calculated CTW of target (or calculated COG if ground stabilised),*
- *calculated STW of target (or calculated SOG if ground stabilised).*

Additional target information, where available, shall be provided to the user on request. If additional target information is available, an indication shall be provided when viewing alphanumeric information of the selected target.

If multiple targets are selected, a subset of alphanumeric data, information and text may be presented.

Target information shall be logically “paired” for presentation (i.e. range and bearing, CPA and TCPA, course and speed).

If display equipment provides facilities for the calculation of CPA/TCPA that are independent of a shipborne radar target tracking system, then the facilities should comply with the relevant clauses of IEC 62388.

5.5.10.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by observation that the information listed above is presented in alphanumeric form for each selected target;
- b) confirm by observation that additional information, where available, is indicated and provided to the user on request;
- c) confirm by analytical evaluation that the target information is logically “paired” for presentation.

5.5.11 Presentation of reported AIS target information**5.5.11.1 Requirement**

(MSC191/6.4.6.4) *For each selected reported AIS target, the following information shall be presented in alphanumeric form:*

- *source(s) of target information (for example, repeated, VTS-generated, etc.);*
- *target identification (at least one of MMSI, call sign, name or IMO number);*
- *reported position and where available its quality;*
- *calculated range of target;*

- 1350 • calculated *bearing* of target;
- 1351 • calculated *CPA*;
- 1352 • calculated *TCPA*;
- 1353 • reported *COG* (or calculated *CTW* if the display is sea stabilised). In sea stabilized display
- 1354 the reported *COG* shall at least be available on demand;
- 1355 • reported *SOG* (or calculated *STW* if the display is sea stabilised). In sea stabilized display
- 1356 the reported *SOG* shall at least be available on demand;
- 1357 • reported *navigational status*.

1358 Target *heading* and reported *rate of turn* (ROT) shall *also be made available*.

1359 All *additional target information* (MMSI, call sign, name and IMO number, if not yet presented;
1360 dimensions, ship and cargo type, destination, ETA, static draught, DTE, AIS class and, if
1361 supported, extended reported AIS target information (see Table 7)), where available from the
1362 same MMSI source (including for example most recent AIS safety-related messages), shall *be*
1363 *provided* to the user *on request*. If additional target information is available, an indication shall
1364 be provided when viewing alphanumeric information of the selected target. When state of
1365 addressed AIS is DTE = 1 (not available) it shall be indicated that the sent AIS safety related
1366 messages may not be displayed at the recipient side.

1367 NOTE DTE informs whether the target is available for text-based communication based on AIS Messages 12 or 14.

1368 If multiple targets are selected, a subset of alphanumeric data, information and text may be
1369 presented.

1370 Target information shall be logically “paired” for presentation (i.e. range and bearing, CPA
1371 and TCPA, COG and SOG, heading and ROT).

1372 (MSC191/6.4.6.5) *If the received AIS target information is incomplete, then the absent*
1373 *information shall be clearly indicated in the target data field as missing.*

1374 If display equipment provides facilities for the calculation of CPA/TCPA that are independent
1375 of a shipborne radar target tracking system, then the facilities should comply with the relevant
1376 clauses of IEC 62388.

1377 **5.5.11.2 Methods of test and required results**

1378 The methods of test and the required results are as follows:

- 1379 a) confirm by observation that the information listed above is presented in alphanumeric
- 1380 form;
- 1381 b) confirm by observation that additional information, where available, is provided to the user
- 1382 on request;
- 1383 c) confirm by analytical evaluation that the target information is logically “paired” for
- 1384 presentation;
- 1385 d) confirm by observation, that there is a clear indication of absent information in the target
- 1386 data field.
- 1387 e) confirm by observation, that when available there is a clear indication that additional
- 1388 information is available.

1389 **5.5.12 Continual update of target information**

1390 **5.5.12.1 Requirement**

1391 (MSC191/6.4.6.6) *The information for a selected target shall be displayed and continually*
1392 *updated, until another target is selected for information display or, if applicable, until the user*
1393 *dialogue area is closed.*

5.5.12.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by observation that information displayed for a selected target is continually updated;
- b) confirm by observation that the information displayed for a selected target remains displayed until another target is selected or the user dialogue is closed.

5.5.13 Own ship's AIS information**5.5.13.1 Requirement**

(MSC191/6.4.6.7) *A means or method shall be provided to present own ship AIS data on request.*

Own ship AIS data include:

- identification (MMSI, call sign, name, IMO number);
- navigational status;
- additional information (dimensions, ship and cargo type, destination, ETA, static draught);
- if supported, extended information (see Table 7).

5.5.13.2 Methods of test and required results

Confirm by observation that it is possible to present own ship's AIS data on request.

5.5.14 Obscuring the operational display area**5.5.14.1 Requirement**

(MSC191/6.4.6.8) *The display of alphanumeric data, information and text shall not obscure graphically presented operational information.*

5.5.14.2 Methods of test and required results

Confirm by analytical evaluation that the display of alphanumeric data, information and text does not obscure graphically presented operational information.

5.6 Operational alerts**5.6.1 Alert status****5.6.1.1 Requirement**

(MSC191/6.4.7.1) *A clear indication of the status of the alerts and the alert criteria (i.e. identification) shall be given to the user. (See also 4.9.1 and 4.9.3.)*

The equipment shall comply with IEC 62923-1 to ensure that the status of alerts is clearly given to the user.

Except for IMO requirements for radar and AIS target symbols displayed in the operational area and for ECDIS highlight of danger, warnings, and caution in the chart area, only text-based visual indication of alert (e.g. in user dialog area) is mandatory. Optionally icons can be presented together with the text, see IEC 62923-1 and Annex F.

5.6.1.2 Methods of test and required results

Confirm by analytic evaluation that a clear indication of the alert criteria is provided as text to the user.

Confirm by observation that if icons are additionally provided that they conform to IEC 62923-1 and Annex F (see also 4.4.3.2)

5.6.2 CPA/TCPA alarms**5.6.2.1 Requirement**

(MSC191/6.4.7.2) *A CPA/TCPA alarm of a tracked radar or activated AIS target shall be clearly indicated and the target shall be clearly marked by a dangerous target symbol as set forth in Annex A (both acknowledged and unacknowledged state). This includes cases when information is received by TTD-sentence (see IEC 61162-1).*

If display equipment provides facilities for the calculation of CPA/TCPA that are independent of a shipborne radar target tracking system, then the facilities should comply with the relevant clauses of IEC 62388.

5.6.2.2 Methods of test and required results

Confirm by observation that dangerous targets are presented in accordance with Annex A.

5.6.3 Acquisition/activation zones warnings**5.6.3.1 Requirement**

(MSC191/6.4.7.3) *If a user defined acquisition/activation zone facility is provided, a target entering or within the zone shall be clearly identified with the relevant symbol set forth in Annex A and for tracked radar targets a warning shall be given. The zone shall be identified with the relevant symbology set forth in Annex A, and shall be applicable to both tracked radar and reported AIS targets.*

A radar target tracking system shall control radar target acquisition zones. The target tracking system shall provide all warnings and indications associated with target detection and tracking including entry into or detection within an acquisition area. Other navigational systems and equipment may provide acquisition zone warnings and indications only if they provide a radar target tracking function complying to IEC 62388.

Other navigational systems and equipment that provide remote presentation of tracked radar targets shall not provide warnings and indications associated with acquisition zones.

Any navigational system or equipment may provide remote presentation of reported AIS targets. These systems shall provide their own AIS activation zone facilities.

If display equipment provides facilities for acquisition zones for the detection of radar targets that are independent of a shipborne radar target tracking system, then the facilities should comply with the relevant clauses of IEC 62388.

5.6.3.2 Methods of test and required results

Where display equipment provides zones for automatic acquisition/activation:

- a) verify that the zones are presented with their relevant symbology in accordance with 5.5.7;
- b) confirm by observation that detected radar targets entering or within a zone are acquired;

NOTE The acquisition status of tracked radar targets is reported by the radar target tracking system, for example, in accordance with the IEC 61162 series of standards.

- c) confirm by observation that radar targets in acquisition state are presented in accordance with Annex A;
- d) verify that the zones apply to both radar targets and reported AIS targets in accordance with 5.5.7.

5.6.4 Lost target warnings

5.6.4.1 Requirement

(MSC191/6.4.7.4) *The last reported/predicted position of a lost target shall be clearly marked by a lost target symbol on the display as set forth in Annex A, and the lost target warning shall be given if the lost target warning function is enabled. The lost target symbol shall disappear if the signal (or message) for the target is received again or after the warning has been acknowledged.* A means or method shall be provided for the user to enable/disable the lost target warning function. *There shall be a clear indication whether the lost target warning function for tracked radar targets and activated AIS targets is enabled or disabled.* If a target is beyond a user defined range, then no warning shall be generated.

5.6.4.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by observation that when a tracked radar target or reported AIS target is lost, a warning is given and the last reported/predicted position is clearly marked by the lost target symbol in accordance with Annex A;
- b) confirm by observation that the lost target symbol disappears if the signal for the target is received again or after the lost target warning has been acknowledged;
- c) confirm by observation that a means or method is provided to enable/disable the lost target warning function;
- d) confirm by observation that there is a clear indication of whether the lost target warning function for tracked radar targets and activated AIS targets is enabled or disabled;
- e) confirm by observation that no warning is generated for a lost target that is beyond the user defined range.

5.7 AIS and radar target association

5.7.1 Requirement

(MSC191/6.4.8.1) *If target information from AIS and radar tracking are both available and where the AIS and radar information are considered as one target, then as a default condition, the activated AIS target symbol and the alphanumeric AIS target information shall be automatically selected and displayed as set forth in Annex A. The user shall have the option to change the default condition to the display of tracked radar targets and shall be permitted to select either radar tracking or AIS alphanumeric information.*

(MSC191/6.4.8.2) *Where the AIS and radar information are considered as two distinct targets, one activated AIS target symbol and one tracked radar target symbol shall be displayed as set forth in Annex A. No alert shall be raised.*

If display equipment provides facilities for the automatic association of reported AIS targets with tracked radar targets that are independent of a shipborne radar target tracking system, then the facilities should comply with the relevant clauses of IEC 62388.

5.7.2 Methods of test and required results

Where display equipment provides the capability to automatically associate reported AIS targets with tracked radar targets:

- a) confirm by observation that a reported AIS target associated with a tracked radar target is presented in accordance with Annex A:

- 1) as an activated AIS target, the default condition;
 2) as a tracked radar target, based upon user-selection as the default condition;
 b) confirm by observation that the user can select either AIS or radar tracking information;

5.8 AIS presentation user selectors and their status indications

5.8.1 Requirement

The user selectors for AIS presentation shall be provided according to Table 3.

Table 3 – User selectors for AIS presentation

Selector	Function	Access
AIS ON/OFF This is master selector for all AIS presentation	Select all AIS related graphical presentation on or off	Simple operator action unless otherwise specified in Annex H
AIS sleeping target filter Separate selector for each provided AIS sleeping target filter criteria (See 5.5.5)	Select AIS sleeping target filter for criteria N on or off ^a	Simple operator action
AIS locating devices (See 5.13.3.1 a)	Select AIS locating devices presentation on or off	Simple operator action
AIS base stations (See 5.13.3.1 b)	Select AIS base stations presentation on or off	Simple operator action
AIS SAR aircrafts (See 5.13.3.1 c)	Select AIS SAR aircraft presentation on or off	Simple operator action
AIS AtoNs, physical (See 5.13.3.1 d and Symbol 2.10a)	Select AIS AtoN, physical presentation on or off	Simple operator action
AIS AtoNs, virtual (See 5.13.3.1 d and Symbol 2.10b)	Select AIS AtoN, virtual presentation on or off	Simple operator action
AIS AtoNs, mobile physical (See 5.13.3.1 d and Symbol 2.10c)	Select AIS AtoN, mobile physical presentation on or off	Simple operator action
AIS AtoNs, mobile virtual (See 5.13.3.1 d and Symbol 2.10c)	Select AIS AtoN, mobile virtual presentation on or off	Simple operator action
AIS ASMs Separate selector for each layer or sub-layers (See 5.14 and Annex J)	Select AIS ASM presentation for layer/sub-layer N on or off ^b	Simple operator action ^c
AIS Synthetic positions (See 5.15)	Select AIS Synthetic positions presentation on or off	Simple operator action
^a NOTE Replace "N" by each available criteria ^b NOTE Replace "N" by each available layer or sub-layer ^c NOTE Removal of Area Notices as single operator action can be performed by AIS ON/OFF selector		

(MSC191/6.4.9) *The AIS presentation status shall be indicated as follows* in Table 4.

1525

Table 4 – AIS status indications (based on MSC191/6.4.9)

Function	Cases to be Presented		Presentation
	<i>AIS processing switched ON/ graphical presentation switched OFF</i>	<i>AIS processing switched ON/ graphical presentation switched ON</i>	
<i>AIS ON/OFF</i>	Indicate whether AIS graphical presentation is switched OFF	Indicate whether AIS graphical presentation is switched ON	<i>Alphanumeric or graphical</i> (see Table E.4)
<i>Filtering of sleeping AIS targets</i> (See 5.5.5.)	Indicate whether the <i>filter status</i> for sleeping AIS targets is switched ON	Indicate whether the <i>filter status</i> for sleeping AIS targets is switched ON	Indications may be <i>alphanumeric or graphical</i> (for example by icon)
<i>Activation of targets</i> (See 5.5.6)		Indicate the <i>activation criteria</i> is for AIS targets, including automatic activation zones	Indications shall be <i>graphical</i> (see symbol 2.14)
<i>CPA/TCPA alarm</i> (See 5.6.2)	Indicate whether the CPA/TCPA Alarm <i>function</i> is switched ON/OFF Indicate the <i>CPA/TCPA Criteria</i> Indicate whether <i>Sleeping AIS targets</i> are <i>included</i> or <i>excluded</i> from CPA/TCPA processing	Indicate whether the CPA/TCPA Alarm <i>function</i> is switched ON/OFF Indicate the <i>CPA/TCPA Criteria</i> Indicate whether <i>Sleeping AIS targets</i> are <i>included</i> or <i>excluded</i> from CPA/TCPA processing	Indications shall be <i>alphanumeric and, if applicable, graphical</i> (for example by icon)
<i>Lost target warning</i> (See 5.6.4)	Indicate whether the Lost Target Warning <i>function</i> is switched ON/OFF If applicable, indicate the <i>Lost target Filter Criteria</i>	Indicate whether the Lost Target Warning <i>function</i> is switched ON/OFF If applicable, indicate the <i>Lost target Filter Criteria</i>	Indications shall be <i>alphanumeric and, if applicable, graphical</i>
<i>Target association</i> (See 5.7)	Indicate whether the Target Association <i>function</i> is switched ON/OFF Indicate the <i>Association Criteria</i> Indicate the <i>Default Target Priority</i>	Indicate whether the Target Association <i>function</i> is switched ON/OFF Indicate the <i>Association Criteria</i> Indicate the <i>Default Target Priority</i>	Indications shall be <i>alphanumeric</i>
This table is a simplified matrix for the presentation of indications associated with AIS functions			

1526

1527 5.8.2 Methods of test and required results

1528 The methods of test and the required results are as follows:

- 1529 a) verify the filtering of sleeping AIS targets in accordance with 5.5.6;
- 1530 b) verify the activation of AIS targets in accordance with 5.5.7;
- 1531 c) verify CPA/TCPA alarm functionality in accordance with 5.6.2;
- 1532 d) verify lost target warning functionality in accordance with 5.6.4;
- 1533 e) verify the association of AIS targets to tracked radar targets in accordance with 5.8

1534 5.9 Trial manoeuvre

1535 5.9.1 Requirement

1536 (MSC191/6.4.10) A *trial manoeuvre simulation* shall be clearly identified by the relevant
 1537 symbol set forth in Annex A, positioned in a conspicuous location within the operational
 1538 display area, for example, nominally centred at the bottom of the presentation area or *astern*
 1539 of own ship symbol.

1540 If display equipment provides facilities for trial manoeuvre that are independent of a shipborne
1541 radar target tracking system, then the facilities should comply with the relevant clauses of
1542 IEC 62388.

1543 **5.9.2 Methods of test and required results**

1544 Where display equipment provides a trial manoeuvre simulation:

- 1545 a) confirm by observation that the manoeuvre is identified in accordance with Annex A;
- 1546 b) confirm by analytical evaluation that the symbol is positioned in a conspicuous location.

1547 **5.10 Measurement**

1548 **5.10.1 Measurement from own ship**

1549 **5.10.1.1 Requirement**

1550 Measurements from own ship (for example, range rings, range and bearing, cursor, tracking
1551 data) shall be made with respect to the CCRP (for example, conning position).

1552 For consistency of measured ranges and bearings, the recommended reference location
1553 should be the conning position. Alternative reference locations may be used where clearly
1554 indicated or distinctively obvious.

1555 **5.10.1.2 Methods of test and required results**

1556 The methods of test and the required results are as follows:

- 1557 a) confirm by observation that the means of taking measurements are centred on to the
1558 CCRP and not centred on any other position except where specifically selected and
1559 clearly indicated;
- 1560 b) confirm by measurement, by comparing at least two alternative sensor inputs that have
1561 different position offsets from CCRP, that the range and bearing measurements are
1562 correct to the CCRP position and, if provided, alternative reference position;
- 1563 c) confirm by measurement that when switching from CCRP to an alternative reference
1564 position that displayed data is changing accordingly but data transmitted via the interface
1565 remains referenced to the CCRP.

1566 **5.10.2 Bearing and range measurements**

1567 **5.10.2.1 Requirement**

1568 Bearings and distances (ranges) drawn on the display, or bearing and range measurements
1569 between features already drawn on the display, shall have an accuracy no less than that
1570 afforded by the scale and resolution of the display.

1571 Range measurements shall be in nautical miles. In addition, facilities for metric measurements
1572 may be provided. All indicated values for range measurement shall be consistent and
1573 unambiguous. Where metric range measurements are required, the accuracy shall not be
1574 inferior to other range measurements.

1575 **5.10.2.2 Methods of test and required results**

1576 The methods of test and the required results are as follows:

- 1577 a) confirm by analytical evaluation that bearings and distances are measured to an accuracy
1578 consistent with the scale and resolution of the display;
- 1579 b) confirm by observation that distances can be measured in nautical miles;
- 1580 c) confirm by observation that the units used for range measurements and range scales are
1581 consistent within the system;

d) confirm by observation that an indication of the units used for measurement is provided.

5.11 Navigation tools

5.11.1 General requirements

This subclause addresses user tools that are common to navigational systems and equipment. Requirements for the provision of these tools are addressed in the relevant individual performance standards. When provided, these tools shall be presented with their relevant symbol(s) as set forth in Annex A.

5.11.2 Range rings

5.11.2.1 Requirement

(MSC191/7.1.4) *If range rings are displayed, then the range ring scale shall be indicated.*

Range rings shall be spaced to logically separate the range scale into equal divisions. Typically from two to six range rings would be provided for nautical mile range scale units, and up to five rings for metric range scale units.

The system accuracy of range rings shall be within 1 % of the maximum range of the range scale in use or 30 m, whichever is the greater distance.

Range rings shall always be centred at the CCRP.

A means or method shall be provided to enable and disable the set of range rings. (See also 6.1.4.)

5.11.2.2 Methods of test and required results

Where range rings are provided:

- a) confirm by observation that range rings are presented in accordance with Annex A;
- b) confirm by observation that the range ring separation (scale) is indicated;
- c) confirm by analytical evaluation that the range ring spacing logically separates each range scale into equal divisions;
- d) confirm by measurement that the accuracy of the range rings is within ± 1 % of the range scale in use or 30 m, whichever is greater;
- e) confirm by observation that the range rings are always centred at the CCRP;
- f) confirm by observation that a means or method is provided to enable and disable the set of range rings.

5.11.3 Variable range marker (VRM)

5.11.3.1 Requirement

Variable range marker(s) (VRMs) may be provided to measure the range of any point object within the operational display area.

Each active VRM shall have a numerical readout and the readout shall have a resolution compatible with the range scale in use.

Each active VRM shall be capable of adjustment to resolution of 0,01 NM, or to appropriate metric equivalent. A coarser resolution may be provided for higher range scales. The readout shall be available in the user dialogue area or, additionally, adjacent to the cursor when the cursor is over the VRM.

1621 The VRM shall enable the user to measure the range of an object within the operational
1622 display area with a maximum system error of 1 % of the range scale in use or 30 m,
1623 whichever is the greater distance.

1624 It shall be possible to use each VRM to measure the range to any point within the operational
1625 area and with the specified accuracy within 5 s.

1626 A means or method to switch each VRM on and off shall be provided.

1627 The VRM range set by the user shall be retained when there is a change in range scale.

1628 If means are provided to move VRM origin from the CCRP to other points within the
1629 operational display area, geographically fixed or moving with the velocity of own ship, then a
1630 means shall be provided to reset the VRM origin to the CCRP position by a simple operator
1631 action.

1632 **5.11.3.2 Methods of test and required results**

1633 Where a VRM is provided:

- 1634 a) confirm by observation that each VRM is presented in accordance with Annex A;
- 1635 b) confirm by observation that a dedicated readout is available for each active VRM;
- 1636 c) confirm that the VRMs are capable of adjustment to 0,01 NM (or appropriate metric
1637 equivalent). A coarser adjustment may be provided for ranges greater than 24 NM or
1638 appropriate metric equivalent;
- 1639 d) confirm by measurement that the accuracy of the VRMs meet the requirement using a
1640 calibrated target or marker;
- 1641 e) confirm by measurement that when metric measurements are provided, the readout and
1642 accuracy is equivalent to those relevant to nautical miles;
- 1643 f) confirm by measurement that the range to any object within the operational display area
1644 can be measured within 5 s with the required accuracy;
- 1645 g) confirm by observation that a means or method to switch each VRM on and off is
1646 provided;
- 1647 h) confirm by observation that the range of the VRM is maintained from range scale to range
1648 scale;
- 1649 i) confirm by observation that if means are provided to move VRM origin from the CCRP to
1650 other points means are provided to reset the VRM origin to the CCRP position by a simple
1651 operator action.

1652 **5.11.4 Bearing scale**

1653 **5.11.4.1 Requirement**

1654 A bearing scale may be provided. The bearing scale shall indicate the bearing from the
1655 CCRP.

1656 For radar display equipment, including radar with charted information, the bearing scale shall
1657 be outside of the operational display area (i.e. around its periphery and outside of which no
1658 radar video shall be displayed). For other display equipment the bearing scale may be inside
1659 the operational display area. It shall be numbered at least every 30° division and shall have
1660 division marks of at least 5°. The 5° and 10° division marks shall be clearly distinguishable
1661 from each other. 1° division marks may be presented where they are clearly distinguishable
1662 from each other and from the 5° and 10° division marks.

1663 If the display is off-centred or the position of own ship is outside of the operational display
1664 area, then the bearing scale shall be suppressed or its marks shall be adjusted to represent
1665 the bearing from CCRP.

1666 For display equipment not presenting radar, a means or method shall be provided to enable
1667 and disable the bearing scale.

1668 **5.11.4.2 Methods of test and required results**

1669 Where a bearing scale is provided:

- 1670 a) confirm by analytical evaluation that the bearing scale indicates bearings as measured
1671 from the CCRP;
- 1672 b) for radar display equipment, confirm by observation that the bearing scale is around the
1673 periphery of the operational display area;
- 1674 c) confirm by observation that the bearing scale remains centred at the CCRP (for example,
1675 in a true motion display mode);
- 1676 d) confirm by observation that the bearing scale is numbered at least every 30° and has
1677 division marks at least every 5°;
- 1678 e) confirm by observation that the 5° division marks are clearly distinguishable from the 10°
1679 division marks;
- 1680 f) where 1° division marks are provided, confirm by observation that they are clearly
1681 distinguishable from each other and from the 5° and 10° division marks;
- 1682 g) for display equipment not presenting radar, confirm by observation that a means or
1683 method is provided to enable and disable the bearing scale.

1684 **5.11.5 Electronic bearing line (EBL)**

1685 **5.11.5.1 Requirement**

1686 Electronic bearing line(s) (EBLs) may be provided to measure the bearing of any point object
1687 within the operational display area, with a maximum system error of 1° at the periphery of the
1688 display.

1689 The EBL(s) shall be capable of measurement from the CCRP relative to the ships heading
1690 and relative to true north. There shall be a clear indication of the bearing reference (i.e. true
1691 or relative).

1692 It shall be possible to move the EBL origin from the CCRP to any point within the operational
1693 display area and to reset the EBL to the CCRP by a simple operator action.

1694 It shall be possible to fix the EBL origin or to move the EBL origin at the velocity of own ship.

1695 A means or method shall be provided to ensure that the user is able to position the EBL
1696 smoothly in either direction, with an incremental adjustment adequate to maintain the system
1697 measurement accuracy requirements.

1698 It shall be possible to use the EBL to measure the bearing to any point object in the
1699 operational display area within 5 s.

1700 Each active EBL shall have a numerical readout with a resolution of 0,1° adequate to maintain
1701 the system measurement accuracy requirements based on a measurement uncertainty of
1702 $\pm 0,5^\circ$.

1703 A means or method shall be provided to enable and disable each EBL.

1704 The bearing of the EBL (i.e. set by the user) shall be retained while the EBL is enabled (for
1705 example, after a change in range scale or after a change in display orientation).

5.11.5.2 Methods of test and required results

Where an EBL is provided:

- a) confirm by observation that each EBL is presented in accordance with Annex A;
- b) confirm by measurement that the bearing to any point object within the operational display area can be measured to within an accuracy of 1°;
- c) confirm by analytical evaluation that bearings can be measured relative to the ships heading and relative to true north, and that a clear indication of the bearing reference is provided;
- d) confirm by observation that a means or method is provided to move the origin of an EBL from the CCRP to any point within the operational display area;
- e) confirm by observation that it is possible to return the origin of the EBL to the CCRP by a simple user action;
- f) confirm by observation that a means or method is provided to fix the origin of the EBL in a geographic location;
- g) confirm by observation that a means or method is provided to move the origin of the EBL at the velocity of own ship;
- h) confirm by observation that the EBL can be rotated smoothly in either direction;
- i) confirm by observation that the incremental adjustment is at least 0,1°;
- j) confirm by measurement that the EBL can be used to measure the bearing to any point object in the operational display area within ±0,5° in less than 5 s;
- k) confirm by observation that a numerical readout with a resolution of 0,1° is available for each active EBL;
- l) confirm by observation that a means or method is provided to enable and disable each EBL;
- m) confirm by observation that an enabled EBL remains over the same point object during a change of range scale and a change of orientation mode.

5.11.6 Parallel index lines (PI)**5.11.6.1 Requirement**

Parallel index (PI) lines may be provided. If parallel index lines are provided:

- independent parallel index lines with a means or method to truncate and switch off individual lines shall be provided;
- a simple and quick means or method of setting the bearing and beam range of a parallel index line shall be provided.

The bearing and beam range of any selected parallel index line shall be available on demand.

It shall be possible to set the bearing and beam range of a parallel index line within 5 s.

PI line range settings shall remain constant when the operator changes the range scale of the display and PI line bearing settings shall remain constant when own ship heading changes.

In addition to on/off selection of individual PI lines, means shall be provided to turn on/off all PI lines as a group.

5.11.6.2 Methods of test and required results

Where parallel index lines are provided:

- a) confirm by observation that parallel index lines are presented in accordance with Annex A;

- 1748 b) confirm by observation that a means or method is provided to truncate the length of each
1749 PI line;
- 1750 c) confirm by observation that PI lines are selectable for display on/off individually and as a
1751 group including all PI lines;
- 1752 d) confirm by measurement that a means or method is provided to set the bearing or range of
1753 a parallel index line within 5 s;
- 1754 e) confirm by observation that means are provided to display the bearing and range for any
1755 parallel index line on demand;
- 1756 f) confirm by observation that the distance of a PI line from the own ship and the true
1757 bearing of PI line does not change when a different range scale is selected, when own
1758 ship heading changes, and during True motion operation.

1759 **5.11.7 Offset measurement of range and bearing**

1760 **5.11.7.1 Requirement**

1761 There may be a means or method to measure the range and bearing of one position on the
1762 display relative to any other position within the operational display area. This may be
1763 accomplished, for example, using an electronic range and bearing line (ERBL), a combination
1764 of a VRM and an EBL, or the cursor.

1765 If a separate tool is provided to measure the combination of range and bearing (for example,
1766 an ERBL):

- 1767 • it shall have a numerical range and bearing readout. The resolution of the range readout
1768 shall be compatible with the range scale in use. The resolution of the bearing readout shall
1769 be 0,1° adequate to maintain the system measurement accuracy requirements;
- 1770 • it shall enable the user to measure the range of an object within the operational display
1771 area with a maximum system error of 1 % of the range scale in use or 30 m, whichever is
1772 the greater distance, and the bearing of any point object with a maximum system error of
1773 1° based on a measurement uncertainty of $\pm 0,5^\circ$ at the periphery of the display;
- 1774 • the user setting shall be retained while the tool is enabled (for example, after a change in
1775 range scale or after a change in display orientation);
- 1776 • it shall enable the user to position its bearing component smoothly in either direction, with
1777 an incremental adjustment adequate to maintain the system measurement accuracy
1778 requirements.

1779 It shall be possible to measure the range and bearing to any object in the operational display
1780 area within 5 s.

1781 **5.11.7.2 Methods of test and required results**

1782 Where a means or method is provided to measure the range and bearing from one position to
1783 another in the operational display area:

- 1784 a) confirm by observation that numerical readouts are available to display the range and
1785 bearing;
- 1786 b) confirm by analytical evaluation that the resolution of the range readout is compatible with
1787 each range scale;
- 1788 c) confirm by observation that the resolution of the bearing readout is 0,1°;
- 1789 d) confirm by measurement that the range from one position within the operational display
1790 area to any other position can be measured to within an accuracy of ± 1 % of the range
1791 scale in use or 30 m, whichever is greater;
- 1792 e) confirm by measurement that the bearing from one position within the operational display
1793 area to any position can be measured to within an accuracy of 0,5° at the periphery of the
1794 display;

- 1795 f) confirm by observation that the bearing component can be rotated smoothly in either
1796 direction;
- 1797 g) confirm by measurement that the range and bearing to any object within the operational
1798 display area can be measured within 5 s;
- 1799 h) where a separate tool is provided to measure the combination of range and bearing,
1800 confirm by observation that a means or method is provided to enable and disable that tool;
- 1801 i) confirm by observation that the user settings are retained after the change of the range
1802 scale and a change of orientation mode while the tool is enabled.

1803 **5.11.8 User cursor**

1804 **5.11.8.1 Requirement**

1805 A user cursor may be provided to enable a fast and concise means or method to designate
1806 any position on the operational display area. If a user cursor is provided:

- 1807 • the cursor position shall have a continuous numerical readout to provide the range and
1808 bearing, measured from the CCRP, and the latitude and longitude of the cursor position
1809 presented either alternatively or simultaneously;
- 1810 • a means or method shall be provided to easily locate the cursor position in the operational
1811 display area;
- 1812 • the accuracy of the range and bearing measurements provided by the cursor shall meet
1813 the relevant requirements for VRM and EBL.

1814 It shall be possible to measure the range and bearing to any object in the operational display
1815 area within 5 s.

1816 **5.11.8.2 Methods of test and required results**

1817 Where a user cursor is provided:

- 1818 a) confirm by observation that the cursor is presented in accordance with Annex A;
- 1819 b) confirm by observation that a numerical readout is available and that it continuously
1820 displays, either alternatively or simultaneously, the range and bearing of the cursor's
1821 position measured from own ship's CCRP, and the latitude and longitude of the cursor's
1822 position;
- 1823 c) confirm by observation that a means or method is provided to locate the cursor in the
1824 operational display area;
- 1825 d) confirm by analytical evaluation that the resolution of the range readout is compatible with
1826 each range scale;
- 1827 e) confirm by observation that the resolution of the bearing readout is 0,1°;
- 1828 f) confirm by analytical evaluation that the resolution of the latitude and longitude readout is
1829 compatible with each display scale;
- 1830 g) confirm by measurement that the range to an object within the operational display area
1831 can be measured to within an accuracy of $\pm 1\%$ of the range scale in use or 30 m,
1832 whichever is greater;
- 1833 h) confirm by measurement that the bearing to any point object within the operational display
1834 area can be measured to within an accuracy of 0,5° at the periphery of the display;
- 1835 i) confirm by observation that the cursor can be moved smoothly to create rotation in either
1836 direction;
- 1837 j) confirm by measurement that the range and bearing to any object within the operational
1838 display area can be measured within 5 s.

5.12 AIS data-link message processing capacity

5.12.1 Requirements

The data-link message processing capacity of the equipment shall provide the capability to process the number of VDM (VHF Data-link Messages) corresponding to 90 % of fully loaded VDL (VHF Data-link). In that condition, continuous and smooth update of displayed AIS data shall be maintained.

NOTE IEC 61162-1 describes the AIS interface as having a maximum data rate of 4 500 messages per minute.

5.12.2 Methods of test and required results

Use the AIS simulator to generate a scenario of VDM messages for 130 moving AIS targets updated every 2 s corresponding to approximately 90 % of a fully loaded VDL. Confirm by observation that the displayed update shows smooth and continuous updates.

5.13 AIS data report

5.13.1 General

Presentation of AIS data reports may be provided. If provided then the following requirements apply.

5.13.2 AIS data report capacity

5.13.2.1 Requirements

The equipment shall provide the capability to display a minimum number of AIS data reports according to Table 5.

The user manual shall specify the processing and display capacity of AIS data reports. In addition, the user manual shall describe the operation in the event that the capacity is at or close to, the maximum provided in each case.

There shall be an indication, or an alert (e.g. a caution) if specified by individual equipment standards, when the AIS data report processing or display capacity has been exceeded.

Table 5 – AIS data report capacity

Requirement	Capacity
Minimum display capacity for AIS data reports	20
Minimum processing capacity for AIS data reports	20

5.13.2.2 Methods of test and required results

The methods of test and the required results are as follows.

- Confirm by inspection of user manual that it specifies the processing and display capacity of AIS data reports and that at least the minimum capacities are provided.
- Use the AIS simulator and confirm by observation that there is an indication, or an alert (e.g. a caution) if specified by individual equipment standards, when the capacity of processing or display of AIS data reports has been exceeded.
- Confirm by inspection of the user manual that it describes the operation in the event that the capacity is at the maximum provided in each case.

1873 5.13.3 AIS data report display

1874 5.13.3.1 Requirement

1875 It shall be possible to add or remove AIS data reports from the display by layer (AIS AtoN,
1876 AIS locating devices, AIS SAR aircraft, AIS base stations), but not as individual objects.

1877 AIS data reports shall be presented by means of an appropriate symbol displayed using the
1878 reported position. For selection of appropriate symbol see Annex J. The shape of the symbol
1879 shall be as defined in Annex A.

1880 An AIS data report selected for display of its alphanumeric information shall be identified by
1881 the relevant symbol 2.12 given in Annex A;

1882 For each selected AIS data report the following information shall be presented in
1883 alphanumeric form:

1884 a) Message 1 and 14, for AIS locating devices

- 1885 • *identification* (Name, from AIS Message 24A, and/or MMSI. Both available at least on
1886 demand);
- 1887 • reported *position and* where available *its quality* (Position accuracy as “<= 10m” or “>
1888 10m” and RAIM as “not in use” or “in use”);
- 1889 • calculated *range* of target;
- 1890 • calculated *bearing* of target;
- 1891 • reported *COG* (or calculated CTW if the display is sea stabilised). In sea stabilized
1892 display the reported COG shall at least be available on demand;
- 1893 • reported *SOG* (or calculated STW if the display is sea stabilised). In sea stabilized
1894 display the reported SOG shall at least be available on demand;
- 1895 • reported *navigational status*;
- 1896 • where available text from AIS Message 14 related to the same MMSI.

1897 b) Message 4, Base station report

- 1898 • identification (Name, from AIS Message 24A, and/or MMSI. Both available at least on
1899 demand);
- 1900 • reported position;

1901 c) Message 9, SAR aircraft position report

- 1902 • identification (Name, from AIS Message 24A, and/or MMSI. Both available at least on
1903 demand);
- 1904 • reported position and where available its quality (Position accuracy as “<= 10m” or “>
1905 10m” and RAIM as “not in use” or “in use”);
- 1906 • reported altitude and where available its source;
- 1907 • calculated range of target;
- 1908 • calculated bearing of target;
- 1909 • reported COG;
- 1910 • reported SOG.

1911 d) Message 21, AtoN report

- 1912 • identification (Name, if not available then MMSI. MMSI at least available on demand);
1913 Name for AtoN is a combination from “Name of Aid-to-Navigation” and “Name of
1914 Aid-to-Navigation Extension”;

- 1915 • reported position and where available its quality (Position accuracy as “≤ 10m” or “> 10m” and RAIM as “not in use” or “in use”) and source (Type of electronic position fixing device);
- 1916
- 1917
- 1918 • AtoN status, see Annex L;
- 1919 • where available text from AIS Message 14 related to the same MMSI.

1920 AIS data reports shall be automatically removed after 6 times the nominal reporting interval
 1921 for AtoNs, SAR aircrafts and base stations and 18 minutes for AIS locating devices from the
 1922 last received report.

1923 NOTE Nominal reporting intervals are given in ITU R M.1371.

1924 AIS data reports shall not initiate any alerts.

1925 **5.13.3.2 Methods of test and required results**

1926 Use the AIS simulator and confirm by observation that the user can add and remove
 1927 information from the presentation by layers, but not as individual objects.

1928 Use the AIS simulator and confirm by observation that AIS data reports are displayed at the
 1929 reported position and that the symbol is as defined in Annex J and that the shape of the
 1930 symbols is as defined in Annex A.

1931 Use the AIS simulator and confirm by observation that an AIS data report selected for the
 1932 display of its alphanumeric information is identified by the relevant symbol 2.12 given in
 1933 Annex A.

1934 Use the AIS simulator and confirm by observation that for each selected AIS data report the
 1935 required information is presented in alphanumeric form.

1936 Use the AIS simulator and confirm by observation that AIS data reports are automatically
 1937 removed after 6 times the nominal reporting interval for AtoNs, SAR aircrafts and base
 1938 stations and 18 minutes for AIS locating devices from the last received report.

1939 Use the AIS simulator and confirm by observation that AIS data reports do not initiate any
 1940 alerts.

1941 **5.14 AIS ASM**

1942 **5.14.1 General**

1943 AIS ASM are uniquely identified as specified in IMO SN.1/Circ.289.

1944 The unique identifier to separate instances of AIS ASM objects is the “Source ID” (i.e. MMSI)
 1945 in combination with FI unless otherwise specified.

1946 [TBD – miss specification of identification of separate parallel instances of AIS ASM FI = 17,
 1947 18, 19, 20, 27, 28, 29, 30, 31]

1948 The unique identifier to separate instances of Tidal window (FI=32) is the “Destination ID”.

1949 The unique identifier to separate instances of Environmental (FI=26) is the “Site ID”.

1950 The unique identifier to separate instances of Area Notice (FI=22 or 23) is a combination of
 1951 the same “Notice description”, “Start date and time of Area”, “Duration” and
 1952 “Latitude/longitude of the Sub-area”. An Exception is “Duration = 0” which cancels the Area
 1953 notice.

1954 Presentation on case by case basis for each uniquely identified AIS ASM (see Table J.1) may
1955 be provided. If provided then the following requirements apply.

1956 **5.14.2 AIS ASM capacity**

1957 **5.14.2.1 Requirements**

1958 The equipment shall provide the capability to display a minimum number of AIS ASMs
1959 according to Table 6.

1960 The user manual shall specify the processing and display capacity of AIS ASM including
1961 which AIS ASMs are supported (see Table J.1), in addition, the user manual shall describe
1962 the operation in the event that the capacity is at or close to, the maximum provided in each
1963 case.

1964 There shall be an indication, or an alert (e.g. a caution) if specified by individual equipment
1965 standards, when the AIS ASM processing or display capacity has been exceeded.

1966 **Table 6 – AIS ASM capacity**

Requirement	Capacity
Minimum display capacity for AIS ASM	12
Minimum processing capacity for AIS ASM	12

1967 **5.14.2.2 Methods of test and required results**

1968 The methods of test and the required results are as follows.

- 1969 a) Confirm by inspection of user manual that it specifies the processing and display capacity
1970 of AIS ASM and that at least the minimum capacities are provided.
- 1971 b) Use the AIS simulator and confirm by observation that there is an indication, or an alert
1972 (e.g. a caution) if specified by individual equipment standards, when the capacity of
1973 processing or display of AIS ASM has been exceeded.
- 1974 c) Confirm by inspection of the user manual that it describes the operation in the event that
1975 the capacity is at the maximum provided in each case.

1976 **5.14.3 AIS ASM display**

1977 **5.14.3.1 Requirement**

1978 It shall be possible to add or remove AIS ASM from the display by layer or sublayer as
1979 defined in Table J.1, but not as individual objects.

1980 AIS ASMs shall be presented by means of an appropriate symbol or symbols displayed using
1981 the reported position. For selection of appropriate symbols see Annex J. The shape of the
1982 symbol shall be as defined in Annex A.

1983 NOTE Some AIS ASMs require more than one symbol to present the information transmitted therein.

1984 Where the user settings for the layers or sub-layers to be displayed cause multiple different
1985 AIS ASM point symbols to be presented in the same position, a representing symbol shall be
1986 presented to represent all the AIS ASMs at that position as follows:

- 1987 • when the multiple different AIS ASM point symbols only include two or more of the
1988 symbols 5.5, 5.6 and/or 5.13 in Table A.5, the representing symbol shall be 5.13 (without
1989 optional addition of symbol 3.4);

- 1990 • when the multiple different AIS ASM point symbols include two or more different symbols
1991 including at least one symbol that is not symbol 5.5, 5.6 or 5.13, the representing symbol
1992 shall be symbol 5.18.
- 1993 When selecting the representative symbol for the presentation of its alphanumeric data, the
1994 details of all the represented ASMs shall be provided to the user.
- 1995 An AIS ASM selected for display of its alphanumeric information shall be identified by the
1996 relevant symbol 2.12 given in Annex A.
- 1997 For each AIS ASM selected for the display of its alphanumeric information the values of the
1998 applicable and available fields contained in Table J.1 and Source ID (i.e. MMSI) shall be
1999 presented at least in alphanumeric form.
- 2000 Graphical presentation of AIS ASMs, which include a specified validity period, shall only be
2001 presented graphically during the period that it is valid for.
- 2002 AIS ASMs shall be automatically removed after 18 minutes from the last received report.
2003 Additionally, AIS ASMs shall be automatically removed after the end date and time specified
2004 or after receiving a cancellation message as per IMO SN.1/Circ.289.
- 2005 NOTE Assumed nominal reporting interval is 6 minutes
- 2006 EXAMPLE An area notice exists as long as reports for it is received at least once within the timeout period of
2007 18 minutes and as long as it is within its specified validity period (i.e. until end of "duration" starting from 'start date
2008 and time of area") and as long as it is not cancelled (i.e. "duration = 0").
- 2009 AIS ASMs shall not initiate any alerts.
- 2010 **5.14.3.2 Methods of test and required results**
- 2011 Use the AIS simulator and confirm by observation that the user can add and remove
2012 information from the presentation by layers or sublayers as defined in Table J.1, but not as
2013 individual objects.
- 2014 Use the AIS simulator and confirm by observation for each case supported and available in
2015 Table J.1 that AIS ASMs are displayed at the reported position and that the symbol is as
2016 defined in Annex J and that the shape of the symbols is as defined in Annex A.
- 2017 Use the AIS simulator to create cases of multiple point AIS ASM objects that are supported
2018 and that are in the same position (at least, where supported, the cases of: Air Gap + Berthing
2019 data; Wind + Weather; Wind + Water level; Tidal window + Water level) and confirm by
2020 observation for each case that symbol 5.13 or 5.18 is displayed as required.
- 2021 Use the AIS simulator and confirm by observation that an AIS ASM selected for the display of
2022 its alphanumeric information is identified by the relevant symbol 2.12 given in Annex A.
- 2023 Use the AIS simulator and confirm by observation that for each AIS ASM selected for the
2024 display of its alphanumeric information the values of the applicable and available fields
2025 contained in Table J.1 are presented.
- 2026 Use the AIS simulator and confirm by observation that AIS ASMs are automatically removed
2027 after 18 minutes from the last received report and are removed after the end date and time
2028 specified or after receiving a cancellation message.
- 2029 Use the AIS simulator and confirm by observation that AIS ASMs do not initiate any alerts.

Use the AIS simulator and confirm by observation that graphical presentation of Environmental data which included a specified validity period from AIS ASMs is only presented graphically during the period that it is valid for.

5.15 Presentation of AIS synthetic position

5.15.1 Requirement

Presentation of AIS synthetic positions may be provided. If presentation of AIS synthetic positions is provided:

- a) the user manual shall specify the processing and display capacity of AIS synthetic positions. The processing capacity shall be at least 40 AIS synthetic positions and the display capacity shall be at least 20 AIS synthetic positions;
- b) it shall be possible to add or remove AIS synthetic positions from the display by layer, but not as individual objects;
- c) means shall be provided to filter displayed AIS synthetic positions, for example based on range, speed, course, etc.;
- d) AIS synthetic positions shall be displayed at the reported position. The symbol shall be as defined in Annex A;
- e) an AIS synthetic position selected for the display of its alphanumeric information shall be identified by the relevant symbol given in Annex A;
- f) for each AIS synthetic position selected for the display of its alphanumeric information the following information shall be presented:
 - 1) source of AIS synthetic position (for example, VTS-generated, etc.);
 - 2) AIS synthetic position identification (for example, MMSI, etc.);
 - 3) reported position;
 - 4) calculated range from own ship to AIS synthetic position;
 - 5) calculated bearing from own ship to AIS synthetic position;
 - 6) additional information, where available;

NOTE Information can be displayed in a separate user dialogue area

- g) AIS synthetic positions shall be automatically removed after 18 minutes from the last received report;

NOTE Assumed nominal reporting interval is 6 minutes

- h) if applicable, AIS synthetic positions shall be automatically removed after receiving "remove from the display after the end date and time specified" or after receiving a cancellation message;
- i) AIS synthetic positions shall not initiate any alerts;
- j) there shall be an indication, or an alert (e.g. a caution) if specified by individual equipment standards, when the processing or display capacity for AIS synthetic positions has been exceeded.

5.15.2 Methods of test and required results

Where presentation of AIS synthetic positions is provided:

- a) confirm by observation that user manual specifies the processing and display capacity of AIS synthetic positions and that at least the minimum capacities are provided;
- b) use the AIS simulator and confirm by observation that it is possible to add or remove AIS synthetic positions from the display by layer, but not as individual objects,
- c) use the AIS simulator and confirm by observation that means are provided to filter displayed AIS synthetic positions, for example based on range, speed, course, etc.;

- 2075 d) use the AIS simulator and confirm by observation that an AIS synthetic position is
2076 displayed at the reported position and that the AIS synthetic position is not subject for
2077 processing, for example update by dead reckoning. Confirm by observation that the
2078 symbol is as defined in Annex A;
- 2079 e) use the AIS simulator and confirm by observation that an AIS synthetic position selected
2080 for the display of its alphanumeric information is identified by the relevant symbol given in
2081 Annex A;
- 2082 f) use the AIS simulator and confirm by observation that for each selected AIS synthetic
2083 position the following information is presented in alphanumeric form:
- 2084 1) source of AIS synthetic position (for example, VTS-generated, etc.);
2085 2) AIS synthetic position identification (for example, MMSI, etc.);
2086 3) reported position;
2087 4) calculated range from own ship to AIS synthetic position;
2088 5) calculated bearing from own ship to AIS synthetic position;
2089 6) Additional information, where available;
- 2090 g) use the AIS simulator and confirm by observation that an AIS synthetic position is
2091 automatically removed after 18 minutes from the last received report;
- 2092 h) use the AIS simulator and confirm by observation that, if applicable, an AIS synthetic
2093 position is automatically removed after receiving "remove from the display after the end
2094 date and time specified" or after receiving a cancellation message;
- 2095 i) confirm by inspection of the user manual that AIS synthetic positions do not initiate any
2096 alerts;
- 2097 j) use the AIS simulator and confirm by observation that there is an indication, or an alert
2098 (e.g. a caution) if specified by individual equipment standards, when the processing or
2099 display capacity for AIS synthetic positions has been exceeded.

2100 **5.16 Presentation of association of DSC received call with a displayed AIS object**

2101 **5.16.1 Requirement**

2102 Presentation of DSC received call associations may be provided. If presentation of DSC
2103 received call associations is provided:

- 2104 a) DSC received calls shall be associated with an AIS object based on MMSI. If the
2105 equipment has no AIS object with the same MMSI then the DSC received call shall not be
2106 presented graphically;

2107 NOTE Typical AIS objects for this association include AIS targets, AIS locating devices and AIS synthetic
2108 positions.

- 2109 b) the user manual shall specify the processing and display capacity of associations of DSC
2110 received calls. The processing capacity shall be at least 40 associations of DSC received
2111 calls and the display capacity shall be at least 20 associations of DSC received calls;
- 2112 c) it may be possible to add or remove DSC received calls from the display by layer, but not
2113 as individual objects;
- 2114 d) if an AIS object, for which an association of DSC received call is available, is displayed
2115 and, where applicable, if the layer of association of DSC received call is enabled, then the
2116 appropriate symbol 5.16 given in Annex A shall be displayed;
- 2117 e) if an AIS object, for which an association DSC received call is available, is selected for the
2118 display of its alphanumeric information then the information received for the association of
2119 DSC received call shall be readily available;
- 2120 f) it shall be possible for the user to remove an association of DSC received call from the
2121 database;
- 2122 g) an association of DSC received call shall be automatically removed from the database
2123 after 8 hours from the last received report;

2124 NOTE Assumed reporting is just a single report.

2125 h) association of DSC received calls shall not initiate any alerts

2126 i) there shall be an indication, or an alert (e.g. a caution) if specified by individual equipment
2127 standards, when the processing or display capacity for association of DSC received calls
2128 has been exceeded.

2129 **5.16.2 Methods of test and required results**

2130 Where presentation of association of DSC received calls is provided:

2131 a) use the AIS simulator to provide DSC received calls and confirm by observation that an
2132 association of DSC received call is connected to an AIS object based on MMSI. Use the
2133 simulator arrangement and confirm by observation that if the equipment has no AIS object
2134 with same MMSI then the association of DSC received call is ignored;

2135 b) confirm by observation that user manual specifies the processing and display capacity of
2136 association of DSC received calls and that at least the minimum capacities are provided;

2137 c) use the AIS simulator to provide DSC received calls and confirm by observation that, if
2138 applicable, it is possible to add or remove association of DSC received calls from the
2139 display by layer, but not as individual objects;

2140 d) use the AIS simulator to provide a DSC received call and confirm by observation that if an
2141 AIS object, for which an association of DSC received call is available, is displayed and if
2142 the layer of association of DSC received call is enable then the symbol 5.16 given in
2143 Annex A is displayed;

2144 e) use the AIS simulator to provide a DSC received call and confirm by observation that if a
2145 target, for which the association of DSC received call is available, is selected for the
2146 display of its alphanumeric information then the information received for the association of
2147 DSC received call is readily available;

2148 f) use the AIS simulator to provide a DSC received call and confirm by observation that user
2149 can remove the association of DSC received call;

2150 g) use the AIS simulator to provide a DSC received call and confirm by observation that the
2151 association of DSC received call is automatically removed after 8 hours from the last
2152 received report;

2153 h) confirm by inspection of the user manual that association of DSC received calls do not
2154 initiate any alerts;

2155 i) use the AIS simulator to provide DSC received calls and confirm by observation that there
2156 is an indication, or an alert (e.g. a caution) if specified by individual equipment standards,
2157 when the processing or display capacity for association of DSC received calls has been
2158 exceeded.

2159 **5.17 AIS ASM information extending reported AIS target information**

2160 **5.17.1.1 Requirement**

2161 Presentation of AIS ASM information extending reported AIS target information may be
2162 provided. If presentation of AIS ASM information extending reported AIS target information is
2163 provided:

2164 a) Table 7 specifies the reported AIS target information extended by AIS ASM messages and
2165 the function identifiers (FI) of AIS ASM messages which extends the reported AIS target
2166 information (see 5.5.11);

2167 b) the extended reported AIS target information of Table 7 shall be linked to the reported AIS
2168 target information (see 5.5.11) and shall be available on demand in alphanumeric form.

2169

Table 7 – Extended reported AIS target information from AIS ASM

Reported AIS target extended information (SN.1/Circ.289)	AIS ASM (DAC=001) source FI
Last Port of Call	24
Next Port of Call	24
Air Draught	24
Diesel	24
Gross tonnage	24
Heavy fuel oil	24
Ice class	24
Laden or Ballast	24
Light fuel oil	24
Lloyd's Ship type	24
Number of Persons	16,24
Second Port of call	24
Shaft Horse power	24
SOLAS Equipment status	24
Total amount of bunker oil in tonnes	24
VHF Working channel	24

2170 **5.17.1.2 Methods of test and required results**

2171 Where presentation of AIS ASM information extending reported AIS target information is
 2172 provided, use the AIS simulation to provide each item of reported AIS target information in
 2173 Table 7 and confirm by observation that the information is available on demand.

2174 **5.18 AIS safety-related messages**

2175 **5.18.1 Requirements**

2176 Presentation of AIS safety-related messages may be provided. If provided, these
 2177 requirements apply unless otherwise specified by an individual equipment standard.

2178 AIS safety-related messages shall be linked to a target based on MMSI.

2179 If a target, for which an unread AIS safety-related message is available or if the content of an
 2180 AIS safety-related message is selected for display, is displayed then the appropriate symbol
 2181 given in Annex A shall be displayed based on user selection. It shall not be possible to
 2182 remove individual symbols appropriate for AIS safety-related message sources from the
 2183 presentation

2184 In this document there are no requirements for synchronization of this functionality between
 2185 individual equipment (e.g. between AIS and Radar).

2186 User shall have means to retrieve and individually view at least the last 20 AIS safety-related
 2187 messages received and at least 20 AIS safety-related messages retained by the user.

2188 Users shall have means to remove any individual or all AIS safety-related messages.

2189 The oldest received AIS safety-related message shall be automatically removed when the
 2190 storage capacity for last received messages is fully occupied and a new AIS safety-related
 2191 message is received.

2192 Indication that there are unread AIS safety-related messages available shall be provided.

2193 Indication of which AIS safety-related-messages are unread or retained shall be provided.

2194 **5.18.2 Methods of test and required results**

2195 Use the AIS simulator to send the storage capacity of the equipment plus one AIS safety-
2196 related messages and confirm by observation that:

- 2197 • the storage capacity for AIS safety-related messages is at least last 20 received
2198 messages plus at least 20 retained messages;
- 2199 • the oldest message has been automatically removed;
- 2200 • each AIS safety-related message is initially in the state of “unread”;
- 2201 • there is an indication that there are “unread” AIS safety-related messages available;
- 2202 • AIS safety-related messages are linked to the targets based on MMSI;
- 2203 • when enabled by the user, targets with linked and unread AIS safety-related messages
2204 are indicated by appropriate symbol in connection to the displayed target symbols;
- 2205 • when enabled by the user, a target for which the content of an AIS safety-related message
2206 is selected for display is indicated by an appropriate symbol in connection to the displayed
2207 target symbol;
- 2208 • it is not possible to remove appropriate AIS safety-related symbols from targets based on
2209 individual AIS safety-related messages.

2210 Confirm by observation that it is possible to remove any individual or all AIS safety-related
2211 message.

2212 Confirm by observation that the textual content of each AIS safety-related message is
2213 available for viewing together with the state (unread/read/retained) indication applicable for
2214 the individual AIS safety-related message.

2215 Confirm by observation that after changing all AIS safety-related messages in the storage as
2216 “read” the indication of unread AIS safety-related messages available is no more displayed.

2217 **6 INS, Radar and chart displays**

2218 **6.1 General**

2219 **6.1.1 Application**

2220 NOTE See IEC 62388 for equivalent tests for this clause for radar equipment.

2221 The provisions of this clause are applicable to stand-alone displays, associated with radar
2222 systems or responsible for the presentation of electronic chart information (for example,
2223 ECDIS) and multifunction display equipment when providing a radar or chart display.

2224 **6.1.2 Multifunction displays**

2225 **6.1.2.1 Requirement**

2226 (MSC191/7.1.1) *If the display equipment is capable of supporting the presentation of multiple*
2227 *functions or operational modes, then there shall be a clear indication of the primary function*
2228 *supported by the presentation (for example, radar, chart, etc.). It shall be possible to select*
2229 *the presentation associated with the primary function, for example, the radar presentation*
2230 *(see 6.2) or the chart presentation (for example, ECDIS) (see 6.3), by a simple operator*
2231 *action.*

2232 Note that if multifunction display equipment provides the primary presentation for multiple
2233 navigational systems and equipment required or allowed for carriage (for example, radar or
2234 ECDIS), then redundant display equipment should be available. The number of displays fitted
2235 on the bridge of a ship should support the simultaneous presentation of information for all
2236 navigational systems and equipment.

2237 **6.1.2.2 Methods of test and required results**

2238 Where display equipment is capable of supporting the presentation of multiple functions:

- 2239 a) confirm by observation that the primary function of the display equipment is clearly
2240 indicated;
- 2241 b) confirm by observation that the presentation associated with the primary function can be
2242 selected by a simple operator action.

2243 **6.1.3 Simultaneous display of radar and chart data**

2244 **6.1.3.1 Requirement**

2245 (MSC191/7.1.2) *If a radar video image and electronic chart information are displayed*
2246 *together, the chart and the radar video image shall use the same reference system and co-*
2247 *ordinate criteria, including, as applicable, datum, CCRP, and stabilisation mode, and shall*
2248 *match in scale, projection and orientation. Any user-entered offset, in addition to installation*
2249 *alignment (for example, to CCRP and/or heading reference), shall be indicated. The details of*
2250 *the offset shall be readily available to the user.*

2251 NOTE The Performance Standards for individual navigational systems and equipment provide functional
2252 requirements for offsets.

2253 **6.1.3.2 Methods of test and required results**

2254 Where a radar video image and electronic chart information are displayed together:

- 2255 a) confirm by observation that they use the same reference system and co-ordinate criteria;
- 2256 b) confirm by observation that they use the same stabilisation mode;
- 2257 c) confirm by observation that they match in scale, projection and orientation;
- 2258 d) confirm by observation that an indication is provided for any user-entered offset to the
2259 presentation of either the radar video image or the electronic chart information;
- 2260 e) confirm by observation that the details of the user-entered offset are readily available.

2261 **6.1.4 Range scales**

2262 **6.1.4.1 Requirement**

2263 (MSC191/7.1.3) *If a radar video image is displayed, range scales of 0,25, 0,5, 0,75, 1,5, 3, 6,*
2264 *12 and 24 nautical miles shall be provided. Additional range scales are permitted below*
2265 *0,25 NM and/or above 24 NM. The selected range scale shall be clearly and permanently or*
2266 *persistently indicated, as appropriate for the application.*

2267 Metric units may also be provided. (See also 5.10.2.)

2268 **6.1.4.2 Methods of test and required results**

2269 Where a radar video image is displayed:

- 2270 a) confirm by observation that range scales of 0,25, 0,5, 0,75, 1,5, 3, 6, 12 and 24 NM are
2271 provided for user selection;
- 2272 b) where additional range scales are provided, confirm by observation that they are below
2273 0,25 NM and/or above 24 NM;

- 2274 c) confirm by observation that the selected range scale is clearly indicated and remains
2275 visible while the radar video image is displayed.

2276 **6.1.5 Operational display area**

2277 **6.1.5.1 Requirement**

2278 (MSC191/7.1.5) *No part of the operational display area shall be permanently used for the*
2279 *presentation of information that is not part of the navigational presentation (for example, pop*
2280 *up displays, drop down menus and information windows). Temporary, limited and relevant*
2281 *alphanumeric data, information and text may be displayed adjacent to a selected symbol,*
2282 *graphic or target within the operational display area.*

2283 Any windows containing text, diagrams, etc. superimposed on the operational display area
2284 shall be temporary and movable (for example, to a less important part of the display, such as
2285 on land).

2286 Note that display equipment should avoid the use of dialogue boxes using white backgrounds,
2287 or provide a means or method of automatically changing the background of dialogue boxes
2288 which appear on displays set for use in dusk or dark conditions.

2289 **6.1.5.2 Methods of test and required results**

2290 The methods of test and the required results are as follows:

- 2291 a) confirm by observation that any information that is not part of the navigational
2292 presentation but is superimposed on the operational display area is presented only in
2293 response to an explicit user action (for example, a menu selection, hyperlink, hot key,
2294 etc.);
- 2295 b) confirm by observation that any windows containing text, diagrams, etc. superimposed on
2296 the operational display area are movable within the operational display area or can be
2297 removed from the operational display area.

2298 **6.1.6 Motion display modes**

2299 **6.1.6.1 Requirement**

2300 A clear indication of the motion mode in use shall be provided. (See also 4.10.1.)

2301 **6.1.6.2 Methods of test and required results**

2302 Verify that a clear indication of the display mode in use is provided in accordance with 4.10.1.

2303 **6.1.7 Orientation modes**

2304 **6.1.7.1 Requirement**

2305 A north up orientation mode shall be provided for radar and chart presentations.

2306 A course up orientation mode shall be provided for radar presentations and may be provided
2307 for chart presentations.

2308 A head up orientation mode may be provided for both radar and chart presentations.

2309 A clear indication of the orientation mode in use shall be provided. (See also 4.10.1)

2310 It shall always be possible to display the SENC information in a “north-up” orientation. Other
2311 orientations are permitted. When such orientations are displayed, the orientation shall be
2312 altered in steps large enough to avoid unstable display of the chart information.

6.1.7.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by observation that a north up orientation mode is provided;
- b) for radar displays, confirm by observation that a course up orientation mode is provided;
- c) verify that a clear indication of the orientation mode in use is provided in accordance with 4.10.1;
- d) for each bearing stabilised orientation that may be provided, confirm by analytical evaluation that for rates of turn between 0°/s and 20°/s the displayed chart symbols and text in the operational display area do not re-orient more often than twice per second and remain legible.

6.1.8 Off-centring**6.1.8.1 Requirement**

If a radar video image is displayed, manual off-centring shall be provided to locate the selected antenna position (i.e. the centre of the radar video image) at any point within at least 50 % and not more than 75 % of the radius, measured from the centre of the operational display area. This limitation is only applicable for Radar or Radar-mode available in the equipment (for example this limitation is not valid for radar overlay in an ECDIS).

If a radar video image is displayed, and an off-centred display is selected, the selected antenna position shall be capable of being located to any point on the display up to at least 50 %, and not more than 75 %, of the radius from the centre of the operational display area. A facility for automatically positioning own ship for the maximum view ahead may be provided. This limitation is only applicable for Radar or Radar-mode available in the equipment (for example this limitation is not valid for radar overlay in an ECDIS).

If a radar video image is displayed, and an off-centred display and true motion display mode are selected, the selected antenna position shall automatically reset at least 50 %, and not more than 75 %, of the radius from the centre of the operational display area to a location giving the maximum view along own ship's course. Provision for an early reset of the selected antenna position shall be provided. This limitation is only applicable for Radar or Radar-mode available in the equipment (for example this limitation is not valid for radar overlay in an ECDIS).

6.1.8.2 Methods of test and required results

Where a radar video image is displayed in a Radar or Radar-mode (not, for example, as a radar overlay on ECDIS):

- a) confirm by observation that manual off-centring is provided;
- b) confirm by observation that manual off-centring provides the capability to locate the selected radar antenna position at any point in the operational display area at least 50 % and not more than 75 % of the radius measured from the centre;
- c) where true motion display mode is selected
 - 1) confirm by observation that the selected radar antenna position is automatically reset at least 50 %, and not more than 75 %, of the radius from the centre of the operational display area,
 - 2) confirm by observation that the user may manually reset the selected radar antenna position.

6.1.9 Stabilisation modes**6.1.9.1 Requirement**

If electronic chart information is displayed, then a ground stabilisation mode shall be provided.

2359 Where radar information is displayed, both ground and sea stabilisation modes shall be
2360 provided.

2361 The stabilisation mode and stabilisation source (i.e. velocity or speed source) shall be clearly
2362 indicated. (See also 4.10.1.)

2363 NOTE Ground stabilisation requires a ground-referenced velocity (i.e. COG/SOG) from an external sensor
2364 capable of providing own ship speed measured over the ground (for example, an EPFS). Sea stabilisation requires
2365 a water-referenced velocity (i.e. CTW/STW or HDG/SPD) from an external sensor capable of providing own ship
2366 speed measured through the water (for example, an SDME).

2367 **6.1.9.2 Methods of test and required results**

2368 The methods of test and the required results are as follows:

- 2369 a) where electronic chart information is displayed, confirm by observation that a ground
2370 stabilisation mode is provided;
- 2371 b) where a radar information is displayed, confirm by observation that both ground and sea
2372 stabilisation modes are provided;
- 2373 c) confirm by observation that a clear indication of the stabilisation mode selected and its
2374 source are provided.

2375 **6.2 Radar displays**

2376 **6.2.1 Application**

2377 The provisions of this subclause are applicable to stand-alone displays associated with radar
2378 systems and multifunction displays when providing a radar display.

2379 NOTE The functional requirements for radar are defined in the performance standards set forth in IMO Resolution
2380 MSC.192(79) and further specified in IEC 62388. The presentation requirements for radar information are defined
2381 in the performance standards for presentation set forth in IMO Resolution MSC.191(79) and further specified in this
2382 standard.

2383 **6.2.2 Radar video image**

2384 **6.2.2.1 Requirement**

2385 (MSC191/7.2.1.1) The *radar video image* (i.e. echoes), *tracked radar targets* and *reported AIS*
2386 *targets* shall *not be substantially degraded, masked or obscured by other presented*
2387 *information*. (See also 5.4.1.)

2388 (MSC191/7.2.1.2) *It shall be possible to temporarily suppress all graphical information from*
2389 *the display, retaining only the radar video image and target trails.*

2390 **6.2.2.2 Methods of test and required results**

2391 The methods of test and the required results are as follows:

- 2392 a) confirm by analytical evaluation that the presentation of the radar video image, tracked
2393 radar targets and reported AIS targets is not degraded, masked or obscured by other
2394 presented information;
- 2395 b) confirm by observation that the user can suppress the presentation of all graphical
2396 information so that only the radar video image and target trails remain.

2397 **6.2.3 Brightness of radar information**

2398 **6.2.3.1 Requirement**

2399 (MSC191/7.2.1.3) *The brightness of the radar video image (i.e. echoes) and associated*
2400 *graphic symbols for tracked radar targets* shall *be variable. It shall be possible to control the*
2401 *brightness of all displayed radar information. There shall be independent means to adjust the*

2402 *brightness of groups of displayed graphics and alphanumeric data*, information and text (for
2403 example, tracked radar targets, navigation tools, etc.). *The brilliance* (i.e. brightness) *of the*
2404 *heading line shall not be variable to extinction.*

2405 **6.2.3.2 Methods of test and required results**

2406 The methods of test and the required results are as follows:

- 2407 a) confirm by observation that a means or method to adjust the brightness of the radar video
2408 image is provided;
- 2409 b) confirm by observation that a separate independent means or method to adjust the
2410 brightness of tracked radar target symbols is provided;
- 2411 c) confirm by observation that a separate independent means or method to adjust the
2412 brightness of groups of other displayed graphics and alphanumeric data, information and
2413 text is also provided;
- 2414 d) confirm by observation that the brightness of the heading line cannot be adjusted to the
2415 point of extinction.

2416 **6.2.4 Display of chart information on radar**

2417 **6.2.4.1 Requirement**

2418 (MSC191/7.2.2.1) *Vector format electronic chart information may be presented on a radar*
2419 *display. This shall be accomplished using layers* (i.e. of charted objects or elements) *selected*
2420 *from an electronic chart database. As a minimum, the elements of the ECDIS Standard*
2421 *Display* (see IEC 61174) *shall be available for individual selection by IMO display category or*
2422 *layer* (for example, by IHO suggested viewing group, see IHO S-52), *but not as individual*
2423 *objects. As far as practical, electronic chart information shall be presented in accordance with*
2424 *this standard* (see 4.5.1, 4.6.2 and 5.5.1) *and with the ECDIS Performance Standards*
2425 *(IEC 61174). Raster navigational charts are not permitted for chart radar applications.*

2426 NOTE IEC 62388 requires a subset of the ECDIS standard display, called the primary chart information set, to be
2427 made available by a primary control function.

2428 (MSC191/7.2.2.3) *If electronic chart information is displayed on a radar presentation, then*
2429 *there shall be a permanent or persistent indication of its status* (for example, on/off,
2430 official/unofficial data, overscale/underscale, etc.), as appropriate for the application. *The*
2431 *source and update information shall also be available* to the user on demand.

2432 Note that the overscale area pattern addressed in IHO S-52 and provided in the IHO ECDIS
2433 Presentation Library may obscure or degrade the presentation of the radar video image. An
2434 alternative means or method of overscale indication (for example, the display of an overscale
2435 factor) is an acceptable alternative.

2436 If electronic chart information is presented on a radar display, it shall be possible to
2437 temporarily remove it by a single operator action and also to switch charts on and off.

2438 **6.2.4.2 Methods of test and required results**

2439 When vector format electronic chart information is presented on a radar display:

- 2440 a) confirm by observation that the content of the electronic chart database includes all of the
2441 elements specified by the IMO for the ECDIS standard display (see IEC 61174);
- 2442 b) confirm by observation that elements of the standard display are available for selection
2443 (i.e. for display) by IMO display category and/or by layer, but not as individual chart
2444 objects;
- 2445 c) verify the presentation of vector format electronic chart information in accordance with
2446 4.5.1, 4.6.2 and 5.5.1;

- d) confirm by observation that raster format electronic chart information cannot be presented when the radar is displayed;
- e) where electronic chart information is presented in shades of grey, confirm that they are distinguishable between respective chart features;
- f) confirm by observation that a permanent indication of the status (official/unofficial data and overscale/underscale) of the electronic chart information is provided;
- g) confirm by observation that the source of the electronic chart information and its update information are available to the user on demand;
- h) confirm by observation that the user may temporarily remove electronic chart information from the display by a single operator action and that there is a facility to switch charts on and off. The temporarily removed function may be combined with other functions;
- i) confirm by document inspection that the user manual describes all available chart functionalities;
- j) confirm by document inspection that the EUT has no functionality to use raster navigational charts;
- k) verify the testing of colours and intensity in accordance with the test methods and required results of the Annex G.

6.2.5 Priority of radar information

6.2.5.1 Requirement

(MSC191/7.2.2.2) *If electronic chart information is presented within the operational display area, the presentation of radar information (for example, the radar video image, target trails, etc.) shall have priority. The electronic chart information shall be clearly perceptible as such. The electronic chart information shall not substantially degrade, mask or obscure the radar video image, tracked radar targets or reported AIS targets.*

6.2.5.2 Methods of test and required results

When electronic chart information is presented on a radar display:

- a) confirm by observation that the radar video image and target trails have display priority over the electronic chart information;
- b) confirm by analytical evaluation that the presentation of electronic chart information cannot be confused with the display of any other information (for example radar information or AIS information);
- c) confirm by analytical evaluation that the presentation of the electronic chart information does not substantially degrade, mask or obscure the presentation of radar information in accordance with 6.2.3.

6.2.6 Display of map graphics

6.2.6.1 Requirement

(MSC191/7.2.3) User generated radar *map graphics* including monitored and/or additional planned routes *may be* presented on a radar display, *but shall not substantially degrade, mask or obscure the radar video image, target trails, tracked radar targets, reported AIS targets, or electronic chart information.*

Note that where a radar system provides map graphics for monitored and/or planned routes, it should comply with the relevant clauses of IEC 61174.

Map graphics may be referenced to own ship or to a geographical position. It shall be possible to remove the display of map graphics by a simple operator action.

Map graphics may consist of lines, symbols and reference points.

2492 The appearance and colours of map graphic lines and symbols are set forth in Annex A.

2493 **6.2.6.2 Methods of test and required results**

2494 When user generated map graphics are displayed on a radar presentation:

- 2495 a) confirm by analytical evaluation that map graphics do not substantially degrade, mask or
2496 obscure the radar video image, target trails, tracked radar targets, reported AIS targets or
2497 electronic chart information;
- 2498 b) confirm by observation that map graphics can be referenced to own ship or to a
2499 geographic position;
- 2500 c) confirm by observation that the user may remove the display of map graphics by a simple
2501 operator action;
- 2502 d) confirm by observation that the appearance and colour of the map graphics lines, symbols
2503 and reference points are in accordance with Annex A.

2504 **6.3 Chart displays**

2505 **6.3.1 Application**

2506 The provisions of this subclause are applicable to stand-alone displays responsible for the
2507 presentation of electronic chart information and multifunction displays when providing a chart
2508 display.

2509 NOTE The functional requirements for ECDIS are defined in the performance standards set forth in IMO
2510 Resolution MSC.232(82) and further specified in IEC 61174. The presentation requirements for electronic chart
2511 information are defined in the performance standards for presentation, set forth in IMO Resolution MSC.191(79)
2512 and further specified in this standard.

2513 **6.3.2 Display of chart information**

2514 **6.3.2.1 Requirement**

2515 (MSC191/7.3.1.1) Electronic chart information *and all updates to it* shall be presented *without*
2516 *any degradation of information content*.

2517 (MSC191/7.3.1.2) Electronic *chart information* shall *not be substantially degraded, masked or*
2518 *obscured by other presented information* (for example, a radar video image, tracked and/or
2519 reported targets, etc.).

2520 **6.3.2.2 Methods of test and required results**

2521 The methods of test and the required results are as follows:

- 2522 a) verify the presentation of electronic chart information in accordance with 4.5.1, 4.6.2 and
2523 5.5.1;
- 2524 b) confirm by analytical evaluation that the electronic chart information is not substantially
2525 degraded, masked or obscured by other presented information.

2526 **6.3.3 IMO ECDIS display categories**

2527 **6.3.3.1 Requirement**

2528 (MSC191/7.3.1.3) *It shall be possible to temporarily suppress all supplemental (e.g. radar,*
2529 *AIS and other overlays) information from the chart display, retaining only chart related*
2530 *information contained in the ECDIS Display Base*. This function is not required to be of single
2531 or simple operator action.

2532 It shall be possible to remove radar information, AIS information and other navigational
2533 information including all non-charted information from the chart display by a single operator

2534 action. Chart display consists of chart itself and all automatic and manual updates for it. This
2535 removal may be permanent or momentary.

2536 ENC and other vector format electronic chart information available for presentation on a chart
2537 display during route planning and route monitoring shall be subdivided into the following three
2538 IMO display categories:

- 2539 • ECDIS Display Base;
- 2540 • ECDIS Standard Display; and
- 2541 • All Other Information.

2542 It shall be possible to present the ECDIS Standard Display at any time by a single operator
2543 action. This single operator action shall not change any non-chart related user settings for the
2544 display.

2545 When a chart display is switched on following a switch off or power failure, it shall return to
2546 the most recent settings for the display.

2547 **6.3.3.2 Methods of test and required results**

2548 The methods of test and the required results are as follows:

- 2549 a) confirm by observation that the user can suppress the presentation of all graphical
2550 information so that only the electronic chart information in the ECDIS display base
2551 remains;
- 2552 b) confirm by observation that by a single operator action the user can permanently or
2553 momentarily remove the presentation of all additional information so that only the chart
2554 display including automatic and manual updates remains;
- 2555 c) verify the subdivision of vector format electronic chart information into IMO display
2556 categories in accordance with IEC 61174;
- 2557 d) verify that the user can select the ECDIS standard display at any time by a single operator
2558 action. Confirm by observation that this single operator action does not change any other
2559 display setting than the displayed layers of the electronic charts;
- 2560 e) confirm by observation that when the chart display is switched on, the electronic chart
2561 information is presented with the most recent display settings.

2562 **6.3.4 Adding or removing information from the display**

2563 **6.3.4.1 Requirement**

2564 (MSC191/7.3.1.4) *It shall be possible to add or remove information from the chart display by*
2565 *layer (IHO viewing group, see IHO S-52)), but not as individual objects. It shall not be*
2566 *possible to remove information contained in the ECDIS Display Base (see IEC 61174) from*
2567 *the display. (See also 6.3.2.)*

2568 **6.3.4.2 Methods of test and required results**

2569 The methods of test and the required results are as follows:

- 2570 a) confirm by observation that the user can add and remove information from the
2571 presentation by layer but not as individual objects;
- 2572 b) confirm by observation that the user cannot remove information contained in the ECDIS
2573 display base;
- 2574 c) confirm by observation that IHO viewing groups can be individually selected for display.

6.3.5 Safety contour**6.3.5.1 Requirement**

(MSC191/7.3.1.5) *It shall be possible to select a safety contour from the depth contours provided by vector format electronic chart information. The safety contour shall be emphasized over other contours on the display* in accordance with IHO S-52.

6.3.5.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by observation that the user can select a safety contour from the depth contours provided in vector format electronic chart information;
- b) confirm by observation that the presentation of the safety contour is emphasised over other depth contours.

6.3.6 Safety depth**6.3.6.1 Requirement**

(MSC191/7.3.1.6) *It shall be possible to specify a safety depth. Soundings equal to or less than the safety depth shall be emphasized whenever spot soundings are selected for display.*

6.3.6.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by observation that the user can specify a safety depth;
- b) confirm by observation that the presentation of spot soundings less than or equal to the safety depth are emphasized over other spot soundings.

6.3.7 Chart scale**6.3.7.1 Requirement**

(MSC191/7.3.1.7) *An indication shall be provided if chart information is displayed at a larger scale than contained in the electronic chart database, or if own ship's position is covered by electronic chart information at a larger scale than the presentation.*

(MSC191/7.3.1.8) *Overscaled areas presented on the chart display shall be identified as defined in the IHO ECDIS Presentation Library in IHO S-52 and its Appendices.*

6.3.7.2 Methods of test and required results

The methods of test and the required results are as follows:

- a) confirm by observation that an indication is provided when chart information is presented at a larger scale than in the electronic chart database;
- b) confirm by observation that an indication is provided when own ship's position is covered by electronic chart information at a larger scale than the presentation;
- c) confirm by observation that overscaled areas presented on the display are identified.

6.3.8 Display of radar and target information**6.3.8.1 Requirement**

(MSC191/7.3.2.1) *A radar video image, tracked radar and reported AIS target information may be presented on a chart display but shall not substantially degrade, mask or obscure the presentation of electronic chart information. As far as practical, the radar video image and*

2614 *target information shall be presented in accordance with the radar Performance Standards*
2615 *(see IEC 62388) and with the presentation standards set forth in this standard.*

2616 (MSC191/7.3.2.2) *A radar video image, tracked radar and reported AIS target information*
2617 *shall be clearly distinguishable from the electronic chart information. It shall be possible to*
2618 *remove radar and target information by a simple operator action.*

2619 **6.3.8.2 Methods of test and required results**

2620 The methods of test and the required results are as follows:

- 2621 a) verify that the radar video image is presented in accordance with 5.4.1 and 5.4.2, as
2622 applicable;
- 2623 b) verify that targets are presented in accordance with 5.5.8;
- 2624 c) verify that radar and target information are clearly distinguishable from chart information in
2625 accordance with 6.3.2;
- 2626 d) confirm by observation that radar and target information can be removed from the
2627 presentation by a simple operator action.

2628 **6.3.9 Display of additional information**

2629 **6.3.9.1 Requirement**

2630 (MSC191/7.3.3.1) *Information from additional sources may be displayed on ECDIS but shall*
2631 *not substantially degrade, mask or obscure the chart information.*

2632 (MSC191/7.3.3.2) *Additional information* (including information for route planning, route
2633 monitoring, information overlays and supplementary navigation tasks) *shall be clearly*
2634 *distinguishable from the electronic chart information. It shall be possible to remove additional*
2635 *information by a simple operator action.*

2636 **6.3.9.2 Methods of test and required results**

2637 The methods of test and the required results are as follows:

- 2638 a) verify the presentation of additional information in accordance with 4.6.2;
- 2639 b) verify that the presentation of electronic chart information is not degraded, masked or
2640 obscured by the presentation of additional information in accordance with 6.3.2;
- 2641 c) verify that additional navigation-related information is clearly distinguishable from chart
2642 information in accordance with 6.3.3;
- 2643 d) confirm by observation that additional navigation-related information can be removed from
2644 the presentation by a simple operator action.

2645 **6.4 Composite task-oriented presentations**

2646 **6.4.1 User-configured presentations**

2647 **6.4.1.1 Requirement**

2648 (MSC191/7.4.1) *The user may configure a presentation for a specific task-at-hand. The*
2649 *presentation may include radar and/or electronic chart information, in combination with other*
2650 *navigation or ship related data or information. When not fully compliant with the relevant*
2651 *Performance Standards, such a presentation shall be identified as an auxiliary presentation.*

2652 **6.4.1.2 Methods of test and required results**

2653 The methods of test and the required results are as follows:

- 2654 a) if the user can configure presentations for the task-at-hand confirm by inspection of
2655 documented evidence that all tasks configurable are noted in the manual;
- 2656 b) confirm by analytical evaluation that for all tasks listed in the user documentation the
2657 relevant related data and information are displayed;
- 2658 c) confirm that the display is fully compliant with the relevant performance standards either
2659 by analytical evaluation or inspection of the relevant test reports related to the task-at-
2660 hand for which test standards exists.

2661 If the display is not fully compliant with the relevant performance standards confirm by
2662 observation that a clear indication as an auxiliary presentation is provided.

2663 **6.4.2 Information associated with the task-at-hand**

2664 **6.4.2.1 Requirement**

2665 *(MSC191/7.4.2) As far as practical, the presentation of any radar and/or chart related*
2666 *functions shall be compliant with the requirements of the relevant Performance Standards and*
2667 *of the presentation standards set forth in this standard, with the exception of size*
2668 *requirements for the operational display area. Windows of chart or radar information may be*
2669 *presented along with other information associated with the task-at-hand.*

2670 **6.4.2.2 Methods of test and required results**

2671 The methods of test and the required results are as follows:

- 2672 a) confirm by inspection of test reports that the Radar and/or chart related functions are
2673 compliant with the relevant Performance Standards;
- 2674 b) confirm by analytical evaluation or inspection of the relevant test reports that the content
2675 and the physical display are compliant with the relevant parts of the presentation
2676 standards. Document the size of the operational display in use;
- 2677 c) confirm by analytical evaluation that the presentation of chart and radar information along
2678 with other information associated with the task-at-hand, if available, is in line with this
2679 standard.

2680 **6.5 Single and simple operator actions**

2681 **6.5.1 Applicability**

2682 The requirements of this subclause 6.5 are from a recommendatory source for ECDIS, radar
2683 and INS. The implementation of this recommendation is optional. Manufacturers shall declare
2684 if these requirements have been implemented.

2685 **6.5.2 Requirement**

2686 *(MSC.1/Circ.1609/Appendix 4/3) The inclusion of non-mandatory functions in the tables of*
2687 *Annex H does not make such functions 'mandatory' to provide. Where the functions in the*
2688 *tables of Annex H are included within navigation equipment, such functions shall comply with*
2689 *the criteria listed in the tables of Annex H.*

2690 *(MSC.1/Circ.1609/Appendix 4/1) Where the equipment provides the functions listed in the*
2691 *tables of Annex H, access shall be as defined as in the tables of Annex H except where*
2692 *conformance is mandated by individual equipment standards. A requirement for information to*
2693 *be presented on single operator action may alternatively be met by a permanent indication.*

2694 *(MSC.1/Circ.1609/Appendix 4/2) Care will need to be taken when adding single and simple*
2695 *operator action buttons to displays. The manufacturer/operator shall consider keeping the*
2696 *display area for the main function of the equipment as much as possible for user operability. It*
2697 *may be more useful to contain shortcut buttons under one setting menu rather than add many*
2698 *icons to the desktop.*

2699 NOTE Single operator action functions available from physical controls outside of the display area are not part of
2700 the above requirements.

2701 Manufacturers shall declare all functions available in the display area for single operator
2702 action and not listed as such in Annex H. The manufacturer's declaration shall include
2703 reasons why such functions are available as single operator action.

2704 **6.5.3 Methods of test and required results**

2705 The methods of test and the required results are as follows:

- 2706 a) confirm by observation that, if provided, functions listed in Annex H have been
2707 implemented as single or simple operator action according to Annex H;
- 2708 b) refer to manufacturer's declaration and confirm by analytical evaluation that any additional
2709 single operator action function, if available in the display area, is appropriate for being
2710 available in the highest level of user interface.

2711 **6.6 User and default settings**

2712 **6.6.1 General**

2713 The requirements of this subclause 6.6 are from a recommendatory source for ECDIS, radar
2714 and INS. The implementation of these recommendation is optional. Manufacturers shall
2715 declare if these requirements have been implemented.

2716 **6.6.2 User-settings**

2717 **6.6.2.1 Requirement**

2718 (MSC.1/Circ.1609/Appendix 5/1) *A facility shall be provided to store and recall user-specific*
2719 *settings to suit the conditions at hand. At least two such configurations shall be available to*
2720 *be stored for recall. Selection for recalling a stored configuration shall be followed by an*
2721 *action to confirm the selection.*

2722 User specific settings shall include at least all settings specified for default settings, see
2723 Annex I. Manufacturer may include additional settings into the user specific settings. All
2724 settings shall be documented in the user manual.

2725 **6.6.2.2 Methods of test and required results**

2726 The methods of test and the required results are as follows:

- 2727 a) confirm by observation that user specific settings include at least all default settings, see
2728 Annex I;
- 2729 b) confirm by inspection of the user manual that all settings included into user specific
2730 settings are part of the documentation;
- 2731 c) confirm by observation that it is possible to store and recall at least two user specific
2732 settings;
- 2733 d) confirm by observation that the recall of user specific settings requires the user to confirm
2734 the selection before application of the settings.

2735 **6.6.3 Default settings**

2736 **6.6.3.1 Requirement**

2737 (MSC.1/Circ.1609/Appendix 5/2) *A facility shall be provided to apply a set of default settings*
2738 *to return the equipment to a known default state, see Annex I. The default settings are*
2739 *intended to provide a basic and minimal mode of operation for the system or equipment that*
2740 *can be built upon by the user.*

2741 (MSC.1/Circ.1609/Appendix 5/3) *Default settings are not intended to provide a redundant*
2742 *setting in the event of an equipment failure or loss of input.*

2743 **6.6.3.2 Methods of test and required results**

2744 Confirm by observation that the default settings include all settings specified in Annex I.

2745 **7 Physical requirements**

2746 **7.1 General**

2747 The provisions of this clause are applicable to the physical displays associated with all
2748 navigational systems and equipment on the bridge of a ship. The equipment manufacturer
2749 may provide documented evidence to show compliance with the requirements specified in this
2750 clause.

2751 Display equipment shall comply with the applicable requirements of IEC 60945. (See 4.2.2.1.)

2752 **7.2 Display adjustment**

2753 **7.2.1 Contrast and brightness**

2754 **7.2.1.1 Requirement**

2755 (MSC191/8.1.1) *It shall be possible to adjust the contrast and brightness of the display, as*
2756 *applicable to the display technology. It shall be possible to dim the display. The range of*
2757 *control shall permit the display to be legible under all ambient light conditions likely to be*
2758 *experienced on the bridge of a ship (for example, day, dusk and night). The range of*
2759 *adjustment shall be sufficient to maintain the user's dark adaptation at night. (See also 4.4.1.)*

2760 (MSC191/8.1.2) *It shall be possible for the user to reset the values of contrast and/or*
2761 *brightness to a preset or default condition.* The manufacturer's documentation shall identify
2762 the default conditions.

2763 If the brightness adjustment is set for night, then means shall be provided to return to such a
2764 brightness level that it is possible to continue control under daylight.

2765 If display equipment is intended to present electronic chart information (see 4.6.2), then it
2766 shall

- 2767 • provide the user with the capability to reset the values of brightness and/or contrast to a
2768 calibrated colour performance reference setting for each of the ambient light conditions
2769 defined in Table 1, and
- 2770 • prevent inadvertent adjustments by the user by restricting access to controls that may
2771 cause degradation of colour performance, such as gamma and colour temperature
2772 adjustments.

2773 **7.2.1.2 Methods of test and required results**

2774 The setup for measurements of contrast, luminance and colour shall be conducted in
2775 accordance with the guidelines of IEC 61966-4 or the VESA Flat Panel Display Measurement
2776 (FPDM) (see VESA-2001-6) standard. Before measurements are taken, display equipment
2777 shall be powered up and allowed to stabilize for a period identified by the manufacturer. (See
2778 also Annex G.)

2779 The following verifications are required.

- 2780 a) Confirm by observation that a manual contrast control is provided, if applicable (for
2781 example, for CRT technology).

- 2782 b) Confirm by observation that a manual brightness control is provided.
- 2783 c) Confirm by observation that, after dimming, the equipment for use at night, when daylight
2784 ambient conditions are applied, there are means to readjust for operation under daylight.
- 2785 d) Verify the adjustment of contrast and brightness in accordance with 4.4.1: (See 4.4.1.2)
- 2786 1) confirm by observation that the contrast and brightness controls can be reset to their
2787 default values;
- 2788 2) where display equipment is intended to display chart information, confirm by
2789 measurement of luminance that a means or method is provided to return the contrast
2790 and brightness controls to their calibrated setting for each ambient light condition in
2791 accordance with Table 1. (See 4.4.1.)
- 2792 e) Confirm by inspection of documented evidence that the default conditions for contrast and
2793 brightness controls are identified.

2794 **7.2.2 Magnetic interference**

2795 **7.2.2.1 Requirement**

2796 (MSC191/8.1.3) If *magnetic fields degrade the presentation of navigation-related information*,
2797 then a means or method to neutralise the effects of magnetic fields shall be provided.

2798 **7.2.2.2 Methods of test and required results**

2799 Confirm by inspection of documented evidence that a means or method to neutralise the
2800 effects of magnetic fields is provided if magnetic fields degrade the presentation of
2801 navigation-related information.

2802 **7.2.3 Temporal stability**

2803 **7.2.3.1 Requirement**

2804 Display equipment shall be perceptually “flicker” free in direct and peripheral vision at the
2805 nominal viewing distance identified in the manufacturer’s documentation in accordance with
2806 the perception thresholds, as defined in Clause G.2.

2807 NOTE The perception threshold of “flicker” is known to vary for observers, depending on such factors as age,
2808 fatigue, ambient lighting conditions, frequencies, the displayed image size, image brightness and image content.

2809 **7.2.3.2 Methods of test and required results**

2810 Establish by inspection of documented evidence whether the luminance persistence
2811 (response time) of the display equipment is less than or more than 1 ms. The test methods
2812 are then as follows.

- 2813 a) For display equipment with a luminance persistence of 1 ms or more (for example, CRT,
2814 LCDs, etc.), confirm by analytical evaluation or measurement that the display equipment
2815 emits less energy in the temporal frequencies than an observer will detect as “flicker” (i.e.
2816 the predicted “flicker” threshold) according to G.2.3.1 under each ambient light condition
2817 specified in Table 1.
- 2818 b) For display equipment based on technologies which have a luminance persistence much
2819 less than 1 ms (for example, EL (electro luminescent), plasma, light emitting diodes (LED),
2820 etc.), confirm by analytical evaluation or measurement that the display equipment emits
2821 less energy in the temporal frequencies than an observer will detect as “flicker” according
2822 to G.2.3.2 under each ambient light test condition specified in Table 1.

2823 **7.2.4 Physical controls and status indicators**

2824 **7.2.4.1 General**

2825 Physical controls for display equipment shall be locatable by visual or tactile means. If the
2826 display equipment has more than three adjacent controls (for example, knobs or switches),

2827 then labels with adjustable illumination shall be provided for identification of these controls.
2828 Labels shall comply with the legibility/readability requirements contained in 4.4.2 and 4.4.3.

2829 Any illuminated status indicators separate from the main display (for example, built-in to the
2830 front panel of the monitor) shall be locatable by visual means. Adjustable illumination
2831 provided for labels and status indicators shall be suitable for all ambient light conditions likely
2832 to be experienced on the bridge of a ship (day, dusk and night) and with due consideration to
2833 the night vision of the officer of the watch.

2834 Illumination shall be dimmable to produce a maximum brightness of not more than 1 cd/m²
2835 and may be extinguishable below that point.

2836 **7.2.4.2 Method of test and required results**

2837 The methods of test and the required results are as follows:

- 2838 a) confirm by observation that physical controls for display equipment, if available, are
2839 locatable by visual or tactile means;
- 2840 b) where more than three adjacent control knobs or switches exist, confirm by observation
2841 that they have labels with adjustable illumination and that the illuminated labels comply
2842 with the legibility/readability requirements contained in 4.4.2 and 4.4.3;
- 2843 c) where illuminated status indicators exist separate from the main display, confirm by
2844 observation that they are locatable by visual means;
- 2845 d) where adjustable illumination is provided, confirm by observation that illumination is
2846 dimmable to not more than 1 cd/m² and may be extinguishable below that point;
- 2847 e) confirm by observation that a visual indication of the presence of power to the display
2848 equipment is provided;
- 2849 f) confirm by observation that a visual indication of the presence of video signals to the
2850 display equipment is provided.

2851 **7.3 Screen size**

2852 **7.3.1 Requirement**

2853 (MSC191/8.2.1) *Display equipment shall be of sufficient size to support the requirements of*
2854 *the relevant IMO Performance Standards.*

2855 (MSC191/8.2.2) *For ECDIS, the operational display area of the chart presentation for route*
2856 *monitoring shall be at least 270 mm × 270 mm.*

2857 For ECDIS back-up arrangements, the effective size of the chart presentation shall be not
2858 less than 250 mm × 250 mm or 250 mm diameter.

2859 (MSC191/8.2.3) For radar display equipment, *the operational display area of the radar*
2860 *presentation shall be at least a circle of diameter of:*

- 2861 • 180 mm for ships smaller than 500 gross tonnage;
- 2862 • 250 mm for ships larger than 500 gross tonnage and HSC less than 10 000 gross tonnage;
- 2863 • 320 mm for ships larger than 10 000 gross tonnage.

2864 The manufacturer's documentation shall identify the intended size of the operational display
2865 area.

2866 **7.3.2 Method of test and required results**

2867 The methods of test and the required results are as follows:

- 2868 a) for ECDIS, confirm by measurement that the dimensions of the operational display area
2869 are at least 270 mm × 270 mm;
- 2870 b) for ECDIS back-up arrangements, confirm by measurement that the dimensions of the
2871 operational display area are at least 250 mm × 250 mm, or 250 mm in diameter;
- 2872 c) for radar display equipment, confirm by measurement that the diameter of the operational
2873 display area is at least a circle of diameter of the intended size specified in the
2874 manufacturer's documentation.

2875 **7.4 Multicoloured display equipment**

2876 **7.4.1 Requirement**

2877 (MSC191/8.3.1) *Multicoloured display equipment shall be used except where monochrome*
2878 *displays are permitted within individual IMO Performance Standards.*

2879 (MSC191/8.3.2) *Multicoloured operational displays including multifunction displays (for*
2880 *example, conning displays) shall provide a minimum of 64 colours except where permitted or*
2881 *not required by the IMO, or when used for a single specific purpose (for example, speed log,*
2882 *echo-sounder).*

2883 Monochrome displays may be provided when used for a single specific purpose (for example,
2884 speed log, echo-sounder) except where multicoloured displays are required by IMO
2885 performance standards or Code on Alerts and Indicators.

2886 **7.4.2 Method of test and required results**

2887 For multicoloured display verify the result in accordance with Clause 4.

2888 For monochrome display verify the result in accordance with Clause 4 except the colour-
2889 related requirements specified in 4.5.1, 4.7.1, 4.7.2, 4.7.3 and 4.8.2.

2890 For monochrome display confirm by inspection of documented evidence that the manufacturer
2891 has noted the limitation of usage of the display to a single specific purpose or noted relevant
2892 IMO Performance Standard permitting use of monochrome display.

2893 **7.5 Screen resolution**

2894 **7.5.1 Requirement**

2895 (MSC191/8.4) *Operational display equipment including multifunction displays (for example,*
2896 *conning displays) shall provide a minimum screen resolution of 1 280 × 1 024 pixels, or*
2897 *equivalent for a different aspect ratio, except where permitted or not required by the IMO, or*
2898 *when used for a single specific purpose (for example, speed log, echo-sounder) or 180 mm*
2899 *diameter radar. For 180 mm diameter radar, a minimum screen resolution of 1 024 pixels ×*
2900 *768 pixels, or equivalent for a different aspect ratio, shall be provided.*

2901 Display equipment intended to support the presentation of electronic chart information shall
2902 provide a maximum pixel pitch of 0,29 mm/m of nominal viewing distance (1 min of arc), for
2903 example, 0,36 mm at 1 237 mm viewing distance.

2904 The manufacturer's documentation shall describe the screen resolution, pixel format and
2905 viewing distance (i.e. for measurement of pixel pitch).

2906 **7.5.2 Method of test and required results**

2907 The methods of test and the required results are as follows:

- 2908 a) confirm by inspection of documented evidence that for radar displays larger than 180 mm
2909 diameter the display equipment supports a screen resolution of at least 1 280 × 1 024 or

2910 equivalent resolution if the equipment uses a different aspect ratio. For radar displays of
2911 180 mm or smaller diameter the requirement is at least 1 024 × 768 or equivalent
2912 resolution if the equipment uses a different aspect ratio;

2913 alternatively, confirm by inspection of documented evidence that the display equipment
2914 supports the minimum screen resolution permitted by the applicable Performance
2915 Standards;

2916 alternatively, if the display equipment is used for a single specific purpose (for example,
2917 speed log, echo-sounder, etc.), confirm by inspection of documented evidence that it is
2918 not required to support a minimum screen resolution;

2919 b) confirm by inspection of documented evidence that the display equipment provides a
2920 maximum pixel pitch of not more than 1 min of arc;

2921 alternatively, if the display equipment is used for a single specific purpose (for example,
2922 speed log, echo-sounder, etc.), confirm by inspection of documented evidence that it is
2923 not required to support a maximum pixel pitch;

2924 c) confirm by inspection of documented evidence that the screen resolution, pixel format and
2925 the viewing distance used for the measurement of pixel pitch are identified.

2926 **7.6 Screen viewing angle**

2927 **7.6.1 Requirement**

2928 (MSC191/8.5) *The display equipment shall support the reading of information under all*
2929 *ambient light conditions, simultaneously, by at least two users, from standing and sitting user*
2930 *positions likely to be found on the bridge of a ship.*

2931 **7.6.2 Methods of test and required results**

2932 Verify in accordance with 4.4.1.2 a) that readability requirements are satisfied from a position
2933 at the side of the operator.

Annex A (normative)

Presentation colours and symbols

A.1 Overview

This annex specifies the harmonised symbols to be used for the presentation of navigation related information on all shipborne navigational systems and equipment in conformance with guidelines published by the IMO and provided in SN/Circ.243.

All text in this annex whose wording is identical to text contained in IMO SN/Circ.243 is printed in *italics*. The IMO reference is made up of two parts; a prefix representing the IMO instrument, followed by the paragraph number, displayed as, for example: (SN243/1).

A.2 Purpose

(SN243/1/1) *The purpose of this annex is to provide guidance on the appropriate use of navigation-related symbols and the use of colour to achieve a harmonized and consistent presentation on all shipborne navigational systems and equipment.*

A.3 Scope

(SN243/1/2) *The use of these guidelines will insure that the symbols used for the display of navigation-related information on all shipborne navigational systems and equipment are presented in a consistent and uniform manner.*

A.4 Application

(SN243/1/3) *The symbols listed in Table A.1 through Table A.5 shall replace symbols which are currently in existing Performance Standards for navigational systems and equipment. Where a standard symbol is not available, another symbol may be used, but this symbol shall not conflict with the symbols listed in this annex.*

A.5 Navigation-related symbols

For the application of the symbols in Table A.1 through Table A.5, the following shall be considered:

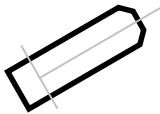

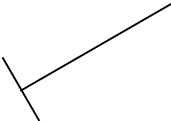
- no colours are recommended for symbols except where IMO has specified the use of the colour red for dangerous targets or use of colour yellow for various reasons;
- colours used for the presentation of tracked radar targets and reported AIS targets (symbols from 2.1 a to symbol 2.9) shall be the same;
- colours used for the presentation of own ship symbols shall be identifiable from colours used for the presentation of targets;
- colours used for the presentation of operational information shall be discriminated from the colours used for the presentation of the radar image, target trails, additional processed radar information and electronic chart information;
- colours recommended for symbols assume that the presentation provides for lighter foreground information against a dark background;
- sizes specified for symbols assume a nominal viewing distance of 1 m (see 4.6.1.1);

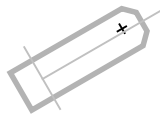
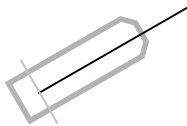

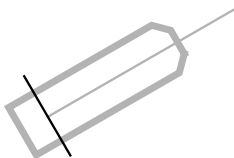
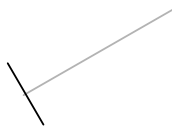
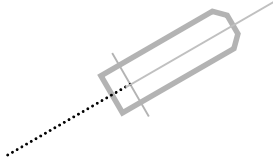
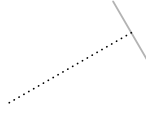
- 2973 • weights specified for line styles assume that the “thick” line style is at least twice the
2974 thickness of the “thin” line style.

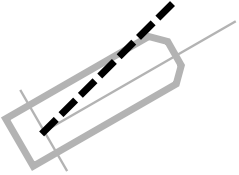
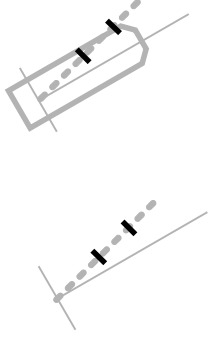
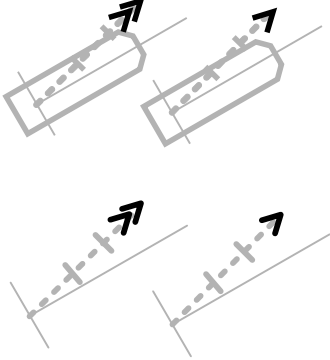
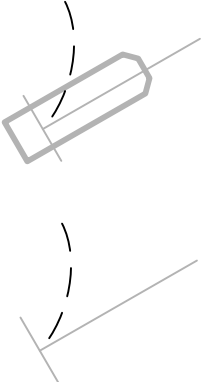
2975 An example of a possible colour scheme that may be used is given in Table A.6.

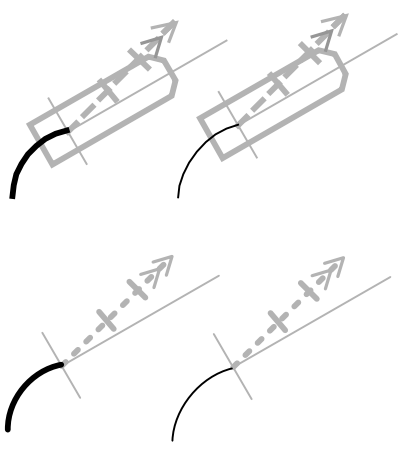
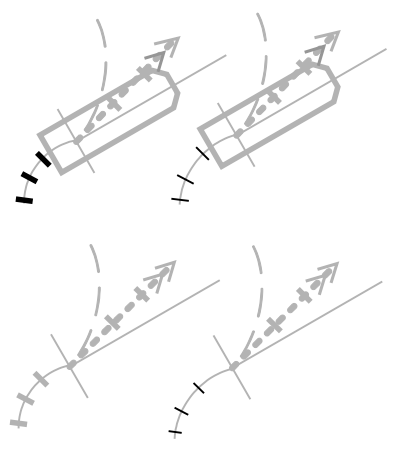
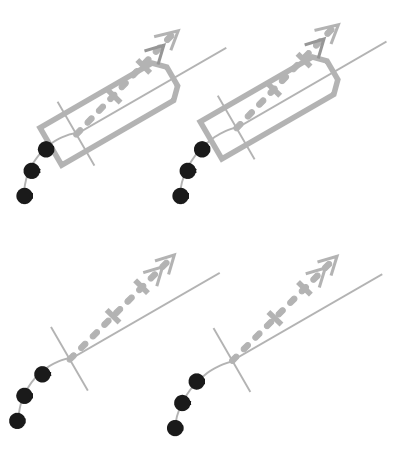
2976 **Table A.1 – Own ship symbols**

2977 The simplified symbol (1.1b) may be used with all examples showing the minimised symbol
2978 (1.1 c) in this Table.

	Symbol name and description	Symbol graphic(s)
1.1 a	<p>Own ship – True scaled outline</p> <p>The user may select to present own ship as a true scaled outline oriented in the direction of heading relative to CCRP and drawn using a thick solid line style with the same basic colour used for own ship symbols.</p> <p>A more detailed true scaled outline symbol, representing the physical shape of the own ship, is permitted as an alternative to the standardized symbol specified in this standard.</p> <p>Automatic selection of the true scaled outline is permitted (see 5.2.1).</p> <p>The true scaled outline shall not be used when heading is unknown in a gyro/THD-stabilised mode, or when the beam of the outline is less than 3 mm.</p> <p>Note that a loss of heading will force the radar into head-up mode (see IEC 62388); in this case, the true scaled outline is still permitted.</p>	 <p>(SN243)</p>
1.1 b	<p>Own ship – Simplified symbol</p> <p>If a navigation display presents the chart mode (with or without the radar image), a simplified symbol may be used for own ship. The simplified symbol may be combined with the minimised symbol (see symbol 1.1c).</p> <p>A simplified symbol shall be used when a chart is displayed in north-up presentation, without a radar image and in the absence of heading information.</p> <p>The outer circle shall be 6 mm in diameter. The inner circle shall be 3 mm in diameter. The circles shall be drawn using a thick solid line style, with the same basic colour used for own ship symbols.</p> <p>Note that for a radar mode, the simplified symbol should not be used as the symbol does not permit the minimum range requirements in IEC 62388.</p>	 <p>(SN243)</p>
1.1 c	<p>Own ship – Minimised symbol</p> <p>If a navigation display presents the radar mode, own ship shall be presented as a minimised symbol. The minimised symbol is comprised of the heading line (see symbol 1.3) and the beam line (see symbol 1.4).</p> <p>Where appropriate, the minimised symbol shall be combined with the true scaled outline of own ship.</p> <p>Note that a loss of heading will force the radar into head-up mode (see IEC 62388) whereby the minimised symbol should be used.</p>	 <p>(SN243)</p>




	Symbol name and description	Symbol graphic(s)
1.2	<p>Radar antenna position</p> <p>If a radar image is displayed and own ship is displayed as a true scaled outline, the user may select to present the radar antenna position as crossed lines centred at the physical location of the radar antenna (the source of the displayed radar image). The total extent of the crossed lines shall be at least 1 mm but not more than 2 mm in length. They shall be drawn using a thin solid line style with the same basic colour used for own ship symbols.</p>	 <p>(SN243)</p>
1.3	<p>Own ship heading line</p> <p>The heading line shall always be indicated (except when temporarily suppressed by the user), originating at CCRP and extending in the direction of own ship heading to the bearing scale. The line shall be drawn using a thin solid line style with the same basic colour used for own ship symbols.</p> <p>The heading line shall always be shown together with the beam line (see symbol 1.4).</p>	  <p>(SN243)</p>
1.4	<p>Beam line</p> <p>The beam line forms part of the own ship minimised symbol. Own ship beam line shall be presented as a single line, perpendicular to the heading line, passing through the CCRP and extending a minimum of 5 mm each side of the CCRP. The line shall be drawn as a thin solid line style with the same basic colour used for own ship symbols.</p>	  <p>(SN243)</p>
1.5	<p>Stern line</p> <p>Optionally, the user may select a stern line that shall originate at CCRP and shall extend, in the direction 180° from the heading, to the bearing scale.</p> <p>The line shall be drawn using a thin dotted line style with the same basic colour used for own ship symbols.</p>	 

	Symbol name and description	Symbol graphic(s)
1.6 a	<p>Velocity vector</p> <p>Optionally, the user may also select to present a velocity vector originating at CCRP and extending in the direction of COG or CTW, as appropriate, for a length representing the distance own ship will travel in a user-selected time interval. The vector shall be drawn using a thick short-dashed line style with the same basic colour as used for own ship symbols. An option to select other colours may be provided, but these colours shall conform to the rules given in Clause A.5.</p>	 <p>(SN243)</p>
1.6 b	<p>Velocity vector – Time increments</p> <p>Optionally, the user may also select to present time increments along the velocity vector perpendicular to the vector with their midpoint on it and extending not more than 1,5 mm on either side. They shall be spaced along the vector to represent the distance own ship will travel in a user-selected increment of the time interval used for the velocity vector. The increments shall be drawn using a thick solid line style with the same basic colour used for own ship velocity vector.</p>	 <p>(SN243)</p>
1.6 c	<p>Velocity vector – Stabilisation indicator</p> <p>Optionally, the user may select to present a stabilisation indicator, positioned at the end of the velocity vector.</p> <p>The ground stabilisation indicator shall be presented as a double arrowhead. The water stabilisation indicator shall be presented as a single arrowhead. The arrowheads shall extend at least 1 mm but not more than 1,5 mm on either side of the vector (i.e. measured perpendicular to it).</p> <p>The arrowhead(s) shall be drawn using a thick solid line style with the same basic colour used for own ship velocity vector.</p>	 <p>(SN243)</p>
1.6 d	<p>Path predictor</p> <p>Optionally, the user may select to present a path predictor, either in place of a velocity vector or independently, as a curved line originating at CCRP and extending along the predicted path over ground that own ship will travel in the time interval used for the velocity vector. The path shall be drawn using a thin long-dashed line style with the same basic colour as used for own ship symbols. An option to select other colours may be provided, but these colours shall conform to the rules given in Clause A.5.</p>	 <p>(SN243)</p>

	Symbol name and description	Symbol graphic(s)
1.7 a	<p>Past track</p> <p>The user may select to present a past track for the primary and/or secondary positioning sources. The past track shall be presented as line connecting own ship current and past positions. The primary past track shall be drawn using a thick solid line style with the same basic colour used for own ship symbol. The secondary past track shall be drawn using a thin solid line style with the same basic colour used for own ship symbols.</p>	 <p>(SN243)</p>
1.7 b	<p>Past track – Time increments</p> <p>Optionally, time increments along the past track may be shown. The time increments shall be presented as single lines perpendicular to the past track with their midpoint on it and extending at least 1 mm but not more than 1,5 mm on either side. They shall be spaced along the past track to represent the distance own ship travelled in the user-selected increment of the time interval used for the velocity vector. The time increments for the primary past track shall be drawn using a solid line style.</p>	 <p>(SN243)</p>
1.7 c	<p>Past track – Past positions</p> <p>Alternatively, the user may select to present past positions along the past track in place of time increments. Past positions shall be drawn as small filled circular symbols with a diameter of not more than 1,5 mm, with the same basic colour used for own ship symbols.</p>	

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Table A.2 – Radar and AIS symbols

	Symbol name and description	Symbol graphic(s)
2.1 a	<p>Radar targets in acquisition state</p> <p>A symbol drawn around radar targets in acquisition state shall be presented as a broken circle centred at the position of target acquisition. The circles shall be a nominal 5 mm in diameter and shall be drawn using a thin dashed line style with the same basic colour used for target symbols.</p>	 <p>(SN243)</p>
2.1 b	<p>Radar targets in acquisition state – Automatically detected</p> <p>A symbol drawn around radar targets in acquisition state that are automatically detected inside an acquisition area, shall be a nominal 5 mm in diameter and using a thick dashed line style, with the required colour red. The symbols shall flash until acknowledged by the user.</p> <p>Once acknowledged, the symbols shall cease flashing (even when they remain inside the acquisition area) and unless considered as dangerous, shall be drawn as a normal radar target in an acquisition state (i.e. detected outside an acquisition area) with the basic colour of other non-dangerous target symbols.</p>	 <p>(SN243)</p>
2.2 a	<p>Tracked radar targets</p> <p>Tracked radar targets shall be presented as circles centred at the targets' tracked position. The circles shall be 3 mm in diameter and shall be drawn using a thick solid line style.</p> <p>Tracked radar targets generated from a target automatically detected in an acquisition area that have not been acknowledged shall be the required red basic colour and shall continue to flash until acknowledged by the user (even when they move outside the acquisition area).</p> <p>Once acknowledged, the symbols shall cease flashing and unless considered as dangerous, shall be drawn as a normal radar target in an acquisition state (i.e. detected outside an acquisition area) with the basic colour of other non-dangerous target symbols.</p> <p>Tracked radar targets may be labeled. Alphanumeric text used to label radar targets shall be drawn with the same basic colour used for target symbols.</p>	 <p>(SN243)</p>

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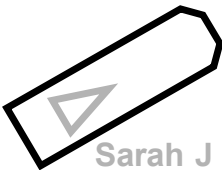
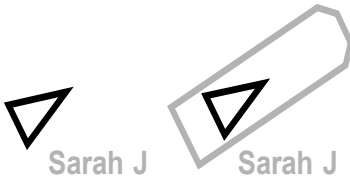

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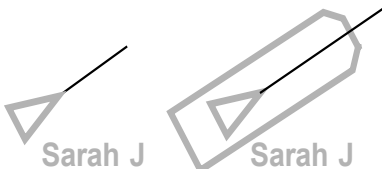
	Symbol name and description	Symbol graphic(s)
2.2 b	<p>Tracked radar targets – Alternative</p> <p>Alternatively, tracked radar targets may be presented as filled circles of not more than 2 mm in diameter.</p>	 <p>18</p> <p>(SN243)</p>
2.2 c	<p>Tracked radar targets – Dangerous targets</p> <p>Tracked radar targets designated as dangerous targets may be presented using 5 mm diameter circles, and shall flash until acknowledged by the user. The required colour shall be red.</p> <p>Once acknowledged, the symbols shall cease flashing, but shall still be drawn with the required basic colour red until the target(s) cease to be a danger.</p>	 <p>18</p> <p>(SN243)</p>
2.3	<p>Reference targets</p> <p>Tracked radar targets designated as reference targets shall be labelled with the letter "R" adjacent to the symbol. <i>Multiple reference targets shall be numbered as "R1", "R2", "R3", etc.</i></p> <p>The reference target labels shall be drawn with the same basic colour used for target symbols.</p>	 <p>R4 18</p> <p>(SN243)</p>
2.4	<p>Sleeping AIS targets</p> <p>Sleeping AIS targets shall be presented as acute isosceles triangles oriented to the targets' reported heading (or COG if heading is not reported) and centred at the targets' reported position. The base of the triangles shall be 3 mm and the height shall be 4,5 mm. The triangles shall be drawn using a thick solid line style with the same basic colour used for target symbols.</p> <p>A sleeping AIS target with neither a reported heading nor COG shall be <i>oriented toward the top of the operational display area</i> and shall include a diagonal line across the triangle.</p>	 <p>(SN243)</p>
		<p><i>Sleeping AIS target with neither reported heading nor COG:</i></p>  <p>(SN243)</p>

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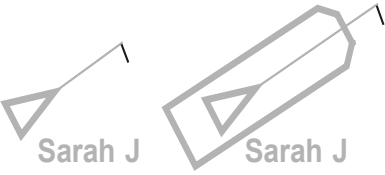
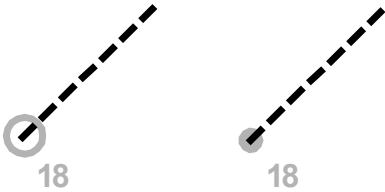
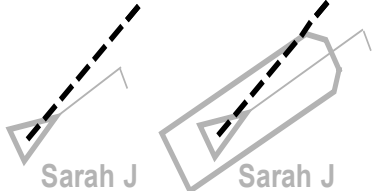
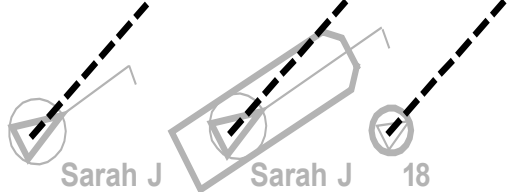
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	Symbol name and description	Symbol graphic(s)
2.5 a	<p>Activated AIS targets</p> <p>Activated AIS targets shall be presented as acute isosceles triangles oriented to the targets' reported heading (or COG if heading is not reported) and centred at the targets' reported position. The base of the triangles shall be 4 mm and the height shall be 6 mm. The triangles shall be drawn using a thick solid line style with the basic colour used for target symbols.</p> <p><i>An activated AIS target with neither a reported heading nor COG shall be oriented toward the top of the operational display area and shall include a diagonal line across the triangle.</i></p> <p>Activated AIS targets may be labelled. Alphanumeric text used to label AIS targets shall be drawn with the same basic colour as used for target symbols.</p>	 <p>(SN243)</p>
		<p><i>Activated AIS target with neither reported heading nor COG:</i></p>  <p>(SN243)</p>
2.5 b	<p>Activated AIS targets – True scaled outlines</p> <p>Alternatively, when own ship is presented as a true scaled outline, the user may select to add true scaled outlines to activated AIS target symbols.</p> <p>True scaled outlines for activated AIS targets shall be drawn around the AIS target symbol triangles relative to the targets' reported position according to the offsets, beam and length. The outline shall be drawn using a thick solid line style.</p> <p>True scaled outlines for activated AIS targets shall be drawn with the same basic colour used for target symbols.</p> <p>True scaled outlines for individual activated AIS targets shall not be used when a target's heading is not reported, or when the beam of the outline is less than 3 mm.</p>	 <p>(SN243)</p>
2.5 c	<p>Activated AIS targets – Dangerous targets</p> <p>Activated AIS targets designated as dangerous targets may be presented with larger triangles, with a base of 5 mm and a height of 7,5 mm, shall be the required basic colour red, drawn with a thick solid line and shall flash until acknowledged by the user.</p> <p>Once acknowledged, the symbols shall cease flashing but shall still be presented using the required basic colour red until no longer considered to be a dangerous target.</p>	 <p>(SN243)</p>
		<p><i>Activated AIS target with neither a reported heading nor COG:</i></p>  <p>(SN243)</p>

	Symbol name and description	Symbol graphic(s)
2.6	<p>Associated targets – alternative</p> <p>The user may select to present associated targets (i.e. activated AIS targets associated with tracked radar targets) as either activated AIS target symbols (see symbol 2.5) or tracked radar target symbols (see symbol 2.2).</p> <p>Alternatively, activated AIS target symbols representing associated targets may be modified by circumscribing a circle around the symbols' isosceles triangle. Tracked radar target symbols representing associated targets may be presented with larger diameter circles (up to 5 mm), modified by inscribing an isosceles triangle inside the symbols' circle.</p> <p>The circumscribed circle and inscribed triangle shall be drawn using a thin solid line style with the same basic colour used for target symbols.</p> <p>Associated targets may be labelled. Alphanumeric text used to label associated targets shall be drawn with the same basic colour as used for target symbols.</p>	<p>Associated targets represented by AIS target symbols:</p>  <p>(SN243)</p>
		<p>Associated targets represented by radar target symbols:</p>  <p>(SN243)</p>
2.7 a	<p>Heading lines</p> <p>Heading lines shall be selected for display for activated AIS targets and associated targets, represented by AIS target symbols.</p> <p>Heading lines shall originate at the apex of the AIS triangle and shall extend not less than 4 mm and at least 4 mm beyond the bow of the true scaled outline when it is used. They shall be drawn using a thin solid line style with the same basic colour as used for target symbols.</p> <p>Heading lines for dangerous AIS targets shall flash with their base symbol until acknowledged by the user.</p> <p>An activated target without a reported heading shall be orientated to the top of the operational display area (see 2.5 a) and when AIS heading is enabled shall not include a heading line.</p>	 <p>(SN243)</p>

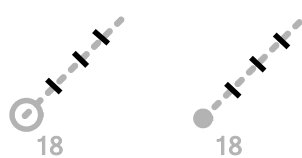
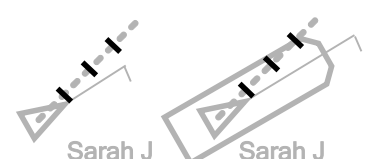
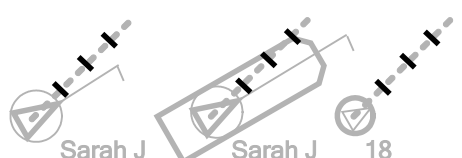

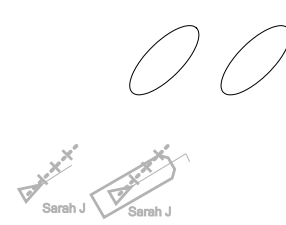
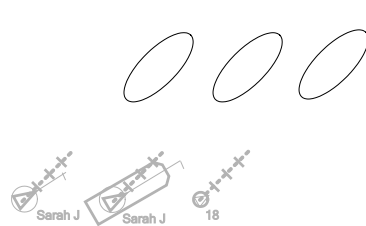
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	Symbol name and description	Symbol graphic(s)
2.7 b	<p>Heading lines – Turn indicators</p> <p>The user shall select to display turn indicators for activated AIS targets and associated targets represented by AIS target symbols.</p> <p>Turn indicators shall be presented as a single line extending at least 1 mm but not more than 2 mm perpendicular to the heading line in the direction of turn. The indicator shall be drawn using a thin solid line style with the same basic colour as used for their target symbols.</p> <p>Turn indicators for dangerous targets shall be the required colour red (until no longer dangerous) and shall flash with their symbol until acknowledged by the user.</p>	 <p>(SN243)</p>
2.8 a	<p>Velocity vectors</p> <p>Velocity vectors for targets shall be selected for display.</p> <p>Velocity vectors shall be presented as single lines originating at the targets' tracked/reported position and extending in the direction of course CTW or COG, as appropriate, for a length representing the distance the target will travel in the time interval used for own ship's velocity vector. Vectors shall be drawn using a thick short-dashed line style with the same basic colour used for target symbols.</p> <p>Velocity vectors for dangerous targets shall be the required red basic colour and shall flash with their base target symbols until acknowledged by the user.</p> <p>Once acknowledged, the symbols shall cease flashing and unless considered as dangerous, shall assume the basic colour of other non-dangerous target symbols.</p>	<p>Radar target velocity vectors:</p>  <p>(SN243)</p> <p>AIS target velocity vectors:</p>  <p>(SN243)</p> <p>Associated target velocity vectors:</p>  <p>(SN243)</p>

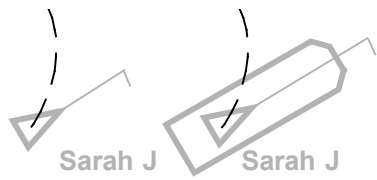
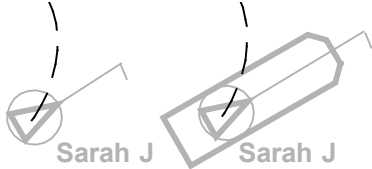
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	Symbol name and description	Symbol graphic(s)
2.8 b	Velocity vectors – Time increments Time increments may be shown drawn across target velocity vectors. Time increments shall be presented as single lines perpendicular to the vectors with their midpoint on them and extending not more than 1,5 mm on either side. They shall be spaced along the vectors to represent the distance the target will travel in the time increment of the time interval used for own ship's velocity vector. The increments shall be drawn using a thick solid line style with the same basic colour as for target symbols. Time increments for dangerous targets shall be the required red basic colour and shall flash with their base target symbols until acknowledged by the user. Once acknowledged, the symbols shall cease flashing and unless considered as dangerous, shall use the basic colour of other non-dangerous target symbols.	Radar target time increments: 
		AIS target time increments: 
		Associated target time increments: 
2.8 c	Predicted area of dangers Optionally, predicted area of dangers (PADs) may be shown along the path of target velocity vectors. PADs shall be presented as an outline area geographically representing a target's predicted CPA/TCPA violations. (The PAD's shape may be modified by knowledge of own ship manoeuvring characteristics, safety contour limits, etc). PADs shall be oriented in the direction of their velocity vectors. The PADs shall be drawn using a thick solid line style with the same basic colour as their target symbols. PADs for dangerous targets shall flash with their base symbols until acknowledged by the user. When a target is selected, the associated PAD may be highlighted for identification. Note that PADs are shown as an elliptical area which is typical. Presentation of more accurate shapes is not excluded.	Radar target PADs:  Not to scale
		AIS target PADs:  Not to scale
		Associated target PADs:  Not to scale

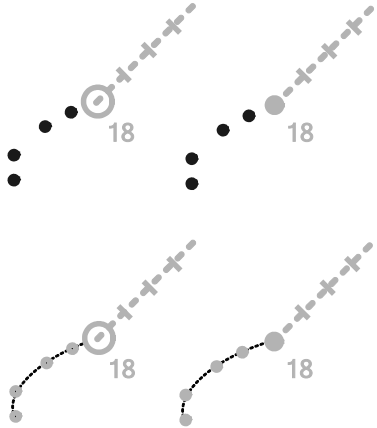
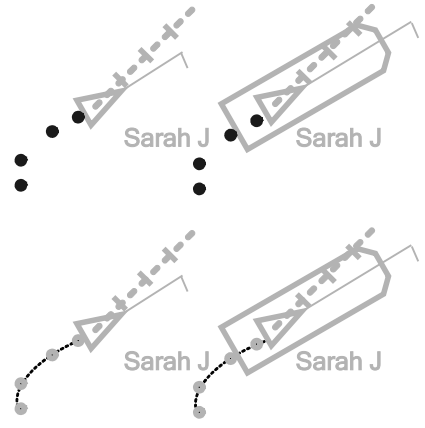
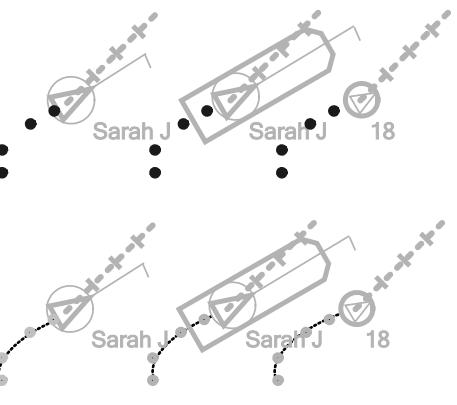
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	Symbol name and description	Symbol graphic(s)
2.8 d	<p>Path predictor</p> <p>Optionally, the user may select to display a path predictor in place of a velocity vector.</p> <p>The <i>path predictor</i> shall be represented as a <i>curved vector</i> originating at the targets' tracked/reported position and extending along the predicted path over the ground that the target will travel, in the time interval used for the target vector.</p> <p>The path shall be drawn using a thin long-dashed line style with the same basic colour used for target symbols.</p>	<p>AIS target path predictor:</p>  <p>Associated target path predictor:</p> 

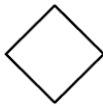
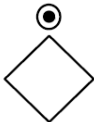
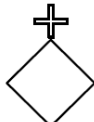
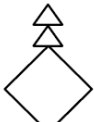
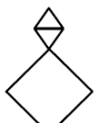
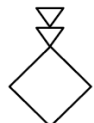
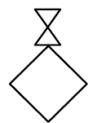
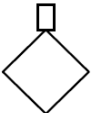
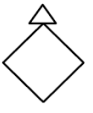
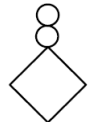
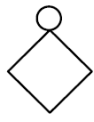
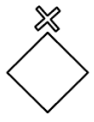
2995


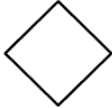

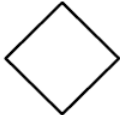
2996

2997

	Symbol name and description	Symbol graphic(s)
2.9	<p>Target past positions</p> <p>Optionally, target past positions may be shown.</p> <p>Past positions shall be presented as a series of small circular symbols of 1 mm diameter. They may be connected by a line drawn from the current tracked or reported position of the target.</p> <p>The line shall be drawn using a thin short-dashed line style with the same basic colour as their target symbols.</p>	<p>Radar target past positions:</p>  <p>(SN243)</p> <p>AIS target past positions:</p>  <p>(SN243)</p> <p>Associated target past positions:</p>  <p>(SN243)</p>

2998


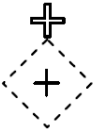
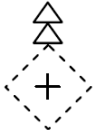





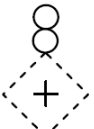


	Symbol name and description	Symbol graphic(s)
2.10 a	<p>AIS aids to navigation – Physical</p> <p>Source of physical AIS AtoN is:</p> <p>AIS Message 21, Virtual AtoN Flag = 0</p> <p>MMSI identity range: 99 MID 1000 – 99 MID 5999</p> <p>Physical AIS aids to navigation (AtoN) shall be presented as an open diamond. The sides of the diamond shall be not more than 6 mm in length.</p> <p>The diamond shall be drawn using a thin solid line style.</p> <p>The basic colour for an “on position” AIS AtoN shall not be yellow or red but may be same as for reported targets.</p> <p>The basic colour for the diamond of an “off position” AIS AtoN shall be yellow, it shall be drawn using thick solid line style and when used against light background it shall include a black one-pixel outline to improve readability.</p> <p>If available, on radar displays AIS AtoN shall be drawn indicating the purpose of the AIS AtoN. On displays containing an underlying chart, AIS AtoNs shall be drawn without indication of purpose unless the object is selected in which case, if available, the symbol shall be drawn indicating the purpose of the AIS AtoN. The purpose symbol shall be drawn using a thin solid line style and shall be the same basic colour as the AIS AtoN symbol. The height of the purpose symbol shall be not more than 5 mm in length.</p> <p>AIS AtoNs shall indicate off position of floating aid including any combinations with Lights off/error and/or Racon error with yellow text “Off Posn” (AIS AtoN Off-Position Indicator = 1). AIS AtoNs shall indicate an extinguished light with yellow text “Unlit”. AIS AtoNs shall indicate failure of Racon with yellow text “Racon err”. AIS AtoNs shall indicate light error or combination of light error/off with racon error with yellow text “Error”. When used against light background the yellow text may include a black one pixel outline to improve readability.</p> <p>AIS AtoNs may be labelled with the AtoN name. Alphanumeric text used to label an AIS AtoN shall be the same basic colour as the AIS AtoN symbol.</p> <p>Other information from AIS AtoN (see 5.13.2.d), and if available from a Message 14 (from the same MMSI), shall be available on demand. For presentation of unread Message 14, see symbol 5.16.</p> <p>All physical AtoNs shall be in their own layer which shall have its own display on/off selection.</p>	<p>Physical AIS AtoN and related AIS AtoN type code and AIS Status bits in parenthesis, where applicable:</p>  <p>Basic shape</p> <p>Default, type not specified (0); Reference point (1); Fixed structure offshore/obstruction (3); Light, without sectors (5); Light, with sectors (6); Leading light front (7); Leading light rear (8); Light vessel/LANBY/Rigs (31)</p>  <p>Racon (2)</p>  <p>Emergency wreck mark (4)</p>  <p>Beacon, Cardinal N (9); Floating, Cardinal Mark N (20)</p>  <p>Beacon, Cardinal E (10); Floating, Cardinal Mark E (21)</p>  <p>Beacon, Cardinal S (11); Floating, Cardinal Mark S (22)</p>  <p>Beacon, Cardinal W (12); Floating, Cardinal Mark W (23)</p>  <p>Beacon, Port hand (13); Beacon, Preferred Channel Port hand (15); Port hand mark (24); Preferred channel port hand (26)</p>  <p>Beacon, Starboard hand (14); Beacon, Preferred Channel Starboard hand (16); Starboard hand mark (25); Preferred channel starboard hand (27)</p>  <p>Beacon, Isolated danger (17); Isolated danger beacon safe (28)</p>  <p>Beacon, Safe water (18); Safe water (29)</p>  <p>Beacon, Special mark (19); Special mark (30)</p> <p>(IALA dictionary, topmarks)</p>


	Symbol name and description	Symbol graphic(s)
		<div><div>Off Posn</div><div></div><div>Off position including any combinations with Lights off/error and/or Racon error</div></div> <div><div>Unlit</div><div></div><div>Light off (bits 11100101 or 11101101 or 11110101)</div></div> <div><div>Racon err</div><div></div><div>Racon error (bits 11111001 or 11111011 or 11111111) (SN243)</div></div> <div><div>Error</div><div></div><div>Light error or combination of light error/off with racon error (bits 11100110 or 11101110 or 11110110 or 11111101)</div></div>

2999

3000








3001

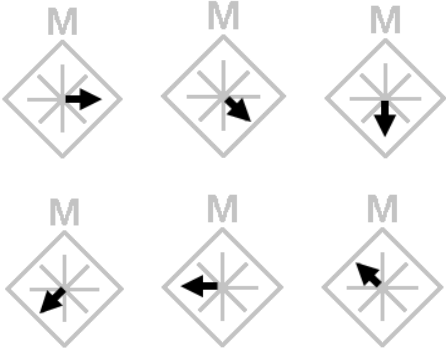
	Symbol name and description	Symbol graphic(s)
2.10 b	<p>AIS aids to navigation – Virtual</p> <p>Source of virtual AIS AtoN is:</p> <p>AIS Message 21, Virtual AtoN Flag = 1</p> <p>MMSI identity range: 99 MID 6000 – 99 MID 7999</p> <p>Virtual AIS aids to navigation (AtoN) shall be presented as an open diamond with crosshair centred at reported position. The sides of the diamond shall be not more than 6 mm in length.</p> <p>The diamond shall be drawn using a thin dashed line style.</p> <p>The basic colour for a Virtual AIS AtoN is as used for the physical AIS AtoN symbols.</p> <p>If available, AIS AtoN shall be drawn indicating the purpose of the AtoN. Purpose symbol shall be drawn using a thin solid line style and shall be the same basic colour as used for AIS AtoN symbol. The height of the purpose symbol shall be not more than 5 mm in length</p> <p>The absence of a charted physical AtoN is communicated as a combined state of 'virtual AtoN flag = 1' and 'off position indicator = 1'. This shall be indicated with yellow text "Missing" above the dotted outline diamond using colour yellow. This symbol shall have no crosshair at the position centre. When used against light background the yellow text may include a black one-pixel outline to improve readability</p> <p>AIS AtoN may be labelled with the AtoN name. Alphanumeric text used to label an AIS AtoN shall be the same basic colour as the AIS AtoN symbol.</p> <p>Other information from AIS AtoN (see 5.13.2.d) and if available from a Message 14 (from the same MMSI), shall be available on demand. For presentation of unread Message 14, see symbol 5.16.</p> <p>All virtual AtoNs shall be in their own layer which shall have own display on/off selection. When selected off a permanent indication shall be provided.</p>	<p>Virtual AIS AtoN and related AIS AtoN type code in parenthesis:</p>  <p>Basic shape</p> <p>Default, type not specified (0); Reference point (1); Light, without sectors (5); Light, with sectors (6); Leading light front (7); Leading light rear (8)</p>  <p><i>Emergency wreck mark</i> (4)</p>  <p><i>Beacon, Cardinal N</i> (9); <i>Floating, Cardinal Mark N</i> (20)</p>  <p><i>Beacon, Cardinal E</i> (10); <i>Floating, Cardinal Mark E</i> (21)</p>  <p><i>Beacon, Cardinal S</i> (11); <i>Floating, Cardinal Mark S</i> (22)</p>  <p><i>Beacon, Cardinal W</i> (12); <i>Floating, Cardinal Mark W</i> (23)</p>  <p><i>Beacon, Port hand</i> (13); <i>Beacon, Preferred Channel Port hand</i> (15); <i>Port hand mark</i> (24); <i>Preferred channel port hand</i> (26)</p>  <p><i>Beacon, Starboard hand</i> (14); <i>Beacon, Preferred Channel Starboard hand</i> (16); <i>Starboard hand mark</i> (25); <i>Preferred channel Starboard hand</i> (27))</p>  <p><i>Beacon, Isolated danger</i> (17); <i>Isolated danger beacon safe</i></p>  <p><i>Beacon, Safe water</i> (18); <i>Safe water</i> (29)</p>  <p><i>Beacon, Special mark</i> (19); <i>Special mark</i> (30)</p> <p>(IALA dictionary, topmarks)</p>

Symbol name and description	Symbol graphic(s)
	<p style="text-align: center;">Missing</p>  <p style="text-align: center;">Charted AtoN is missing</p> <p style="text-align: right;">(SN243)</p>



3002

3003

Symbol name and description	Symbol graphic(s)
<p>2.10 c AIS aids to navigation – Mobile</p> <p>Source of mobile AIS AtoN is:</p> <p>AIS Message 21</p> <p>AtoN Status = Page ID 011</p> <p>MMSI identity range: 99 MID 8000 – 99 MID 9999</p> <p>Mobile AIS aids to navigation (AtoN) shall be presented as an open diamond topped by letter "M" of not more than 2 mm in length or height and a compass rose inside centred at reported position. The sides of the diamond shall be not more than 6 mm in length.</p> <p>The diamond and the compass rose shall be drawn using a thin solid line style (Virtual AtoN Flag = 0) or a thin dashed line (Virtual AtoN flag = 1).</p> <p>The basic colour for a mobile AIS AtoN is as used for the physical AIS AtoN symbols.</p> <p>Mobile AIS AtoN with known direction of movement shall include an arrow originating from the compass rose centre oriented towards to the reported COG of the mobile AIS AtoN (see AIS AtoN Status bits when Page ID bits = 011 in Table L.1) adjusted to the orientation mode in use. The result from "adjusted to the orientation mode" shall be presented aligned with the closest line of the compass rose.</p> <p>Mobile AIS AtoNs may be labelled with the AtoN name. Alphanumeric text used to label a mobile AIS AtoN shall be the same basic colour as the mobile AIS AtoN symbol.</p> <p>Other information from mobile AIS AtoN (see 5.11.2.d) and if available from a Message 14 (from the same MMSI), shall be available on demand. For presentation of unread Message 14, see symbol 5.16.</p> <p>All mobile AtoNs shall be in their own layer which shall have its own display on/off selection.</p>	<p style="text-align: center;">Basic shapes</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>M</p>  <p>Default</p> </div> <div style="text-align: center;"> <p>M</p>  <p>Virtual</p> </div> </div> <p>Basic shapes shall use the additional qualifiers below to denote the AtoN as propelled. Coarse direction of COG within $\pm 22,5^\circ$ sectors as defined by AtoN Status bits (see Table L.1)</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>M</p>  </div> <div style="text-align: center;"> <p>M</p>  </div> </div> <p>No information about COG report or available (AtoN Status bits 0110111x)</p> <p>Tethered (AtoN Status bits 0110101x)</p> <div style="text-align: center;"> <p>M</p>  </div> <p>If COG information is provided, it shall be presented with an arrow pointed in the general direction of movement (see Table L.1).</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>M</p>  </div> <div style="text-align: center;"> <p>M</p>  </div> </div>

	Symbol name and description	Symbol graphic(s)
		

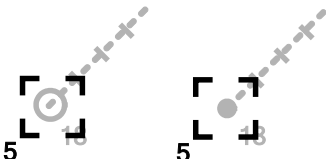
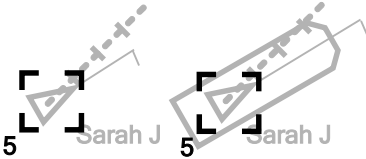
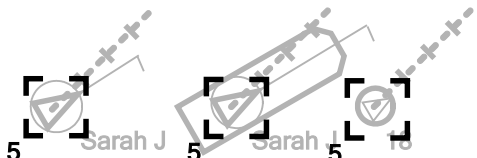

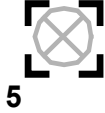
3004

	Symbol name and description	Symbol graphic(s)
2.11	<p>AIS search and rescue transmitter and other devices using AIS burst transmission technology</p> <p>NOTE Also known collectively as AIS locating devices</p> <p>Sources of AIS locating devices are:</p> <ul style="list-style-type: none"> • AIS-SART use identity range 970 00 0000 to 970 99 9999, • AIS MOB use identity range 972 00 0000 to 972 99 9999, • EPIRB-AIS use identity range 974 00 0000 to 974 99 9999. <p>Active AIS locating devices shall be presented as a 8 mm diameter circle with a cross inside drawn with a solid line. The symbol shall use the same basic colour as the AIS AtoN symbols.</p> <p>An active DSC Class (AIS) MOB (i.e. combination of DSC call and AIS MOB for same MMSI) shall be presented as combination of basic shape for active AIS locating device and symbol 5.16.</p> <p>Test versions of AIS locating devices shall include label "TEST" in lower right-hand side of the symbol. The symbol and labels shall be drawn using a solid line style and shall use the same basic colour as the AIS AtoN symbols.</p> <p>AIS locating device symbol has no associated speed or course vector.</p> <p>The operational mode as received from AIS Message 1 (Navigational Status =14 or 15) and associated Message 14 (SART ACTIVE, SART TEST, MOB ACTIVE, MOB TEST, EPIRB ACTIVE, EPIRB TEST) shall be available on demand. For presentation of unread Message 14 or for presentation of association of DSC call (AIS-MOB with DSC MOB call), see symbol 5.16.</p>	<p>Active AIS locating device</p>  <p>(SN243)</p> <p>AIS locating device under test</p> 

3005

3006

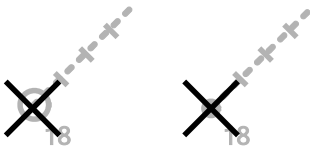
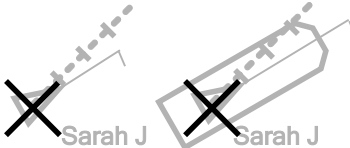
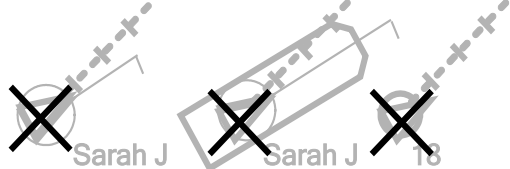


3007

	Symbol name and description	Symbol graphic(s)
2.12	<p>Selected object</p> <p><i>Selected object symbol shall be presented as broken square indicated by their corners, centred on the selected object symbol by the user and clearly extending beyond it. The square shall be drawn using a dashed line.</i></p> <p>Alphanumeric text used to label a selected object shall be the same basic colour as the selected object symbol.</p> <p>Selection marker can be used, for example, for selected radar targets, selected AIS targets, selected associated targets, selected AIS ATON, selected AIS locating device, selected AIS SAR aircraft, selected AIS SAR vessel, selected waypoint, etc.</p> <p>This selected object symbol can be used for objects based on point geometry.</p>	<p>Selected radar targets:</p>  <p>(SN243)</p>
		<p>Selected AIS targets:</p>  <p>(SN243)</p>
		<p>Selected associated targets:</p>  <p>(SN243)</p>
		<p>Selected AIS ATON:</p>  <p>(SN243)</p>
		<p>Selected AIS locating device</p>  <p>(SN243)</p>

3008

3009

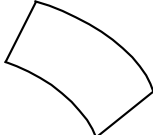



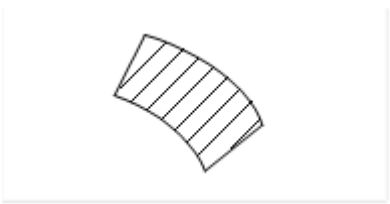
3010

	Symbol name and description	Symbol graphic(s)
2.13	<p>Lost targets</p> <p><i>Lost target symbols shall be presented as crossed lines centred on the target symbol and extending at least 2 mm but not more than 3 mm beyond the symbol. The lines shall be drawn using a thick solid line style and shall flash with the required colour red until acknowledged by the user.</i></p> <p>Once acknowledged, the lost target symbol and its target symbol shall be removed from the display.</p>	<p>Lost radar targets:</p>  <p>(SN243)</p>
		<p>Lost AIS targets:</p>  <p>(SN243)</p>
		<p>Lost associated targets:</p>  <p>(SN243)</p>
		<p>Lost AIS ATON:</p>  <p>(SN243)</p>
		<p>Lost AIS locating device</p>  <p>(SN243)</p>

3011

3012




3013

	Symbol name and description	Symbol graphic(s)
2.14	<p>Target acquisition area</p> <p>The user may select to display radar target acquisition areas and/or AIS target activation areas.</p> <p>Target acquisition areas shall be presented as a series of lines bounding a geographic area designated for radar target acquisition and/or AIS target activation. The lines shall be drawn using a thin solid line style with the same basic colour used for target symbols. Another colour may be used when in edit mode.</p> <p>The area may be filled providing the colour of the fill does not degrade the visibility of the radar image and target symbols. Area fill shall be transparent and shall be the same basic colour as the area boundary.</p>	 <p>(SN243)</p>
2.15 a	<p>AIS SAR aircraft – fixed wing</p> <p>Source of AIS SAR aircraft – fixed wing is:</p> <p>AIS Message 9</p> <p>MMSI identity range: 111 MID 100 – 111 MID 499</p> <p><i>An AIS SAR aircraft – fixed wing shall be drawn with a thin solid outline with the same basic colour as used for target symbols. The symbol shall be oriented in the direction of the COG. The length of the symbol shall be 6 mm.</i></p>	 <p>(SN243)</p>
2.15 b	<p>AIS SAR aircraft – helicopter</p> <p>Source of AIS SAR aircraft – helicopter is:</p> <p>AIS Message 9</p> <p>MMSI identity range: 111 MID 500 – 111 MID 999</p> <p><i>An AIS SAR aircraft – helicopter shall be drawn with a thin solid outline with the same basic colour as used for target symbols. The symbol shall be oriented in the direction of the COG. The length of the symbol shall be 6 mm.</i></p>	
2.16	<p>AIS SAR vessel</p> <p>Source of AIS SAR vessel is:</p> <p>Message 5 contains ship type, ship type 51 is SAR.</p> <p><i>If provided, a search and rescue vessel shall be presented by having a circle with cross drawn with a solid line inside the standard activated AIS vessel symbol (see 2.5a and 2.5b)</i></p>	 <p>(SN243)</p>
2.17	<p>Target exclusion zone</p> <p>The user may select to display radar target acquisition exclusion zone and/or AIS target exclusion zone.</p> <p>Target exclusion zones shall be presented as a series of lines bounding a geographic area designated for radar target acquisition exclusion and/or AIS target activation exclusion. The lines shall be drawn using a solid line style with the same basic colour used for target symbols. The area shall include solid thin diagonal lines. Another colour may be used when in edit mode.</p>	

3014

3015

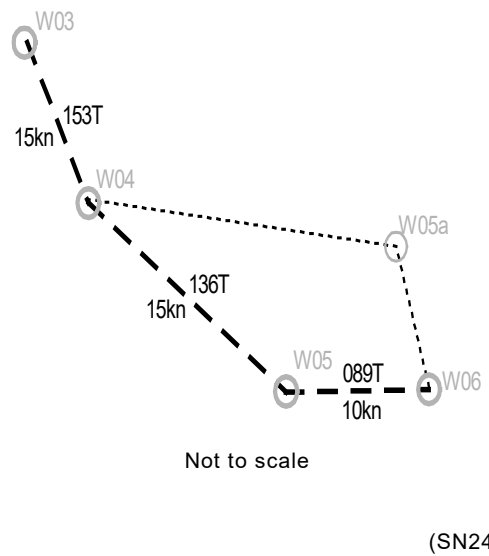
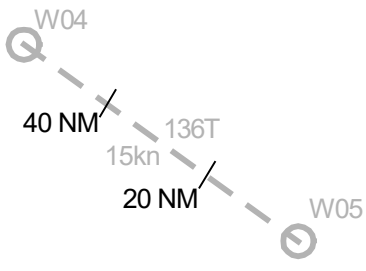
Table A.3 – Navigation symbols

	Description	Symbol
3.1 a	<p>Waypoint</p> <p>Waypoints shall be presented as circles centred at the position of the waypoint.</p> <p>The circles shall be at least 4 mm but not more than 6 mm in diameter.</p> <p>Circles representing waypoints on the monitored route shall be drawn using a thick solid line style with the same basic colour used for the route.</p> <p>Alternatively, the next waypoint on the monitored route may be presented as a set of two concentric circles. The outer circle shall be nominally 6 mm in diameter. The inner circle shall be nominally 4 mm in diameter.</p> <p>Circles representing waypoints on the alternate planned route shall be drawn using a thin solid line style.</p> <p>Optionally, waypoints may be labelled adjacent to their symbol. The label shall be offset by at least 2 mm from the symbol and shall not interfere with text used to label the track leg.</p> <p>Alphanumeric text used to label a waypoint shall be the same basic colour as the waypoint symbol.</p>	<div> W04</div> <div>(SN243)</div> <div> W04</div> <div> W04</div>

3016

3017

3018

	Description	Symbol
3.1 b	<p>Routes</p> <p>A route is as a series of waypoints connected by one or more legs.</p> <p>Leg lines on the monitored route shall be drawn using a bold long-dashed line style. Leg lines on an alternate or a planned route shall be drawn using a thin dotted line style.</p> <p>The IHO's specified colour for leg lines on the monitored route is red.</p> <p>Leg lines on the monitored route may be labelled adjacent to their line with their course and planned speed, ideally on opposite sides. The label shall be offset by at least 2 mm from the line and shall not interfere with text used to label the waypoint.</p> <p>Note that the IHO recommends drawing a box around the planned speed.</p> <p>Alphanumeric text used to label a leg line shall be the same colour as the leg line.</p> <p>The alternate planned route shall be presented as a series of track legs connecting a series of waypoints.</p>	 <p>Not to scale</p> <p>(SN243)</p>
3.1 c	<p>Distance to run</p> <p>Leg lines on the monitored route may be marked with distance to run. These marks shall be presented as single lines perpendicular to the leg line with their midpoint on it and extending at least 2 mm but not more than 3 mm on either side. They shall be located along the leg line to represent the distance to the next waypoint. The marks shall be drawn using a thin solid line style with the same colour as the leg line.</p> <p>Distance to run may be labelled adjacent to the marks. The label shall be offset by at least 2 mm from the mark and shall not interfere with other text used to label the leg line or waypoints.</p> <p>Alphanumeric text used to label distance to run shall be the same colour as the mark.</p>	

3019

3020

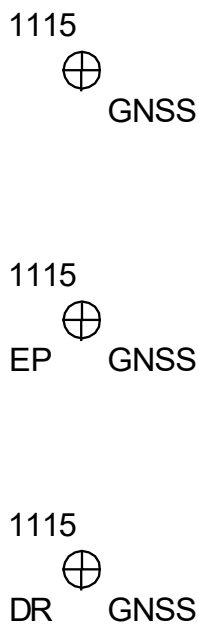
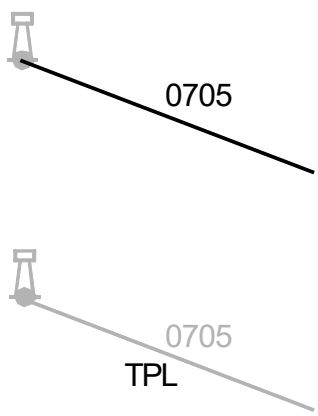
3021

	Description	Symbol
3.1 d	<p>Planned position</p> <p>Optionally, track legs may be marked with a planned position.</p> <p>These marks shall be presented as single lines perpendicular to the track leg with their midpoint on the line and extending at least 2 mm but not more than 3 mm on either side. They shall be located along the track leg to represent the distance from the previous waypoint. The marks shall be drawn using a thin solid line style.</p> <p>Planned position may be labelled adjacent to the mark with the date and time of planned arrival. The label shall be offset by at least 2 mm from the mark and shall not interfere with other labels.</p> <p>Alphanumeric text used to label planned position shall be the same basic colour as the mark.</p>	
3.1 e	<p>Visual limit of lights</p> <p>Leg lines on the monitored route may be marked with the visual limits of lights (i.e. rising/dipping range).</p> <p>The visual limit shall be presented as an arc centred on the light and extending across the track leg at least 10 mm on either side. The arc shall be drawn using a thin solid line with the same basic colour as the leg line.</p> <p>The visual limit may be labelled adjacent to the arc with the rising/dipping range and information about the light.</p> <p>Alphanumeric text used to label visual limits shall be the same basic colour as the arc.</p>	
3.1 f	<p>Wheel-over line</p> <p>Track leg lines on the monitored route may be marked with a wheel-overline. The wheel-over line shall be presented as single line centred on the current leg line, parallel to the next leg line and extending at least 5 mm on either side of the current leg line. The line shall be drawn using a thin solid line with the same colour as the leg line. A second perpendicular line to the current leg line may be presented. This second line shall not extend more than 5 mm on either side of the current leg line. The second line shall be drawn using a thin solid line with the same colour as the leg line.</p> <p>The wheel-over line may be labelled adjacent to the line with the planned rudder angle and time of wheel-over. Alphanumeric text used to label wheel-over position shall be the same basic colour as the wheel-over line.</p>	

3022

3023


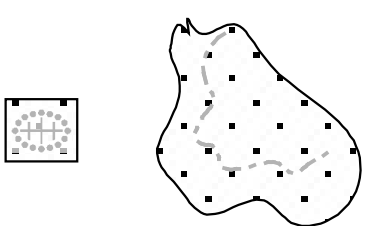
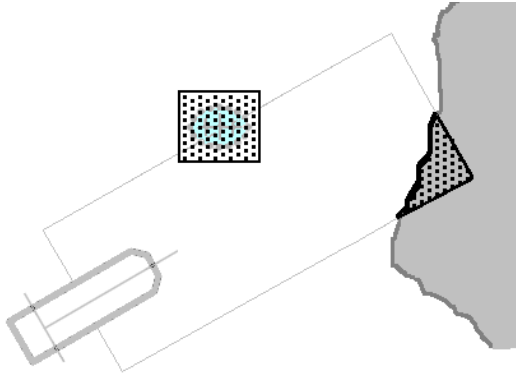
3024

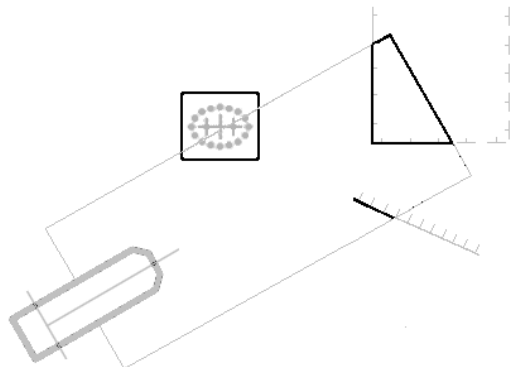
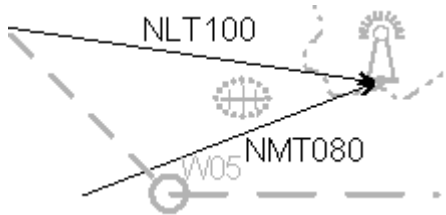
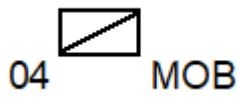
	Description	Symbol
3.2	<p>Plotted position</p> <p><i>A plotted position (Fix, EP, and DR) shall be presented as a circle with crossed lines centred at the position. The circle shall be 5 mm in diameter. The length of the crossed lines shall be the diameter of the circle.</i></p> <p>The circle and crossed lines shall be drawn using a thin solid line style.</p> <p><i>The position shall be labelled with time and an indication of its source for example GNSS, L (Loran), R (Radar range), V (Visual bearing), VR (Visual bearing and Radar range). If the position is an estimated position, it shall also be labelled with the letters "EP". If the position is a dead reckoned position, it shall also be labelled with the letters "DR".</i></p> <p><i>Alphanumeric text used to label the position shall be the same basic colour as the symbol.</i></p>	 <p>(SN243)</p>
3.3	<p>Line of position</p> <p><i>A line of position (LOP) shall be presented as a single line originating from a charted object and extending towards own ship. The bearing of the LOP shall be referenced to the CCRP.</i></p> <p>The LOP shall be drawn using a thin solid line style.</p> <p><i>The LOP shall be labelled with time. If the LOP is transferred, it may also be labelled with the letters "TPL" for transferred position line.</i></p> <p><i>Alphanumeric text used to label LOP shall be the same basic colour as the line.</i></p> <p><i>A LOP range observation will be an arc.</i></p>	 <p>Examples show the default symbol for a water tower.</p> <p>(SN243)</p>

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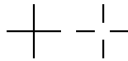
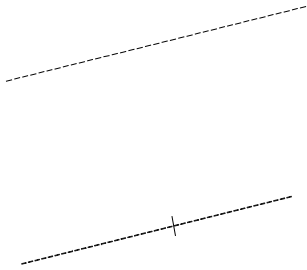

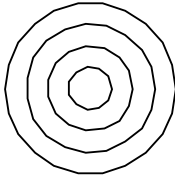
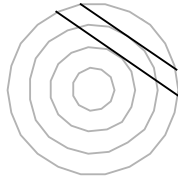
3027

	Description	Symbol
3.4	<p>Tidal stream</p> <p>A tidal stream shall be presented as a single line with three arrowheads. The line shall originate from the charted position for which a tidal stream table (or tidal stream data) is available and shall extend no more than 15 mm in length. The triple arrowhead shall extend no more than 2 mm on either side (perpendicular to the line).</p> <p>The line for an actual tidal stream shall be drawn using a thin solid line style.</p> <p>The line for a predicted tidal stream shall be drawn using a thin long dashed line style.</p> <p>The arrowheads for a tidal stream shall be drawn using a thin solid line style.</p> <p>The tidal stream shall be labelled adjacent to the line with the effective strength and time, ideally on opposite sides. The label shall be offset by at least 2 mm from the line.</p> <p>Alphanumeric text used to label the tidal stream shall be the same basic colour as the line.</p>	 <p>Examples show the default symbol for a point or area for which a tidal stream table is available.</p> <p>(SN243)</p>
3.5 a	<p>Mariner entered danger</p> <p><i>A danger highlighted by a mariner shall be presented as a polygon bounding a geographic area designated as dangerous to navigation, or as a poly-line creating a boundary around such an area. The boundary of the polygon, or poly-line, shall be drawn using a thick solid line style. Recommended colour: red.</i></p> <p><i>The polygon, or bounded area shall be filled with a transparent fill using the same colour as the polygon or poly-line.</i></p>	 <p>Examples show the default symbol for a mariner entered danger highlight of a dangerous wreck at an unknown depth bounded by a rectangular danger highlight and an outcropping of land bounded by a user-entered danger highlight.</p> <p>(SN243)</p>
3.5 b	<p>Look-ahead alarm highlight</p> <p><i>The graphical indication in the chart area of an alarm condition (see MSC.232(82)/A 11.4.4 and 11.4.6) shall be presented as a polygon or poly-line on the boundary of the area or point object causing the condition. The polygon or poly-line shall be drawn using a thick solid line style with recommended colour red. The bounded area shall have a transparent fill of the same colour.</i></p>	 <p>The example shows a depth area shallower than safety contour and a dangerous wreck within the look-ahead safety check area.</p> <p>(SN243)</p>

	Description	Symbol
3.5 c	<p>Look-ahead indication highlight</p> <p><i>The graphical indication in the chart area of warning or caution conditions (see MSC.232(82)/A 11.4.4 and 11.4.6) shall be presented as a polygon or poly-line on the boundary of the area or point object causing the condition. The polygon or poly-line shall be drawn using a thick solid line style with recommended colour yellow and adjacent thin lines of black on either side for visibility against a white (Day) background. The bounded area shall not be filled.</i></p>	 <p>Examples show point (wreck), restricted area and line (fish stakes).</p> <p>(SN243)</p>
3.6	<p>Danger bearing</p> <p><i>A danger bearing or clearing line shall be presented as a single line with an arrowhead directed at the base of a charted object. The line shall extend at least 20 mm in length and ideally through or across the monitored route.</i></p> <p><i>The line shall be drawn using a thin solid line style with the required colour red.</i></p> <p><i>A danger bearing shall be labelled with its bearing. The letters "NMT" shall be used to indicate "not more than". The letters "NLT" to indicate "not less than".</i></p> <p><i>Alphanumeric text used to label the danger bearing shall be the same basic colour as the line.</i></p>	 <p>The drawing is not to scale. The example shows the default symbols for a light and a dangerous wreck at an unknown depth.</p> <p>(SN243)</p>
3.7	<p>Event marker</p> <p>An event marker shall be presented as a 5 x 8 mm rectangle with a diagonal line inscribed.</p> <p>The symbol shall be drawn using a solid line style.</p> <p>An event marker shall be labelled. Multiple event markers may be numbered.</p> <p>Alphanumeric text used to label an event marker shall be the same basic colour as the symbol.</p>	 <p>(SN243)</p>

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Table A.4 – Navigation tools

	Description	Symbol(s)
4.1	<p>User cursor</p> <p>The user cursor shall be presented as crossed lines perpendicular to each other extending at least 3 mm from the centre on all sides. The cursor shall be drawn in a thick solid line style.</p> <p>Optionally, the centre of the cursor may be open. Either symbol may be used.</p>	 <p>(SN243)</p>
4.2	<p>Electronic bearing line (EBL)</p> <p>Electronic bearing lines (EBL) shall be presented as a single line originating from CCRP, from a position offset from CCRP, or from a geographically fixed position. An EBL shall be drawn as a <i>dashed line</i> style. Each <i>additional EBL</i> shall be distinguished by different styles of dashed lines and/or colours.</p> <p>If an EBL is offset, the EBL may be combined with a VRM to form an ERBL (electronic range and bearing line). The range shall be presented as a small arc across the EBL and referenced from the origin of the EBL. The arc shall use the same colour as the EBL.</p>	 <p>(SN243)</p>
4.3	<p>Variable range marker (VRM)</p> <p>Variable range markers (VRM) shall be presented as a <i>circle</i>. The VRM shall be drawn as a dashed line style. Each <i>additional VRM</i> shall be distinguished by different styles of dashed lines and/or colours.</p>	 <p>(SN243)</p>
4.4	<p>Range rings</p> <p>If selected, a set of fixed range rings shall be presented as an appropriate number of equally spaced concentric circles centred at the CCRP. Spacing between range rings is dependent on the range scale (i.e. range rings represent logical subdivisions of the range scale). The circles shall be drawn as a thin solid line style.</p>	 <p>(SN243)</p>
4.5	<p>(parallel) Index lines</p> <p>Parallel index lines shall be presented as a series of lines aligned to a set bearing, and spaced at a series of beam ranges (for example at the range ring spacing).</p> <p>No line style is specified for (parallel) index lines, however, they shall be distinguishable from each other and from EBLs.</p> <p>Index lines set at other bearings may be used.</p> <p>A series of index lines at other positions may be used.</p>	

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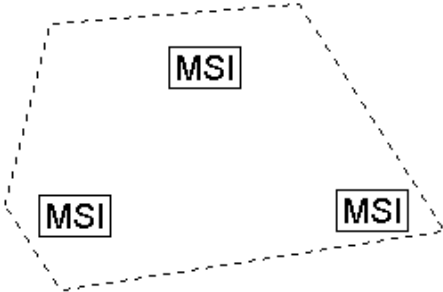
3033 For the application of the symbols in Table A.5, the following shall be considered when
 3034 information for more than one symbol in Table A.5 are available at the same location:


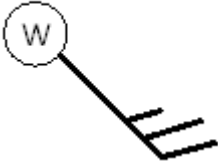
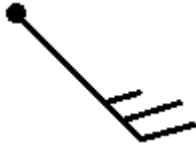
- 3035 • a single message, object, file, etc. may contain information for multiple symbols. Each
 3036 separate part of the information shall be connected to the related symbols in Table A.5;
- 3037 • it shall be possible to see symbols for all co-located information either alone or together
 3038 with other symbols;
- 3039 • multiple symbols may be co-located;
- 3040 • a minimum means shall be provided to prevent co-located symbols from obscuring each
 3041 other, for example by user selection, by type of information.

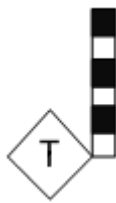

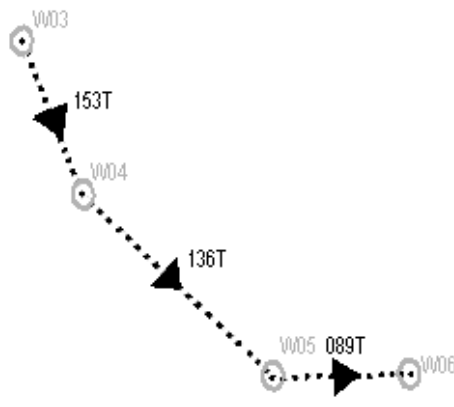
3042




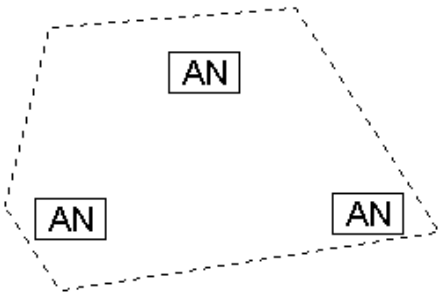
Table A.5 – Other symbols




	Description	Symbol(s)
5.1	<p>Trial manoeuvre</p> <p>When a trial manoeuvre function is enabled, it shall be indicated by the presentation of a large letter "T" in a conspicuous location in the operational display area.</p>	<p style="text-align: center; font-size: 48pt;">T</p> <p style="text-align: right;">(SN243)</p>
5.2	<p>Simulation mode</p> <p>When a simulation mode is enabled, it shall be indicated by the presentation of a large letter "S" in a conspicuous location in the operational display area.</p>	<p style="text-align: center; font-size: 48pt;">S</p> <p style="text-align: right;">(SN243)</p>
5.3	<p>Radar test target</p> <p>When an internally generated test target is enabled, it shall be indicated by the presentation of the large letter "X" adjacent to the target with the basic colour used for the target symbol.</p> <p>In addition, a bold "X" shall be shown in a conspicuous location in the operational display area.</p>	<p style="text-align: center; font-size: 48pt;">X</p> <p style="text-align: right;">(SN243)</p>




	Description	Symbol(s)
5.4	<p>Maritime Safety Information, MSI</p> <p><i>MSI point symbol shall be presented as box with the "MSI" inscribed inside it. The box shall be centred at the position derived from MSI message. The box shall not be more than 6 mm in height, drawn using a thick solid line style.</i></p> <p><i>MSI area symbol shall be presented as a series of lines bounding a geographic area designated as "caution" to navigation. Connecting lines shall be drawn using thin dashed line style and using same basic colour as the symbol itself. The area shall be filled with a sparse pattern of MSI point symbols separated by 50 mm.</i></p> <p>MSI symbols shall be in a separate user selectable layer or group, removable by single operator action. The removal may be connected to generic removal functionality of non-chart object layers.</p> <p>The user dialog area shall have an indication if MSI notices are available in the area currently displayed, but the MSI layer is not automatically selected for display.</p> <p>MSI symbols may be connected to a date range and in such case each MSI notice symbol shall be displayed only when user selected date is within data range.</p> <p>It shall be possible to cursor pick an MSI symbol for further details.</p> <p>When presentation of MSI point and area symbols are provided as overlay on chart or radar, then means shall be provided for cursor pick of the symbol to provide further information in the user dialog area of the display.</p> <p><i>Note that the source of MSI maybe NAVTEX, EGC, AIS ASM function identifier 22 or 23 (SN.1/Circ.289), etc.</i></p> <p>Note that sub-components of MSI, for example Navigational Warnings (S-124) may have their own symbology</p>	<p>Example of point symbol</p>  <p>Example of area symbol</p> 



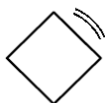





	Description	Symbol(s)
5.5	<p>Meteorological information</p> <p><i>Meteorological information symbols consist of two parts:</i></p> <ul style="list-style-type: none"> - the weather station symbol or reference point; and - the wind shaft. <p><i>The weather station symbol shall be presented as a circle with "W" inscribed inside it. The circle shall be centred at the position derived from the site location report binary message. The circle shall not be more than 6 mm in diameter, drawn using a thin solid line style and using the same basic colour as AIS AtoN.</i></p> <p><i>The reference point symbol shall be presented as a dot. The dot shall not be more than 1 mm in diameter, drawn using solid fill and using the same basic colour as AIS AtoN.</i></p> <p><i>Alphanumeric text may be used to label the weather station.</i></p> <p><i>The optional wind shaft shall be used to represent actual wind (i.e. not forecast) force and direction as defined by WMO No.485, Appendix II-4, the surface plotting model. If actual wind force and direction is not available then there shall be no wind shaft. The wind shaft shall be not more than 3 times the diameter of the weather station symbol. The length of barbs and pennants shall not exceed the diameter of the weather station symbol. The wind shaft shall be drawn using a thick solid line style and using the same basic colour as AIS AtoN.</i></p> <p><i>The wind shaft is directed along the axis of the wind towards the centre of the station circle and stops at its circumference. Wind is represented by barbs and solid pennants. The full barbs representing 5 m s^{-1} or 10 kn, the half barbs representing $2,5 \text{ m s}^{-1}$ or 5 kn and the solid pennant representing 25 m s^{-1} or 50 kn. All pennants and barbs lie to the left (clockwise) of the wind shaft in the northern hemisphere and to the right (counter clockwise) of the wind shaft in the southern hemisphere. Barbs are at an angle of 110° to 130° from the wind shaft. Pennants are triangles with their bases on the wind shaft. A calm shall be indicated by a circle drawn around the weather station circle: Missing wind speed shall be indicated by placing an "x" at the end of the wind shaft in lieu of the wind barbs.</i></p> <p>Other meteorological or hydrographic information such as visibility, temperature, salinity, etc., if available, shall be available on demand.</p> <p><i>Note that the source of meteorological information may be AIS ASM function identifier 26 or 31 (SN.1/Circ.289), etc.</i></p>	<p>Dover</p>  <p>(WMO) (SN243)</p> <p>Example of weather station</p> <p>Dover</p>  <p>(WMO) (SN243)</p> <p>Example of weather station with optional wind shaft in southern hemisphere</p>  <p>(SN243)</p> <p>Example of reference point with optional wind shaft in southern hemisphere</p>


	Description	Symbol(s)
5.6	<p>Tidal and water level information</p> <p><i>Tidal and water level information symbol consist of two parts: the tidal symbol and the tidal gauge symbol.</i></p> <p><i>The tidal symbol shall be presented as a diamond with "T" inscribed inside it. The diamond shall be centred at the position derived from the site location report binary message. The sides of the diamond shall not be more than 6 mm in length, drawn using a thin solid line style and using the same basic colour as AIS AtoN.</i></p> <p><i>The optional tidal gauge part of the symbol shall be used to represent availability of water level information. If water level is not available then there shall be no tidal gauge symbol. The tidal gauge symbol shall not be more than 10 mm in length, drawn using a thick solid line style, transparent fill and using the same basic colour as AIS AtoN.</i></p> <p>If selected, the details of water level shall be presented in the associated AIS object dialog.</p> <p><i>Note that the source of tidal information may be AIS ASM function identifier 31 (SN.1/Circ.289), etc.</i></p>	 <p>(SN243)</p>
5.7	<p>Signal station</p> <p><i>Signal station shall be presented as a diamond centred at the reported position of the signal station. The sides of the diamond shall be not more than 6 mm in length, drawn using a thin solid line style and shall be the same basic colour as the AIS AtoN symbol.</i></p> <p><i>The symbol shall be labelled with text "SS" centred in the diamond and the colour of the label shall be the same colour as the symbol.</i></p> <p>Other information from signal station, if available, shall be available on demand.</p> <p><i>Note that a signal station is a station capable of transmitting marine traffic signals. The source of signal station may be AIS ASM function identifier 19 (SN.1/Circ.289), etc.</i></p>	 <p>(SN243)</p>
5.8	<p>Route information received</p> <p><i>Route information is as a series of waypoints connected by one or more legs.</i></p> <p><i>Leg lines on the route information shall be drawn using a thin dotted line style. They shall have a centred solid triangle with equal length of each side of not more than 4 mm and shall be the same basic colour as the AIS AtoN symbol. Solid triangle is centred on visible part of each leg.</i></p> <p><i>Leg lines on the route information may be labelled adjacent to their line with their course. The label shall be offset by at least 2 mm from the line and shall not interfere with text used to label the waypoint.</i></p> <p><i>Alphanumeric text used to label a leg line shall be the same colour as the leg line.</i></p> <p><i>The colour of route type "mandatory route" shall be different from other route types and symbol 3.1b. Note that the source of route information may be AIS ASM function identifier 27 or 28 (SN.1/Circ.289), etc.</i></p>	 <p>NOTE Not to scale</p> <p>(SN243)</p>

	Description	Symbol(s)
5.9	<p>Berthing data</p> <p><i>Berthing assignment shall be presented as a box with the "BERTH" inscribed inside it. The box shall be centred at the position derived from the berthing data message. The box shall not be more than 6 mm in height, drawn using a thick solid line style and shall be the same basic colour as the AIS AtoN symbol.</i></p> <p>Other information from berthing data, if available, shall be available on demand.</p> <p><i>Note that the source of berthing data may be AIS ASM function identifier 20 (SN.1/Circ.289), etc.</i></p>	 <p>(SN243)</p>
5.10	<p>Clearance time to enter port</p> <p><i>Clearance time to enter port shall be presented as a box with the "CTE" inscribed inside it. The box shall be centred at the position derived from clearance time to enter port data message. The box shall not be more than 6 mm in height, drawn using a thick solid line style and shall be the same basic colour as the AIS AtoN symbol.</i></p> <p>Other information from clearance time to enter, if available, shall be available on demand.</p> <p><i>Note that the source of clearance to enter port may be AIS ASM function identifier 18, 22 or 23 (SN.1/Circ.289), etc.</i></p>	 <p>(SN243)</p>
5.11	<p>Area notice</p> <p><i>Area notice point symbol shall be presented as box with the "AN" inscribed inside it. The box shall be centred at the position derived from Area notice message. The box shall not be more than 6 mm in height, drawn using a thick solid line style and shall be the same basic colour as the AIS AtoN symbol.</i></p> <p><i>Area notice area symbol shall be presented as a series of lines bounding a geographic area. Connecting lines shall be drawn using the thin dashed line style and using the same basic colour as the symbol itself. The area shall be filled with a sparse pattern of Area notice point symbols separated by 50 mm.</i></p> <p><i>Drawing priority of Area notice symbol is below Maritime Safety Information MSI, see symbol 5.4.</i></p> <p>Area notice symbols shall be in a separate user selectable layer, which is removable by single operator action. The removal may be connected to generic removal functionality of non-chart object layers.</p> <p>The user dialog area shall have an indication if area notices are available in the area currently displayed, but the area notice layer is not selected for display.</p> <p>Area notice symbols may be connected to a date range and in such case each area notice symbol shall be displayed only when user selected date is within data range.</p> <p>It shall be possible to cursor pick an Area notice symbol for further details.</p> <p><i>Note that the source of the area notice may be AIS ASM function identifier 22 or 23 (SN.1/Circ.289), etc.</i></p>	<p>Example of point symbol</p>  <p>Example of area symbol</p>  <p>(SN243)</p>

	Description	Symbol(s)
5.12	<p>Air gap</p> <p><i>Air gap symbols consist of two parts: the air gap symbol and the air gap gauge symbol.</i></p> <p><i>The air gap symbol shall be presented as a diamond with "A" inscribed inside it. The diamond shall be centred at the position derived from the site location report binary message. The sides of the diamond shall not be more than 6 mm, drawn using a thin solid line style and using the same basic colour as AIS AtoN.</i></p> <p><i>The air gap gauge part of the symbol shall be used to represent availability of air gap information. If air gap is not available then there shall be no air gap gauge symbol. The air gap gauge symbol shall not be more than 10 mm in length, drawn using a thick solid line style, transparent fill and using the same basic colour as AIS AtoN.</i></p> <p>Air gap relative to the water surface in metres with one decimal and other air gap information, if available, shall be available on demand.</p> <p><i>Note that the source of the air gap/air draught information may be AIS ASM function identifier 26 (SN. 1/Circ.289), etc.</i></p>	 <p>(SN243)</p>
5.13	<p>Environmental report</p> <p><i>The environmental report symbol shall be presented as a diamond with "ENV" inscribed inside it. The diamond shall be centred at the position derived from the site location report binary message. The sides of the diamond shall not be more than 6 mm, drawn using a thin solid line style and using the same basic colour as AIS AtoN.</i></p> <p>All available details of environmental information shall be displayable on demand.</p> <p>The tidal flow/current may optionally be represented by symbol 3.4 (tidal stream). If tidal/current speed and direction is not available then there shall be no tidal flow symbol. The tidal flow symbol shall use the same basic colour as AIS AtoN.</p> <p>If selected, the details of tidal flow/current shall be presented in the associated AIS object dialog using one decimal.</p> <p><i>Note that the source of environmental information may be AIS ASM function identifier 26 or 31 (SN. 1/Circ.289), etc.</i></p>	 <p>(SN243)</p>
5.14	<p>Fairway closure</p> <p>The fairway closure symbol shall be presented as crossed lines centred on a fairway symbol (two converging dashed lines) plus a box around the symbol, drawn using a thin solid line style and using the same basic colour as AIS AtoN.</p> <p>All available details of fairway closure shall be displayable on demand.</p>	

	Description	Symbol(s)
5.15 a	<p>AIS synthetic position - distress</p> <p>AIS synthetic positions for which the source is AIS ASM when FI=22 or FI=23 Area Notice with "Sub-areas" set to "0" circle or point and "Area shape" set to "0" and "Radius" set to "0" and "Notice Description" set to a value range from 64 to 74 shall be presented as quadrilateral and centred at the reported position. The shorter sides of quadrilateral shall be 4 mm and the longer sides shall be 6 mm. The quadrilaterals shall be drawn using a thick solid line style with yellow colour and when used against light background it shall include a black one-pixel outline to improve readability.</p> <p>Quadrilaterals may be labelled. Alphanumeric text used to label quadrilaterals shall be drawn with the same basic colour as used for AIS AtoN.</p>	
5.15 b	<p>AIS synthetic position</p> <p>AIS synthetic positions for which the source is AIS ASM when FI=17 VTS generated/synthetic target shall be presented as quadrilaterals oriented to the reported COG and centred at the targets' reported position. The shorter sides of quadrilateral shall be 4 mm and the longer sides shall be 6 mm. The quadrilaterals shall be drawn using a thick solid line style and using the same basic colour as AIS AtoN.</p> <p>An AIS synthetic position without a reported COG shall be oriented toward the top of the operational display area and shall include a diagonal line across the quadrilateral.</p> <p>Quadrilaterals may be labelled. Alphanumeric text used to label quadrilaterals shall be drawn with the same basic colour as used for AIS AtoN</p>	
		<p>AIS synthetic position without COG</p> 

	Description	Symbol(s)
5.16	<p>Source of a received call or unread message</p> <p>Received call or unread message shall be presented by having two increasing centred 1/8 arcs drawn using a thin solid line at upper right hand side of the AIS target symbol (see 2.4, 2.5a and 2.5b).</p> <p>If presented together with symbol 2.12 the size of the symbol 2.12 shall include the area of this symbol.</p>	<p>With AIS target</p>  <p>With AIS synthetic position</p>  <p>With AIS AtoN physical</p>  <p>With AIS AtoN virtual</p>  <p>With AIS AtoN mobile</p>  <p>with AIS locating device</p>  <p>With Base station</p> 
5.17	<p>AIS base station</p> <p>AIS base station shall be presented as a diamond at the reported position of the base station. The sides of the diamond shall be not more than 6 mm in length, drawn using a thin solid line style and shall be the same basic colour as the AIS AtoN symbol.</p> <p>The symbol shall be labelled with text "BS" centred in the diamond and the colour of the label shall be the same colour as the symbol</p> <p>Other information from AIS base station (see 5.11.2.b) and if available from a Message 14 (from the same MMSI), shall be available on demand. Unread Message 14 shall be presented by having two increasing centred 1/8 arcs drawn using a thin solid line at upper right-hand side of the AIS AtoN.</p>	 <p>Basic shape</p>

	Description	Symbol(s)
5.18	<p>Co-located AIS ASM</p> <p>Co-located AIS ASM shall be presented as a diamond at the reported position of the AIS ASM. The sides of the diamond shall be not more than 6 mm in length, drawn using a thin solid line style and shall be the same basic colour as the AIS AtoN symbol.</p> <p>The symbol shall be labelled with text “INFO” centred in the diamond and the colour of the label shall be the same colour as the symbol</p>	

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Table A.6 – Example of possible colour scheme

Symbol	Colour white background/ dark background	Colour token (IHO S-52)
1.1a, 1.1b	Black/White	SHIPS
1.7a	Black/White	PSTRK
2.1a, 2.4, 2.5a, 2.15, 2.16	Blue-green	ARPAT
2.10, 2.11, 5.5, 5.6, 5.7	Blue	RESBL
2.12, 4.1, 4.2, 4.3, 4.4, 4.5	Orange	CURSR
2.14, 3.7, 5.4	Orange	NINFO
3.1a	Red	PLRTE
3.1a	Orange	APLRT

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Annex B (normative)

Guidelines for the presentation of navigation-related terminology and abbreviations

B.1 Overview

This annex specifies the terminology and abbreviations to be used for the presentation of navigation related information in conformance with guidelines published by IMO and provided in SN/Circ.243. All text in this standard whose wording is identical to that in the IMO guidelines is printed in *italics*, and the referenced paragraph number is indicated in brackets with the abbreviated prefix for example (SN243/2).

B.2 Purpose

(SN243/2/1) *The purpose of this annex is to provide guidelines on the use of appropriate navigation-related terminology and abbreviations intended for presentation on all shipborne navigational systems and equipment. These are based on terminology and abbreviations used in existing navigation references.*

B.3 Scope of these guidelines

(SN243/2/2) *These guidelines will ensure that the terminology and abbreviations used for the presentation of navigation-related information on all shipborne navigational systems and equipment are presented in a consistent and uniform manner.*

B.4 Application

(SN243/2/3) *These guidelines apply to all shipborne navigational systems and equipment when navigation-related information is presented as text, the standard terminology or abbreviations listed in Table B.1 and Table B.2 shall be used in place of terminology and abbreviations which are currently contained in existing Performance Standards for navigational systems and equipment. Where standard terminology or a standard abbreviation is not available, another may be used. This shall provide a clear meaning and shall not conflict with the standard terminology or abbreviations listed in Table B.1 and Table B.2. Standard marine terminology shall be used for this purpose. When the meaning is not clear from its context, it shall not be abbreviated. When another terminology or abbreviation is used, it shall be explained in the operating manual.*

(SN243/2/3) *Unless otherwise specified, standard terms shall be presented in lower case while abbreviations shall be presented in upper case.*

B.5 Navigation related terminology and abbreviations

For the application of the standard terminology and abbreviations listed in Table B.1 and the standard units of measurement and abbreviations listed in Table B.2, the following shall be considered:

- terminology and abbreviations used in nautical charts are published in relevant IHO publications and are not listed here;
- in general, terminology should be presented using lower case text with upper case first character for each separate word and abbreviations should be presented using upper case

3087 text. Those abbreviations that may be presented using lower case text are identified in
3088 Table B.2;

3089 • abbreviations may be combined, for example, “CPA LIM” or “T CRS”. When the
3090 abbreviation for the standard terminology “Relative” is combined with another
3091 abbreviation, the abbreviation “R” should be used instead of “REL”, for example, “R CRS”
3092 (see NOTE 2 to Table B.1);

3093 • the use of the abbreviations “SIM” and “TRIAL” are not intended to replace the appropriate
3094 symbols listed in Table A.5 (see NOTE 3 to Table B.1).

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Table B.1 – List of standard terms and abbreviations

Term	Abbreviation	Term	Abbreviation
Acknowledge	ACK	Bow Crossing Range	BCR
Acquire, Acquisition	ACQ	Bow Crossing Time	BCT
Acquisition Zone	AZ	Built in Test Equipment	BITE
Additional Military Layer	AML	Calibrate	CAL
Adjust, Adjustment	ADJ	Cancel	CNCL
Aft	AFT	Cancel All	CNCL ALL
Alarm	ALARM	Carried (for example, carried EBL origin)	C
Alert Setting	ALERT SET	Central Processing Unit	CPU
Altitude	ALT	Centre	CENT
Amplitude Modulation	AM	Change	CHG
Anchor Watch	ANCH	Chart Display Settings	CHT DISP SET
Antenna	ANT	Chart Management	CHT MGMT
Anti Clutter Rain	RAIN	Chart Safety Settings	CHT SF SET
Anti Clutter Sea	SEA	Circularly Polarised	CP
April	APR	Clear	CLR
Audible	AUD	Closest Point of Approach	CPA
August	AUG	Compact Disk Read Only Memory	CDROM
Automatic	AUTO	Conning	CONN
Automatic Frequency Control	AFC	Consistent Common Reference Point	CCRP
Automatic Gain Control	AGC	Consistent Common Reference System	CCRS
Automatic Identification System	AIS	Contrast	CONT
Automatic Identification System – Search and Rescue Transmitter	AIS-SART	Coordinated Universal Time	UTC
Automatic Radar Plotting Aid	ARPA	Correction	CORR
Autopilot	AP	Course	CRS
Auxiliary System/Function	AUX	Course Over the Ground	COG
Available	AVAIL	Course Through the Water	CTW
Azimuth Indicator	AZI	Course To Steer	CTS
Background	BKGND	Course Up	C UP ^a
BeiDou Navigation Satellite System	BDS	Cross Track Distance	XTD
Bearing	BRG	Cross Track Limit	XTL
Bearing Waypoint To Waypoint	BWW	Cursor	CURS
		Dangerous Goods	DG

Term	Abbreviation
<i>Date</i>	<i>DATE</i>
<i>Dated Objects</i>	<i>Dated Objects</i>
<i>Day</i>	<i>DAY</i>
<i>Day/Night</i>	<i>DAY/NT</i>
<i>Dead Reckoning, Dead Reckoned Position</i>	<i>DR</i>
<i>December</i>	<i>DEC</i>
<i>Decrease</i>	<i>DECR</i>
<i>Default Settings</i>	<i>DFLT SET</i>
<i>Delay</i>	<i>DELAY</i>
<i>Delete</i>	<i>DEL</i>
<i>Departure</i>	<i>DEP</i>
<i>Depth</i>	<i>DPTH</i>
<i>Destination</i>	<i>DEST</i>
<i>Deviation</i>	<i>DEV</i>
<i>Differential BDS</i>	<i>DBDS</i>
<i>Differential Galileo</i>	<i>DGAL^a</i>
<i>Differential GLONASS</i>	<i>DGLONASS^a</i>
<i>Differential GNSS</i>	<i>DGNSS^a</i>
<i>Differential GPS</i>	<i>DGPS^a</i>
<i>Digital Selective Calling</i>	<i>DSC</i>
<i>Display</i>	<i>DISP</i>
<i>Display Brilliance</i>	<i>BRILL</i>
<i>Distance</i>	<i>DIST</i>
<i>Distance Root Mean Square</i>	<i>DRMS^a</i>
<i>Distance To Go</i>	<i>DTG</i>
<i>Down</i>	<i>DN</i>
<i>Drift</i>	<i>DRIFT</i>
<i>Dropped (for example, dropped EBL origin)</i>	<i>D</i>
<i>East</i>	<i>E</i>
<i>Echo Reference</i>	<i>REF</i>
<i>Electronic Bearing Line</i>	<i>EBL</i>
<i>Electronic Chart Display and Information System</i>	<i>ECDIS</i>
<i>Electronic Chart System</i>	<i>ECS</i>
<i>Electronic Navigational Chart</i>	<i>ENC</i>
<i>Electronic Position Fixing System</i>	<i>EPFS</i>
<i>Electronic Range and Bearing Line</i>	<i>ERBL</i>
<i>Emergency Position Indicating Radio Beacon</i>	<i>EPIRB</i>
<i>Emergency Position Indicating Radio Beacon – AIS</i>	<i>EPIRB-AIS</i>

Term	Abbreviation
<i>ENC Management Report</i>	<i>ENC MGMT REP</i>
<i>ENC Update Status Report</i>	<i>ENC UPD STATUS</i>
<i>Enhance</i>	<i>ENH</i>
<i>Enter</i>	<i>ENT</i>
<i>Equipment</i>	<i>EQUIP</i>
<i>Error</i>	<i>ERR</i>
<i>Estimated Position</i>	<i>EP</i>
<i>Estimated Time of Arrival</i>	<i>ETA</i>
<i>Estimated Time of Departure</i>	<i>ETD</i>
<i>European Geo-Stationary Navigational Overlay System</i>	<i>EGNOS</i>
<i>Event</i>	<i>EVENT</i>
<i>Exclusion Zone</i>	<i>EZ</i>
<i>Export Route</i>	<i>ROUTE EXP</i>
<i>External</i>	<i>EXT</i>
<i>F-Band (applies to radar)</i>	<i>F-Band</i>
<i>February</i>	<i>FEB</i>
<i>Foreword</i>	<i>FWD</i>
<i>Fishing Vessel</i>	<i>FISH</i>
<i>Fix</i>	<i>FIX</i>
<i>Forward</i>	<i>FWD</i>
<i>Frequency</i>	<i>FREQ</i>
<i>Frequency Modulation</i>	<i>FM</i>
<i>Full</i>	<i>FULL</i>
<i>Gain</i>	<i>GAIN</i>
<i>Geographics</i>	<i>GEOG</i>
<i>Geometric Dilution Of Precision</i>	<i>GDOP</i>
<i>Global Maritime Distress and Safety System</i>	<i>GMDSS</i>
<i>Global Navigation Satellite System</i>	<i>GNSS</i>
<i>Global Orbiting Navigation Satellite System</i>	<i>GLONASS</i>
<i>Global Positioning System</i>	<i>GPS</i>
<i>Great Circle</i>	<i>GC</i>
<i>Grid</i>	<i>GRID</i>
<i>Ground</i>	<i>GND</i>
<i>Grounding Avoidance System</i>	<i>GAS</i>
<i>Group Repetition Interval</i>	<i>GRI</i>
<i>Guard Zone</i>	<i>GZ</i>
<i>Gyro</i>	<i>GYRO</i>
<i>Harmful Substances (applies to AIS)</i>	<i>HS</i>
<i>Head Up</i>	<i>H UP^a</i>

Term	Abbreviation
Heading	HDG
Heading Control System	HCS
Heading Line	HL
Heading Line Off	HL OFF
High Frequency	HF
High Speed Craft	HSC
Horizontal Dilution Of Precision	HDOP
Identification	ID
Import Chart	IMPORT CHT
Import Route	ROUTE IMP
In	IN
Increase	INCR
Indication	IND
Information	INFO
Information Report	INFO REPORT
Infrared	INF RED
Initialisation	INIT
Input	INP
Input/Output	I/O
Integrated Navigation System	INS
Integrated Radio Communication System	IRCS
Interference Rejection	IR
Interswitch	ISW
Interval	INT
January	JAN
July	JUL
June	JUN
Label	LBL
Latitude	LAT
Latitude/Longitude	L/L
Leeway	LWY
Limit	LIM
Line Of Position	LOP
Log	LOG
Long Pulse	LP
Long Range	LR
Longitude	LON
Loran	LORAN
Lost Target	LOST TGT
Low Frequency	LF
Magnetic	MAG
Man Overboard	MOB

Term	Abbreviation
Manoeuvre	MVR
Manual	MAN
Manual Update	MAN UPD
Map(s)	MAP
March	MAR
Maritime Mobile Services Identity number	MMSI
Maritime Pollutant (applies to AIS)	MP
Maritime Safety Information	MSI
Marker	MKR
Master	MSTR
Maximum	MAX
May	MAY
Medium Frequency	MF
Medium Pulse	MP
Menu	MENU
Minimum	MIN
Missing	MISSING
Mute	MUTE
Navigation	NAV
Night	NT
Normal	NORM
North	N
North Up	N UP ^a
Not Less Than	NLT
Not More Than	NMT
Not Under Command	NUC
November	NOV
October	OCT
Off	OFF
Off centred	OFF CENT
Officer of the Watch	OOW
Offset	OFFSET
On	ON
Out/Output	OUT
Own Ship	OS
Own Ship Look-Ahead	LOOK AHEAD
Panel Illumination	PANEL
Parallel Index Line	PI
Past Positions	PAST POSN
Passenger Vessel (applies to AIS)	PASSV
Performance Monitor	MON
Permanent	PERM

Term	Abbreviation
Person Overboard	POB
Personal Identification Number	PIN
Pilot Vessel	PILOT
Port/Portside	PORT
Position	POSN
Positional Dilution Of Precision	PDOP
Power	PWR
Predicted	PRED
Predicted Area of Danger	PAD
Predicted Point of Collision	PPC
Pulse Length	PL
Pulse Modulation	PM
Pulse Repetition Frequency	PRF
Pulse Repetition Rate	PRR
Pulses Per Revolution	PPR
Racon	RACON
Radar	RADAR
Radar Overlay	RADAR OVR
Radar Settings	RADAR SET
Radar Plotting	RP
Radar Transponder	TPR
Radius	RAD
Rain	RAIN
Range	RNG
Range Rings	RR
Raster Chart Display System	RCDS
Raster Navigational Chart	RNC
Rate Of Turn	ROT
Real-time Kinematic	RTK
Receiver	RX ^a
Receiver Autonomous Integrity Monitoring	RAIM
Reference	REF
Relative	REL ^b
Relative Motion	RM
Revolutions per Minute	RPM
Rhumb Line	RL
Roll On/Roll Off Vessel (applies to AIS)	RoRo
Root Mean Square	RMS
Route	ROUTE
Route Monitoring	ROUTE MON

Term	Abbreviation
Route Plan	ROUTE PLAN
Safety Contour	SF CNT
Sailing Vessel	SAIL
Satellite	SAT
Satellite Based Augmentation System	SBAS
Save User Settings	SAVE USR
S-Band (applies to Radar)	S-BAND
Scan to Scan	SC/SC
Search And Rescue	SAR
Search And Rescue Transponder	SART
Search And Rescue Vessel	SARV
Select	SEL
Select User Settings	USR SEL
September	SEP
Sequence	SEQ
Set (i.e., set and drift, or setting a value)	SET
Ship's Time	TIME
Short Pulse	SP
Signal to Noise Ratio	SNR
Silence	SLNC
Simulation	SIM ^c
Slave	SLAVE
South	S
Speed	SPD
Speed and Distance Measuring Equipment	SDME
Speed Over the Ground	SOG
Speed Through the Water	STW
Stabilized	STAB
Standard Display	STND DISP
Standby	STBY
Starboard/Starboard Side	STBD
Station	STN
Status and Data	STAT DISP
Symbol(s)	SYM
Synchronization	SYNC
System Electronic Navigational Chart	SENC
Target	TGT
Target Tracking	TT
Test	TEST
Time	TIME

Term	Abbreviation	Term	Abbreviation
Time Difference	TD	Very High Frequency	VHF
Time Dilution Of Precision	TDOP	Very Low Frequency	VLF
Time Of Arrival	TOA	Vessel Aground (applies to AIS)	GRND
Time Of Departure	TOD	Vessel at Anchor (applies to AIS)	ANCH
Time to CPA	TCPA	Vessel Constrained by Draught (applies to AIS)	VCD
Time To Go	TTG	Vessel Engaged in Diving Operations	DIVE
Time to Wheel Over Line	TWOL	Vessel Engaged in Dredging or Underwater Operations (applies to AIS)	DRG
Track	TRK	Vessel Engaged in Towing Operations (applies to AIS)	TOW
Track Control System	TCS	Vessel Not Under Command (applies to AIS)	NUC
Tracking	TRKG	Vessel Restricted in Manoeuvrability (applies to AIS)	RIM
Track Made Good	TMG ^d	Vessel Traffic Service	VTS
Trail(s)	TRAIL	Vessel Underway Using Engine (applies to AIS)	UWE
Transceiver	TXRX ^a	Video	VID
Transferred Line Of Position	TPL	Visual Display Unit	VDU
Transmitter	TX ^a	Voyage	VOY
Transmitting Heading Device	THD	Voyage Data Recorder	VDR
Trial	TRIAL ^c	Warning	WARNING
Trial Settings	TRIAL SET	Water	WAT
Trigger Pulse	TRIG	Waypoint	WPT
True	T	Waypoint Closure Velocity	WCV
True Motion	TM	West	W
Tune	TUNE	Wheel Over Line	WOL
Ultrahigh Frequency	UHF	Wheel Over Point	WOP
Uninterruptible Power Supply	UPS	Wheel Over Time	WOT
Universal Time, Coordinated	UTC	World Geodetic System	WGS
Universal Transverse Mercator	UTM	X-Band (applies to Radar)	X-BAND
Unstabilised	UNSTAB		
Update Log	UPD LOG		
Update Review	UPD REV		
User Chart	USR CHT		
Variable Range Marker	VRM		
Variation	VAR		
Vector	VECT		

3097 ^a These abbreviations may be presented using lower case text, for example, “dGNSS”, “Rx”.

3098 ^b When the abbreviation for “Relative” is combined with another abbreviation, the abbreviation “R” should be
3099 used instead of “REL”, for example “R CRS”.

3100 ^c The use of abbreviations “SIM” and “TRIAL” are not intended to replace the appropriate symbols listed in
3101 Table A.5.

3102 ^d The term “Course Made Good” has been used in the past to describe “Track Made Good”. This is a misnomer in
3103 that “courses” are directions steered or intended to be steered with respect to a reference meridian. “Track
3104 Made Good” is preferred over the use of “Course Made Good”.

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Table B.2 – List of standard units of measurement and abbreviations

Unit	Abbreviation
<i>cable length</i>	<i>cbl</i>
centimetre	cm
<i>cycles per second</i>	<i>cps</i>
<i>degree(s)</i>	<i>deg or °</i>
<i>fathom(s)</i>	<i>fm</i>
<i>feet/foot</i>	<i>ft</i>
<i>gigahertz</i>	<i>GHz</i>
<i>hectopascal</i>	<i>hPa</i>
<i>hertz</i>	<i>Hz</i>
<i>hour(s)</i>	<i>hr(s)</i>
inch	in
<i>kilohertz</i>	<i>kHz</i>
<i>kilometre</i>	<i>km</i>
<i>kilopascal</i>	<i>kPa</i>
<i>knot(s)</i>	<i>kn</i>
<i>megahertz</i>	<i>MHz</i>
<i>metre</i>	<i>m</i>
<i>minute(s)</i>	<i>min or '</i>
<i>Nautical Mile(s)</i>	<i>NM</i>
<i>second(s)</i>	<i>s or "</i>

Annex C (informative)

Guidance on display and dialogue design in MSC/Circ.982

C.1 Overview

This annex lists the guidelines in MSC/Circ.982 that are related to presentation, and their association with the presentation-related requirements provided in IEC 60945 and this standard.

C.2 General

IMO MSC/Circ.982 provides guidelines on ergonomic criteria for bridge equipment and layout with the objective of improving the reliability and efficiency of navigation. These guidelines contain additional, relevant and useful information that may be applied to the design of computer-based displays for navigational systems and equipment.

C.3 Requirements in MSC/Circ.982 related to the display design

Some of the paragraphs in MSC/Circ.982 can be associated with the general requirements for shipborne navigational systems and equipment in IEC 60945:2002, particularly those related to display equipment or displays. Others are wholly or partially related to display design. Table C.1 through Table C.3 list those paragraphs.

Table C.1 – Paragraphs in MSC/Circ.982 associated with IEC 60945 requirements

IEC 60945:2002 Subclause	MSC/Circ.982 Paragraph
4.2.1 Ergonomics and HMI 4.2.1.3 Operation	5.3.2.6 Control/indicator discernability 5.5 Input devices 5.7 General user input guidelines
4.2.1.4 Identification	5.3.2.4 Control and display location 5.2.2.5 Simultaneous use
4.2.1.5 Screen displays and indications	5.3.5.1 Function labelling 5.3.5.2 Label terminology 5.6.3.3 Background colour (Conflicts with paragraph 7) 5.7 General user input guidelines (Paragraph g))
4.2.2 Hardware 4.2.2.2 Alarms and indicators	5.4.1.1 Alarm acknowledgement

Table C.2 – Other paragraphs in MSC/Circ.982 related to display design

MSC/Circ.982 Paragraph
5.3.2.7 High priority displays
5.3.3.5 Spacing between controls
5.4.1.4 Sensor input failure
5.4.1.8 Alarm Minimization
5.4.1.12 Presentation of Alarms

MSC/Circ.982 Paragraph	
5.4.2	Visual Alarms (all 6 sub-criteria)
5.6.1.1	Lack of ambiguity
5.6.1.2	Use of digital displays
5.6.1.3	Digital readout
5.6.1.10	Display fields for the display of important information
5.6.2.3	Demarcation of Groups
5.6.3.8	Flicker
5.6.3.9	Image continuity
5.6.3.10	CRT image linearity
5.6.5.2	Meaningful abbreviations
5.6.5.3	Units of measurement
5.6.5.7	Highlighting
5.6.5.8	Scaling in standards intervals
5.6.5.10	Unobtrusive grids

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Table C.3 – Other paragraphs in MSC/Circ.982 partially related to display design

MSC/Circ.982 Paragraph	
5.3.2.4	Control and display location
5.3.2.5	Simultaneous use
5.3.3.4	Consistent arrangement
5.3.3.5	Simultaneous use
5.4.1.3	Failure or reduction of power supply
5.4.1.13	Modes of Alarms
5.4.3	Audible Alarms (all 6 sub-criteria)

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Annex D **(informative)**

Guidance on testing

D.1 Methods of test derived from ISO 9241-12

D.1.1 General

The methods of test in this standard are derived from ISO 9241-12. The methods of test do not identify specific processes, approaches or facilities. Rather, they are intended to provide guidance to accredited testing laboratories for the development of test plans and test procedures that evaluate compliance with the requirements specified.

D.1.2 Observation

The test method "observation" refers to simple examination of the presentation of information to confirm that a particular observable condition has been met. The phrase "confirm by observation" is used.

Observations may be made by any person with the necessary skill to understand the presentation of information to determine if a statement concerning an observable property has been correctly applied. It is used when suitably trained individuals with a broad range of education and/or experience can be confidently expected to reach the same conclusion about a property of presented information or the performance of display equipment.

Compliance is determined by comparing the observed property to the requirement. Some observations may be made directly from the presentation. Other observations may require simulation of input from sensors or other sources. Typical confirmations by observation include:

- existence of functions or features;
- use of symbols or a defined range of words;
- a system output in response to a defined input.

D.1.3 Inspection of documented evidence

The test method "inspection of documented evidence" refers to examination of relevant documents to confirm that a particular presentation or display requirement has been met. The phrase "confirm by inspection of documented evidence" is used.

Documented evidence may include manuals, system requirements, design justification, industry conventions, etc. Inspections may be made by a suitably qualified person who has the necessary education, skill and/or experience to apply the documentation to the system's presentation or display equipment. It is used when performance of a system's presentation or display equipment is not directly observable or measurable. It may also be used when observation would be excessively repetitious, time consuming, or expensive.

Compliance is determined by comparing the documented property to the requirement. Typical confirmations by inspection of documented evidence include:

- conformance to a standard or other documented evidence;
- existence of optional features or functions;
- design and/or operation of algorithms.

D.1.4 Measurement

The test method “measurement” refers to measuring or calculating a value or variable for comparison to a specified value to determine that a particular presentation or display requirement has been met. The phrase “confirm by measurement” is used.

Measurements may require the use of test facilities and equipment. Measurements may be made by any person with the necessary skill to measure and/or calculate the value and compare it against a requirement, standard or other documented evidence.

Compliance is determined by comparing the measured or calculated value or variable to the requirement. Typical confirmations by measurement include:

- assessing whether the end users of a display will be able to read characters from the intended viewing distance;
- differences between displayed colours or absolute levels of display brightness;
- achievement of a level of availability or dependability.

D.1.5 Analytical evaluation

The test method “analytical evaluation” refers to detailed examination of the presentation of information to confirm that a particular condition has been met. The phrase “confirm by analytical evaluation” is used.

Analytical evaluations may be made by a relevant expert with the necessary education, skills and/or experience to make an informed and reliable judgement concerning the presentation of information, its appropriateness and usability. It is used for the evaluation of properties which can be judged only in the context of other information or knowledge which requires the tester to make an informed assessment of the likely performance of a typical user of the presentation.

Compliance is determined by comparing the observed property to the requirement. Typical confirmations by analytical evaluation include:

- the largest amount of information that can be presented to a user on a single display;
- the smallest difference in size, colour or line thickness that will be distinguished by a user on a particular display;
- consistency and clarity in presentation of information.

D.2 Application of IEC 60945

D.2.1 Display equipment category

The manufacturer should categorize their display equipment according to IEC 60945:2002, 4.4.

D.2.2 Technical performance

A performance test should be used to confirm compliance with the requirements specifying parameters.

A performance check should be used to confirm that the equipment operates.

The testing laboratory should use the appropriate measure of technical performance (i.e. performance test or performance check) for each test in the test plan.

3211 The equipment should operate in accordance with this standard during each performance test
3212 or performance check.

3213 **D.2.3 Pre-conditioning for environmental tests**

3214 The manufacturer should specify any mechanical or electrical preconditioning required for
3215 environmental tests. The testing laboratory should inspect the display equipment and perform
3216 any preconditioning specified by the manufacturer.

3217 The testing laboratory should carry out environmental tests with display equipment in its
3218 normal operational configuration, including mounting and supports, and with all mechanical
3219 arrangements secure.

3220 **D.2.4 Methods of test derived from ISO 9241-12 applied for IEC 60945**

3221 Many requirements for the presentation of information are of a nature that may be tested by
3222 simple observation. Other requirements are, however, of a more complex nature and may
3223 require informed judgement in the context of other information or knowledge by an expert with
3224 the necessary education, skills and/or experience. This is particularly the case in assessing
3225 conditions of appropriateness, usability or the likely performance of a typical user.

3226 These considerations are reflected in the guidance on test methods provided by Clause D.1,
3227 and in the structure of IEC 62288 in general, where the test method to be applied is specified
3228 test by test.

3229 IEC 60945:2002 simply specifies that each requirement should be “checked”, without further
3230 guidance. Table D.1 gives appropriate test methods.

3231 **Table D.1 – Methods of test applied for IEC 60945**

IEC 60945:2002 subclause	Original test method	Appropriate test method
6.1.2a	Check	Analytical evaluation
6.1.2b	Check	Analytical evaluation
6.1.2c	Check	Measurement
6.1.2d	Check	Analytical evaluation
6.1.2e	Check	Observation
6.1.2f	Check	Observation
6.1.2g	Check	Observation
6.1.2h	Check	Analytical evaluation
6.1.3a	Check	Analytical evaluation
6.1.3b	Check	Analytical evaluation
6.1.3c	Check	Observation
6.1.3d	Check	Analytical evaluation
6.1.4a	Check	Observation
6.1.4b	Check	Observation
6.1.4c	Check	Observation
6.1.4d	Check	Analytical evaluation
6.1.5a	Check	Analytical evaluation
6.1.5b	Check	Observation
6.1.5c	Check	Analytical evaluation
6.1.5d	Check	Observation

IEC 60945:2002 subclause	Original test method	Appropriate test method
6.1.5e	Check	Analytical evaluation
6.1.5f	Check	Analytical evaluation
6.1.5g	Check	Inspection of documented evidence
6.1.5h	Check	Analytical evaluation
6.1.5i	Check	Analytical evaluation
6.1.5j	Check	Analytical evaluation
6.1.5k	Check	Analytical evaluation
6.1.5l	Check	Analytical evaluation
6.1.5m	Check	Observation
6.1.5n	Check	Observation
6.1.5o	Check	Analytical evaluation
6.1.5p	Check	Observation
6.1.5q	Check	Observation
6.1.5r	Check	Observation
6.1.5s	Check	Observation
6.1.5t	Check	Observation
6.1.6a	Check	Analytical evaluation
6.1.6b	Check	Observation
6.1.6c	Check	Observation
6.1.6d	Check	Observation
6.1.7a	Check	Analytical evaluation
6.1.7b	Check	Analytical evaluation
6.1.7c	Check	Analytical evaluation
6.1.7d	Check	Analytical evaluation
6.1.7e	Check	Analytical evaluation
6.1.8a	Check	Analytical evaluation
6.1.8b	Check	Observation
6.1.8c	Check	Observation
6.1.8d	Check	Observation
6.1.8e	Check	Observation
6.1.8f	Check	Analytical evaluation
6.2.1a	Check	Observation
6.2.1b	Check	Analytical evaluation
6.2.1c	Check	Analytical evaluation
6.2.1d	Check	Observation
6.2.2a	Check	Observation
6.2.2b	Check	Observation
6.2.2c	Check	Observation
6.2.3a	Check	Observation
6.2.3b	Check	Observation
6.2.3c	Check	Inspection of documented evidence
6.2.3d	Check	Observation
6.2.3e	Check	Observation

IEC 60945:2002 subclause	Original test method	Appropriate test method
6.2.3f	Check	Analytical evaluation
6.2.3g	Check	Observation
6.2.3h	Check	Observation
6.2.3i	Check	Observation

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3233 **D.3 Compliance with requirements**

3234 Compliance with a requirement can be established by verifying that it is implemented in
 3235 accordance with another standard or with another clause or subclause within this standard; or
 3236 by confirming that it is implemented in accordance with the requirement(s) specified in the
 3237 current clause/subclause.

3238 **D.4 Simulation**

3239 Some test methods require simulation. A simulator arrangement should provide the
 3240 capabilities to replicate own ship navigational sensors, radar video images including individual
 3241 radar echoes for the tracking of targets, reported radar targets (for example, in accordance
 3242 with the IEC 61162 series), and reported AIS targets.

3243 IEC 62388 describes a Target Scenario Simulator (TSS), a Reported Target Simulator (RTS)
 3244 and a combined TSS/RTS.

3245 **D.5 Electronic chart data**

3246 Some test methods require electronic chart data or an electronic chart test data set.

3247 IEC 61174, describes a test data set for ENC. IHO S-64 contains the IHO test data sets for
 3248 ECDIS. The ECDIS test data sets are comprised of an ENC test data set and an RNC test
 3249 data set.

Annex E (normative)

Operational controls and logical grouping

E.1 Overview

Operational controls for navigational systems and equipment shall be easy to identify and simple to use. Controls may be implemented through dedicated hardware, screen-accessed soft keys, or a combination of both. The primary controls for each navigational system or equipment shall be identified and provided with an associated status indication in accordance with the function it is serving.

E.2 Logical grouping of data and control functions

Data and control functions shall be divided into logical groups for the function or the task-at-hand, in accordance with 4.3.1.

Table E.1 provides logical grouping for radar, ECDIS and INS.

Table E.2 provides examples of voluntary to implement top-level logical groupings of data and controls for radar and charting functionality. Specific requirements for logical grouping of data and control functions, when contained in the individual standards for navigational systems and equipment, shall also be followed. Examples of major groups:

- alerts and indications;
- own ship information;
- track monitoring data (as specified in IEC 62065);
- trial manoeuvre;
- navigational tools and readouts;
- target information;
- range/scale and mode readout;
- radar system information;
- radar signal information;
- chart database information;
- system settings.

Table E.1 – Logical grouping for radar, ECDIS and INS applications (based on MSC.1/Circ.1609)

<i>Own ship information</i>
<i>HDG: <value> <unit> <sensor source/ status></i>
<i>COG: <value> <unit> <sensor source/ status></i>
<i>SOG: <value> <unit> <sensor source/ status></i>
<i>STW: <value> <unit> <sensor source/ status></i>
<i>Position (Optional) <LAT value> <LON value> <Sensor source and status></i>
<i>Date and Time</i>
<i><Date> <Time> <time reference></i>
<i><Date> <Time> <UTC></i>

Target information
<i>Target Number/ Identifier</i> <1234> <i>Target Name</i> <Alphanumeric> <i>COG:</i> <value> <unit> <i>SOG:</i> <value> <unit> <i>STW:</i> <value> <unit> > <i>Closest Point of Approach (CPA):</i> <value> <unit> <i>Time to Closest Point of Approach (TCPA):</i> <value> <unit> <i>Bearing from Ownship:</i> <value> <unit> <i>Range from Ownship:</i> <value> <unit>
Measurement Info
<i>EBL bearing:</i> <value><unit> <i>VRM range:</i> <value><unit> >
Cursor Location
<i>Position</i> <LAT value> <LON value> <i>Bearing from Ownship:</i> <value> <unit> <i>Range from Ownship:</i> <value> <unit>
Route
<i>Route Name:</i> <RTE Name> <i>Next Waypoint Number/ Name:</i> <WPT name> <i>Distance to "TO-WPT":</i> <value> <unit> <i>Bearing to "TO-WPT":</i> <value> <unit> <i>Time to go to "TO-WPT":</i> <value> <unit> <i>Estimate time of arrival:</i> <value> <unit> <time reference> <i>Next course:</i> <value> <unit> <i>Current Cross Track Distance:</i> PORT <value> <unit> Or STBD <value> <unit> <i>Cross track Limit Current Leg:</i> PORT <value> <unit> STBD <value> <unit>

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Table E.2 – Examples of logical grouping for voluntary implementation

Scale and mode information	Chart database information
Chart scale Chart datum Orientation mode Motion mode Symbol set	ENC cell Cell edition/date Corrected through date
Radar signal information	Radar system information
Gain Rain Sea Processing (for example, target enhancement or correlation)	Standby/run Pulse length Frequency band Master/slave designation Tune
Range and mode information	
Range scale Orientation mode Stabilization mode Motion mode	

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E.3 Navigation related terminology and icons for common function controls (Hot keys and shortcuts)

When any of the following controls listed in this subclause are used, they shall be identified in English by the relevant name or abbreviation as listed by the appropriate table. In addition, they may be identified by standard icons, described below.

General equipment controls apply to all equipment and are defined in Table E.3. Navigation controls are defined in Table E.4. Radar specific controls are defined in Table E.5. Chart display controls are defined in Table E.6. Some chart related functions are in Table E.7. Chart database controls are defined in Table E.8. Route plan and monitoring controls are defined in Table E.9. Miscellaneous controls are defined in Table E.10.




Icons in Table E.6 shall be implemented using the specified colours based on IHO colour scheme or similar. For all other icons manufacturer has free selection of colours.

All icons in the tables are examples of the shape and to be adjusted for space available for an icon in the target equipment.

The following code of practice shall be used when marking equipment controls with optional icons:

- the minimum dimension of a symbol shall be not less than 9 mm;
- the distance between the centres of two adjacent symbols shall be not less than 1,4 times the size of the larger symbol;
- switch function symbols shall be linked by a line. A linked line infers controlled action;
- variable control function symbols shall be linked by a line, preferably an arc. The direction of increase shall be indicated;
- icons shall be presented with a high contrast against their background;
- the various elements of a symbol shall have a fixed ratio one to another;
- multiple functions of controls and switch positions may be indicated by a combined symbol;
- where concentric controls or switches are fitted, the outer of the symbols should refer to the larger diameter control.

Table E.3 – General controls

Explanation	Term	Abbreviation	Icon (hot key)
To identify the "off" position of the control or switch	OFF	OFF	
To identify the "Radar on" position of the switch or alternatively To identify the "on" position of the control or switch The relative size of the dot with respect to the circle may vary as long as it is easily distinguishable.	ON	ON	 or 










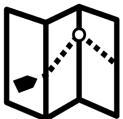



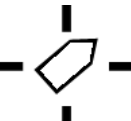
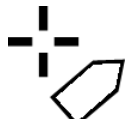
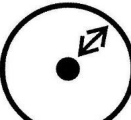












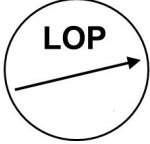


Explanation	Term	Abbreviation	Icon (hot key)
To identify the “on/off” alternate control or switch	ON/OFF	ON/OFF	
To identify the standby alternate control or switch and To identify the combined “on/off” plus standby alternate control or switch Table E.5 specifies this symbol for Radar. A radar may use this symbol or the symbol specified in Table E.5	STANDBY	STBY	
To activate system menu	Menu	MENU	
To perform Undo	Undo	UNDO	
To perform Redo	Redo	REDO	
To return to Colour calibrated display	Colour calibrated	COLCAL	
To perform Print screen	v	PRT SC	

Table E.4 – General navigation functions (based on MSC.1/Circ.1609)

Explanation	Term	Abbreviation	Icon (hot key)
To set panel illumination	Panel illumination	PANEL	
To set display brilliance	Display brilliance	BRILL	
To select ECDIS mode (for multifunction displays)	ECDIS	ECDIS	
To select Radar mode (for multifunction displays)	Radar	RADAR	

Explanation	Term	Abbreviation	Icon (hot key)
To select Conning display or to select 'navigation control data' task of the INS (for multifunction displays)	Conning	CONN NAV CTRL	
To select CAM-HMI as defined in Bridge Alert Management (BAM) (for example as required by INS)	CAM-HMI	CAM	
To select North Up display	North Up	N UP	N UP
To select Head Up display	Head Up	H UP	H UP
To select Course Up display	Course Up	C UP	C UP
To select True Motion mode	True Motion	TM	TM
To select Relative Motion mode	Relative Motion	RM	RM
To select ship centred Mode	Centred	CENT	
To select ship off centred Mode	Off centred	OFF CENT	
To perform True Motion reset	TM reset	TM RESET	TM RESET
To select range	Range	RANGE	
To perform Range up (for example, from 3nm to 6nm)	Up	+	+
To perform Range down (for example, from 6nm to 3nm)	Down	-	—
To identify the "heading line" off position	Heading Line Off	HL OFF	


Explanation	Term	Abbreviation	Icon (hot key)
To toggle Range Rings on and off	Range Rings	RR	
To set Variable Range Marker	Variable Range Marker	VRM	VRM
To set Electronic Bearing Line	Electronic Bearing Line	EBL	EBL
To control simultaneous measurement of range and bearing	Electronic Range and Bearing Line	ERBL	ERBL
To perform Target Acquire	Acquire	ACQ	ACQ
To perform selection (for example, target or chart object)	Select	SEL	
To call up the information associated with an object by cursor selection on its symbol	Info report	INFO REPORT	
To perform target cancellation	Cancel	CNCL	
To perform cancellation of all targets	Cancel all	CNCL ALL	
To acknowledge an alert	Acknowledge	ACK	ACK
To temporarily silence alerts	Silence	SLNC	
To record or log an event or occurrence	Record Event	REC EVENT	
To select default settings	Default settings	DFLT SET	
To select user settings	Select user settings	USR SET	

Explanation	Term	Abbreviation	Icon (hot key)
To save user settings	Save user settings	SAVE USR	
To select standard display for chart symbol	Standard display	STND DISP	STND DISP
To execute Trial Manoeuvre	Trial manoeuvre	TRIAL	TRIAL
To toggle Day/Night/Dusk mode	Day / Night	DAY / NT	
To plot own ship position manually	Line of Position	LOP	
To toggle True/Relative Vector mode	True/Relative Vector	T/R VECT	
To toggle On/Off AIS	Automatic Identification System contacts on/off	AIS	AIS
To toggle On/Off Automatic Identification System Application Specific Messages	AIS ASM on/off	AIS ASM	AIS ASM
To "status and data display" tasks of the INS	Status and Data	STAT DISP	STAT DISP
To activate anchor watch	Anchor watch	ANCHOR	

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Table E.5 – Radar specific controls

Explanation	Term	Abbreviations	Symbol
To identify the "Radar stand-by" position of the switch Table E.3 specifies this case for general use. A radar may use this symbol or the symbol specified in Table E.3	STANDBY	STBY	












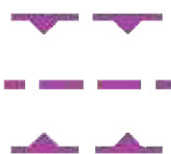








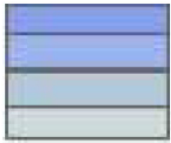










Explanation	Term	Abbreviations	Symbol
To identify the “short” pulse position of the pulse length selection control	SHORT PULSE	SP	
To identify the “long” pulse position of the pulse length selection control	LONG PULSE	LP	
To identify the “tuning control”	TUNE	TUNE	
To identify the “gain” control	GAIN	GAIN	
To identify the minimum position of the “rain” control or switch	RAIN	RAIN	
To identify the minimum position of the “anti-clutter sea” control	SEA	SEA	
To identify the position of the performance monitor switch	PERFORMANCE MONITOR	PM	
To select target association priority for radar target The circle is drawn using a thick line and triangle is drawn using a thin line			
To select target association priority for AIS target The circle is drawn using a thin line and triangle is drawn using a thick line			
NOTE The circles around the SHORT PULSE, LONG PULSE, and PERFORMANCE MONITOR icons are optional.			

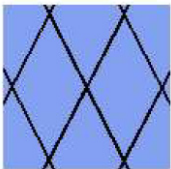




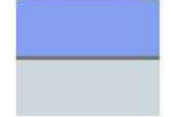
Table E.6 – Control of Chart display functions (based on MSC.1/Circ.1609)

Explanation	Term	Abbreviation	Icon (hot key)
To show accuracy related symbols	Accuracy	CATZOC	

Explanation	Term	Abbreviation	Icon (hot key)
<i>Selector for viewing group layer</i>	<i>All isolated dangers</i>	<i>ISODNG</i>	
	<i>Archipelagic sea lanes</i>	<i>ALS</i>	
	<i>Boundaries and limits</i>	<i>BNDLIM</i>	
	<i>Buoys, beacons, aids to navigation</i>	<i>ATON</i>	
	<i>Cautionary notes</i>	<i>CNTNTE</i>	
<i>Chart boundary shown</i>	<i>Chart boundary</i>	<i>CHTBND</i>	
<i>Selector for viewing group layer</i>	<i>Chart scale boundaries</i>	<i>CHTSCA</i>	
<i>To show contour labels</i>	<i>Contour label</i>	<i>CNTLBL</i>	
<i>Deep contour</i>	<i>Deep contour</i>	<i>DEEPCNT</i>	
<i>Selector for viewing group layer</i>	<i>Display base</i>	<i>DISPBASE</i>	

Explanation	Term	Abbreviation	Icon (hot key)
Use four shades	Four shades	4SHADES	
Selector for full light sector lines	Full light lines	FULLSEC	
Show date dependent object	Highlight date dependent	DATEDEP	
Show symbol for INFORM and NINFOM	Highlight info	INFHLT	
Show symbol for TXTDSC, NTXDS and PICREP	Highlight document	DOCHLT	DOC HLT
Selector for viewing group layer	Important text	IMPTXT	IMP TXT
	Other text	OTH TXT	OTH TXT
	Magnetic variation	MAGVAR	
	Miscellaneous	MISC	MISC
Show national language NOBJNM, text group 2	National language	NATLANG	


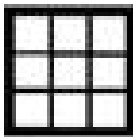


Explanation	Term	Abbreviation	Icon (hot key)
<i>Selection for point object style</i>	<i>Paper chart symbols</i>	<i>PAPERSYM</i>	
	<i>Simplified symbols</i>	<i>SIMPSYM</i>	
<i>Selection for line style</i>	<i>Plain boundaries</i>	<i>PLNBND</i>	
	<i>Symbolized boundaries</i>	<i>SYMBND</i>	
<i>Selector for viewing group layer</i>	<i>Prohibited and restricted areas</i>	<i>PRBAREA</i>	
	<i>Drying line</i>	<i>DRYLNE</i>	DRY LNE
<i>To select safety contour</i>	<i>Safety contour</i>	<i>SF CNT</i>	SAFE CNT
<i>Shallow contour</i>	<i>Shallow contour</i>	<i>SHAL CNT</i>	SHAL CNT
<i>Depths in safety area shown, soundings in safe area shown</i>	<i>Safe depths shown</i>	<i>SF DPTH SHOW</i>	DPTH SHWN
<i>To select safety depth</i>	<i>Safety depth</i>	<i>SF DPTH</i>	SAFE DPTH
<i>To turn SCAMIN off</i>	<i>Scale min</i>	<i>SCAMIN</i>	SCA MIN

Explanation	Term	Abbreviation	Icon (hot key)
<i>Selector for viewing group layer</i>	<i>Seabed</i>	<i>SEABED</i>	SEA BED
<i>To show shallow pattern</i>	<i>Shallow pattern</i>	<i>SHALPAT</i>	
<i>To show isolated dangers in shallow waters</i>	<i>Shallow water dangers</i>	<i>SHALDNG</i>	
<i>Selector for viewing group layer</i>	<i>Ships' routeing systems and ferry routes</i>	<i>ROUTEING</i>	
	<i>Spot soundings</i>	<i>SPOTSND</i>	18
	<i>Submarine cables and pipelines</i>	<i>SUBCAB</i>	
	<i>Tidal</i>	<i>TIDAL</i>	
	<i>Two shades</i>	<i>2SHADE</i>	
<i>Selector for displaying unknown objects</i>	<i>Unknown</i>	<i>UNKNOWN</i>	?
<i>To highlight objects which have undergone modification</i>	<i>Update review</i>	<i>UPD REV</i>	UPD REV

NOTE The icons in Table E.6 can be modified in a consistent manner to provide an indication of current state (i.e. on or off)

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Table E.7 – Control of chart functionality (based on MSC.1/Circ.1609)

Explanation	Term	Abbreviation	Icon (hot key)
To select a date or date range for displaying all chart objects active at that date and time	Dated objects	DATE OBJ	
To toggle latitude/longitude grid	Grid	GRID	
To perform manual update	Manual update	MAN UPD	
To toggle radar overlay	Radar overlay	RADAR OVR	
To select original compilation scale of the chart or To select 1:1 chart pixel to display pixel for RCDS mode	TBD	TBD	1:1


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Table E.8 – Database functions (based on MSC.1/Circ.1609)

Explanation	Term	Abbreviation	Icon (hot key)
To import ENC	Import Chart	IMPORT CHT	Not applicable
To review ENC updates	Update review	UPD REV	Not applicable
To view ENC update summary report	Update summary	UPD SUM	Not applicable
To view graphical index of ENC charts	Graphical index	GRAPH INDX	Not applicable
To view ENC update log	Update log	UPD LOG	Not applicable
To view ENC Update Status Report	ENC Update Status Report	ENC UPD STATUS	Not applicable
To view ENC Management Report	ENC Management Report	ENC MGMT REP	Not applicable
NOTE Some of these functions may also apply to RNC.			

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Table E.9 – Route plan and monitoring functions (based on MSC.1/Circ.1609)

Explanation	Term	Abbreviation	Icon (hot key)
To export route plan	Export Route	RTE EXPORT	

















Explanation	Term	Abbreviation	Icon (hot key)
To import route plan	Import Route	RTE IMPORT	
To set own-ship look ahead	Own ship look-ahead	LOOK AHEAD	Not applicable
To add WPT	Add waypoint	ADD WPT	
To edit WPT	Edit waypoint	EDIT WPT	
To delete WPT	Delete waypoint	DEL WPT	

Table E.10 – Groups of functions (based on MSC.1/Circ.1609)

Explanation	Term	Abbreviation	Icon (hot key)
To set collision avoidance limits and other target-related parameters (including CPA, TCPA, etc.)	Target settings	TGT SET	 TGT
To set radar controls (including tunings, anti-clutter, etc.)	Radar settings	RADAR SET	 RADAR
To set chart related limits and other chart-related parameters (including safety contour, safety depth, areas with special conditions, own ship check area, etc.)	Chart safety settings	CHART SET	 CHART
To set trial manoeuvre parameters	Trial Settings	TRIAL SET	 TRIAL
To add or remove information from the ECDIS display.	Chart display settings	CHART DISP SET	
To provide additional mariner's information.	User Chart	USR CHT	 USER

Explanation	Term	Abbreviation	Icon (hot key)
To access route plan functionality	Route plan	ROUTE PLAN	
To access route monitoring functionality	Route monitoring	ROUTE MON	
To access management chart database	Chart management	CHART MGMT	
To access alert setting management	Alert Setting	ALERT SET	
To access functionality related to MSI	Not specified in this standard	Not specified in this standard	
To access functionality of received messages, e.g. AIS safety-related messages	Not specified in this standard	Not specified in this standard	

3322

Annex F
(normative)

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Icons for presentation of the state of an alert

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Icons for presentation of the state of an alert are given in IEC 62923-1.

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Annex G (normative)

Testing for colours, intensity and flicker

G.1 Testing for colours and intensity

G.1.1 General

The IHO ECDIS Presentation Library contains colour differentiation test diagrams to enable test personnel to determine whether it is possible to discriminate features by colour.

The colours in the IHO ECDIS Presentation Library are defined using the CIE 1931 colour coordinate system (x , y and L) which specify chrominance and luminance. CIE 15 defines the following units for colour difference in terms of chrominance and luminance:

- ΔE^* as a measure of the overall discrimination including both chrominance and luminance differences;

$$\Delta E^* = \text{SQRT} [(L_2^* - L_1^*)^2 + (u_2^* - u_1^*)^2 + (v_2^* - v_1^*)^2]$$

- $\Delta(u^*, v^*)$ as a measure of the discrimination in chrominance alone.

$$\Delta(u^*, v^*) = \text{SQRT} [(u_2^* - u_1^*)^2 + (v_2^* - v_1^*)^2]$$

Tolerances for conversion from CIE 1931 colour coordinates to RGB values for display equipment are defined by three terms:

- ΔE^* between the colour coordinates resulting from the RGB values calculated for each colour and the other colours from the same colour table for each ambient light condition;
- $\Delta(u^*, v^*)$ between the defined colour coordinates and the coordinates resulting from the RGB values calculated for each colour in each colour table for each ambient light condition;
- luminance ratio ($L_{\text{measured}}/L_{\text{defined}}$) between the defined coordinates of the colours within the colour table for each ambient light condition and the coordinates resulting from the RGB values calculated for each colour.

ΔE^* should be a minimum of 10 except for colour pairs listed in IHO S-52 Table of Colour – Colour pairs that are exempt from the colour separation tolerance test, which, as defined, are very close in colour.

$\Delta(u^*, v^*)$ should be a maximum of 16 for display equipment tested as part of the navigational system or equipment (i.e. where the display screen and its source of video are tested together) or for system components between which the transfer of the video is based on a lossless method (for example DVI-D for digital transfer). $\Delta(u^*, v^*)$ should be a maximum of 8 for system components that are tested independently of each other (i.e. where the display screen equipment is not tested with the identical video source that it will be installed with aboard ship or where a computer is not tested with the identical display screen that it will be installed with aboard ship).

For each colour token within the colour table, the luminance should be within 20 % of the value specified in IHO S-52, Colour conversion tolerances and tests, for each colour table specified in the IHO S-52, for example; day, dusk and night. The colour black is an exception, which should be a maximum 0,52 cd/m² as defined in the IHO S-52, Colour conversion tolerances and tests for the day colour table.

Calculations of L^* , u^* , and v^* shall be made in reference to the chromaticity and luminance specified for the brightest white colour token in the respective colour table (Y_0 , u_0 , y_0); where

3373 Y0 is the luminance in cd/m^2 . It should be noted that this is not the brightest white of the
3374 monitor.

3375 **G.1.2 Test personnel**

3376 Personnel conducting tests related to the discrimination of colours should have passed the
3377 minimum colour vision and acuity tests required for users by IMO STCW Code Part B. They
3378 should also have adapted to night viewing for 10 min before conducting tests using the night
3379 display.

3380 **G.1.3 Method of test**

3381 The method of test is as follows:

3382 a) confirm by analytical evaluation the measurement process of the manufacturer and
3383 confirm by inspection of documented evidence provided by the manufacturer that for each
3384 colour table that the difference between the calculated RGB values for any two colours in
3385 the table are at least 10 ΔE^* units, except for those pairs defined to have a tabular ΔE^*
3386 less than 20; as defined in the IHO S-52, Colour conversion tolerances and tests and IHO
3387 S-52, Table of Colour – Colour pairs that are exempt from the colour separation tolerance
3388 test;

3389 b) confirm by analytical evaluation the measurement process of the manufacturer and
3390 confirm by inspection of documented evidence provided by the manufacturer that the
3391 results of the colour calibration conversion of each specified colour (x, y, L) for each
3392 colour table into RGB values for an individual monitor are within the tolerance as defined
3393 in the IHO S-52, Calculations to achieve correct colours;

3394 c) colour table calibration verification measurements shall be carried out in a dark-room.
3395 Manufacturers may choose between two different methods of colour calibration. The first
3396 method is for the test of a monitor and a video source intended to be installed together as
3397 an integrated system. The second method is for the test of a monitor independent of the
3398 video source/computer with which it will be installed or, similarly, a video source tested
3399 independently of a monitor.

3400 • For independent test of monitors, the manufacturer shall provide a reference computer.

3401 • For independent test of computers, the manufacturer shall provide a reference monitor.

3402 The test shall be performed as follows:

3403 1) for the Day colour table display a completely black image on the screen provided by
3404 the manufacturer. Confirm by measurement perpendicular to the centre of the screen
3405 that the luminance is as required (less than or equal to 0,52 cd/m^2 when the CHWHT
3406 is set to 80 cd/m^2 or more (Day colour table));

3407 2) for the Day colour table, select a screen provided by the manufacturer which has a box
3408 of CHWHT (brightest white) on a black background. The box size should be at least
3409 5 cm per side but not more than 25 % of the total screen area. Confirm by
3410 measurement perpendicular to the centre of the screen that the level of CHWHT is
3411 within the tolerances of $\Delta(u^*, v^*)$ for $\Delta(u^*, v^*) < 16$ for integrated units, $\Delta(u^*, v^*) < 8$ for
3412 independent test) and L (is within 20 % of its specified value);

3413 3) repeat the test for CHMGF (brightest magenta), CHYLW (brightest yellow) and BKAJ2
3414 (darkest grey) from the Day colour table;

3415 4) repeat the tests 2) and 3) for Dusk and Night colour tables and other colour tables
3416 provided, e.g. colour tables with black background for chart radar. Confirm by
3417 measurement that BKAJ1 (black background) luminance is 0,05 cd/m^2 in the night
3418 setting when the white level is dimmed down so that CHWHT is 1 cd/m^2 ;

3419 d) colour table calibration verification observations shall be carried out as follows. The user's
3420 manual brightness control and contrast control, if provided, shall be set to their calibration
3421 reference settings; while the display is off, adjust the ambient light level reflected from a
3422 white paper positioned on the display screen to the appropriate ambient values specified
3423 in Table 1. For each colour table provided, under the appropriate ambient light condition,

display the colour differentiation test diagram as defined in the IHO ECDIS presentation library. Confirm by observation that:

- 1) each foreground stripe is clearly distinguished from its background;
- 2) the foreground stripes representing yellow, orange, magenta, green, blue and grey may be clearly identified;

e) under each of the ambient light conditions defined above, display the black-adjust boxes available from ECDIS Chart 1 (see ECDIS chart 1 chart AA5C1ABO.) Select each table in turn and confirm by observation that the ECDIS colour token BKAJ2 (dark grey) is clearly distinguished against a black background (BKAJ1);

f) confirm by observation that the procedure for on-board use of the colour differentiation test diagrams is defined in the equipment manual;

g) confirm by observation that means are provided to return the display to the calibrated brightness and contrast settings for each ambient light condition defined above;

h) confirm by observation that each of the mandatory colour tables provided in the IHO ECDIS presentation library may be selected by the user.

G.2 Testing for flicker

G.2.1 Overview

This Clause reproduces the method originally developed in Annex B of ISO 13406-2:2001.

NOTE The actual perception of flicker is known to vary between individual observers and within an individual observer. Some of these variations are systematic. Flicker sensitivity decreases with age (between individuals) and with fatigue (for the individual). In addition, the conversion of display luminance to retinal illumination requires an assumption about the luminance that drives pupil response. In positive polarity displays, average display luminance and "adapting" luminance can be assumed to be the same. There is some evidence that this is not true for negative polarity displays. Due to cross-coupling of photo receptors in the eye, the correct value probably lies between the average and peak luminance. The average luminance is the worst case and is used in this method.

G.2.2 Analytic model

G.2.2.1 Principle

It can be predicted whether people will detect a homogeneously illuminated display appears to flicker or not by the amount of energy in the temporal frequencies of the display. The first step in the method therefore, is to find out the amount of energy in the temporal frequencies, $E_{\text{obs } n}$. These numbers are then compared to the amounts of energies that people will detect as flicker, the predicted flicker threshold, $E_{\text{pred } n}$. Flat panels exhibit more diverse luminance-time functions than progressively scanned cathode ray tubes, so significant energy may exist at several different frequencies. The index, n is carried from 1, at the fundamental repetition frequency of the display (generally, 0,5 times the refreshment rate is necessary on LCD panels), in integer steps until the frequency exceeds 120 Hz. The observed energies may be calculated or measured. The energy at various frequencies is learned by examining the Fourier transform of the luminance-time function.

If $E_{\text{obs}} < E_{\text{pred}}$ at every frequency then it is likely that people will not see flicker.

If $E_{\text{obs}} > E_{\text{pred}}$ at any frequency then it is likely that people will see flicker.

G.2.2.2 Fourier coefficients

The average luminance of a luminance-time function, $f(t)$ is:

$$c_0 = \frac{1}{T} \int_{-\frac{T}{2}}^{\frac{T}{2}} f(t) dt$$

3466

3467 where

3468 c_0 , the zero Fourier coefficient, is the dark-room luminance averaged over time;3469 T is the repetition period of the luminance-time function. For progressively scanned
3470 cathode ray tubes, the refreshment rate is $1/T$.3471 NOTE When measuring $f(t)$ and using a fast Fourier transform, FFT, it is sometimes not appropriate to use
3472 $\text{FFT}(v)_0$ for c_0 since this could lead to errors depending on the specific form of FFT used.3473 $\text{FFT}(v)_0$, is the 0 term of the fast Fourier transform of v .3474 v is the list of measured samples of $f(t)$. The number of items in the list shall be a
3475 power of 2 and an integer number of repetition times shall be sampled.3476 The average luminance, c_0 is calculated from dark-room measurements. $L_R = qE_S$. In this
3477 model, the “adapting” luminance, L_t used in converting cd/m^2 to trolands is $c_0 + L_R$.

3478 The general coefficients are:

$$c_n = \frac{1}{T} \int_{-\frac{T}{2}}^{\frac{T}{2}} f(t) e^{-\frac{2ni\pi t}{T}} dt$$

3479

3480 where

3481 c_n is the n th Fourier coefficient,3482 $i = \sqrt{-1}$ 3483 T is the repetition time of $f(t)$.3484 In the case where $f(t)$ is the sum of components, for example, red, green and blue, the
3485 coefficients can be obtained one at a time and added.

$$c_0 = \sum_{j=1}^m c_{0j} = L_t - L_r$$

$$c_n = \sum_{j=1}^m c_{nj}$$

$$\text{AMP}_n = \frac{2 \times |c_n|}{c_0}$$

3486

3487 If there are m components, then:

$$|c_n| = \sqrt{[\operatorname{Re}(c_n)]^2 + [\operatorname{Im}(c_n)]^2}$$

3488

3489 where AMP is a value between 0 and 2.

3490 The frequency associated with AMP_n , f_n is:

$$f_n = \frac{n}{T} \text{ for } n = 1, 2, \dots$$

3491

3492 while $f_n < 120$ Hz

$$\text{AMP}_n = \frac{2 \times |\text{FFT}(\nu)_n|}{\text{FFT}(\nu)_0}$$

3493

3494 When using the fast Fourier transform, the set of observations, ν_p for $p = 0 \dots 2^z - 1$ is
 3495 sampled at frequency, f_s and processed with FFT, where z is 6, 7 . . . The value AMP_n has a
 3496 corresponding frequency $n \times f_s/z$. The sampling frequency is $k \times 2^z/T$, where $k = 1, 2, \dots$. The
 3497 period of $f(t)$ shall be determined. Generally, $k = 1$ yields the best result.

3498 **G.2.2.3 Pupil**

3499 The pupil area shall be known to convert the luminance to trolands. The expression for pupil
 3500 area can be simplified:

$$A = b_0 L_t^{b_1}$$

3501

3502 where

3503 b_0 12,451 843504 b_1 -0,160 323505 L_t is the adaptation luminance = $L_{H\text{-dark}}(\Theta_D, \Phi_D) + q_H(\Theta_D, \Phi_D) E_s$.

3506

3507 **G.2.2.4 DC component**

3508 To calculate the amount of energy in the temporal frequencies of interest.

3509 a) Convert the screen luminance into units of retinal illuminance (trolands).

3510 b) Calculate the pupil area, A from the formula in G.2.2.3.

3511 c) The DC component is:

$$DC = A \times c_0$$

3512

3513 **G.2.3 Decision criteria**3514 **G.2.3.1 General case**

3515 This case applies to technologies with a luminance persistence of 1 ms or more (for example,
 3516 CRT, LCDs, etc.).

3517 Energy at each frequency is:

3518 $E_{\text{obs } n} = \text{DC} \times \text{AMP}_n$

3519 The criteria are that the energy at every frequency satisfies:

3520 $E_{\text{obs } n} \leq E_{\text{pred } n}$

3521 where

3522
$$E_{\text{pred } n} = ae \frac{nb}{T}$$

3523 where a and b are as given in Table G.1.

3524 **Table G.1 – Values of predicted energy and special coefficients**

Row	Screen diagonal arc degrees	Predicted energy coefficients		Special case coefficients	
		a	b	D	E
1	<20	0,127 6	0,191 9	36,44	13,83
2	20 to 40	0,191 9	0,120 1	39,81	16,40
3	40 to 65	0,507 6	0,100 4	37,93	19,62
4	>65	0,530	0,099 2	37,96	19,86

3525

3526 **G.2.3.2 Simpler special case**

3527 This case applies to technologies having luminance persistence that is much less than 1 ms
 3528 (for example EL, dc plasma, light-emitting diode (LED)). For such technologies, AMP = 2 for
 3529 refresh rates less than 100 Hz.

3530 Conditions:

3531 a) Reflected luminance of 5 cd/m² to 15 cd/m².

3532 b) Average dark-room luminance L_{dark} is from 10 cd/m² to 340 cd/m².

3533 Then, the display meets the requirement if the refresh rate is greater than

3534
$$D + E \log_{10}(L_{\text{dark}})$$

3535 where D and E are given in the two right-hand columns of Table G.1.

3536

Annex H (normative)

Single and simple operator actions

H.1 General

The requirements of this Annex H are from a recommendatory source (MSC.1/Circ.1609/Appendix 4) for ECDIS, radar and INS. The implementation of these recommendations is optional. Manufacturers shall declare if these requirements have been implemented.

H.2 Tables for single and simple operator actions

Table H.1 – Access to functions, as defined before June 2019 (based on MSC.1/Circ.1609)

<i>Function</i>	<i>Equipment</i>	<i>Access</i>
Select ECDIS Standard Display	ECDIS	Single operator action
Remove radar (image and tracked target), AIS and other navigational target information overlaid over the ENC chart	ECDIS	Single operator action
Select route monitoring display covering own ship's position	ECDIS	Single operator action
Select default ECDIS settings	ECDIS	Single operator action followed by an action to confirm the selection
Select AIS target information	Radar/ECDIS	Simple operator action
Remove chart data	Radar	Single operator action
Reset VRM origin to CCRP	Radar/ECDIS	Simple operator action
Reset EBL origin to CCRP	Radar/ECDIS	Simple operator action
Reset ERBL origin to CCRP	Radar	Simple operator action
Reset Parallel Index line to own ship's heading	Radar	Simple operator action
Remove user defined maps	Radar	Simple operator action
Select default radar settings	Radar	Single operator action followed by an action to confirm the selection
Select presentation mode (radar, chart and other navigation information)	Radar/ECDIS	Simple operator action
Remove AIS Area Notice	Radar/ECDIS	Single operator action
Remove additional information, (including information for route planning, route monitoring, information overlays and supplementary navigation tasks)	Radar/ECDIS	Simple operator action

Table H.2 – Access to functions (based on MSC.1/Circ.1609)

<i>Function</i>	<i>Equipment</i>	<i>Access</i>
Set panel illumination	Radar/ECDIS	Simple operator action
Set display brilliance / Toggle Day /Night mode	Radar/ECDIS	Simple operator action
Select ECDIS mode	INS/Radar/ECDIS	Simple operator action
Select Radar mode	INS/Radar/ECDIS	Simple operator action
Select Conning display mode	INS	Simple operator action

Function	Equipment	Access
Select CAM-HMI as defined in Bridge Alert Management (BAM) (for example as required by INS)	INS	Simple operator action
Select North Up display	Radar/ECDIS	Simple operator action
Select ship's Head Up display	Radar/ECDIS	Simple operator action
Select ship's Course Up display	Radar/ECDIS	Simple operator action
Select True Motion mode	Radar/ECDIS	Simple operator action
Select Relative Motion mode	Radar	Single operator action
Select Ship centred mode	Radar	Single operator action
Select Ship off centred mode	Radar/ECDIS	Simple operator action
Perform True Motion reset	Radar/ECDIS	Single operator action
Select range	Radar/ECDIS	Simple operator action
Perform Range up	Radar/ECDIS	Single operator action
Perform Range down	Radar/ECDIS	Single operator action
Temporarily suppress the "heading line"	Radar	Single operator action
Toggle Range Rings on and off	Radar/ECDIS	Simple operator action
Start Variable Range Marker adjustment	Radar/ECDIS	Simple operator action
Start Electronic Bearing Line adjustment	Radar/ECDIS	Simple operator action
Start Electronic Range and Bearing Line adjustment	Radar/ECDIS	Simple operator action
Perform Target Acquire	Radar	Simple operator action
Select tracked target	Radar/ECDIS	Simple operator action
Call up the information associated with an object by cursor pick on its symbol	ECDIS	Simple operator action
All AIS targets to Sleep Mode	Radar/ECDIS	Simple operator action
Acknowledge an Alert	Radar/ECDIS	Single operator action
Silence alerts	Radar/ECDIS	Single operator action

3550

3551

Table H.3 – Access to group of functions (based on MSC.1/Circ.1609)

Group of function	Equipment	Access
Record an event	ECDIS	Simple operator action
Set Trial Manoeuvre on	Radar	Simple operator action
Select True Vector	Radar	Single operator action
Select Relative Vector	Radar	Single operator action
Select True Trail	Radar	Simple operator action
Select Relative Trail	Radar	Simple operator action
Select CATZOC	INS/ECDIS	Single operator action
View ECDIS software version	ECDIS	Simple operator action
View ENC information	ECDIS	Simple operator action

3552

Annex I (normative)

Default settings

I.1 General

The requirements of this Annex I are from a recommendatory source (MSC.1/Circ.1609/Appendix 5) for ECDIS, radar and INS. The implementation of these recommendations is optional. Manufacturers shall declare if these requirements have been implemented.

I.2 ECDIS default settings

(MSC.1/Circ.1609/Appendix 5/4) The Table I.1 lists the default settings for ECDIS.

Table I.1 – ECDIS settings configured in response to "Default" selection (based on MSC.1/Circ.1609)

<i>Function</i>	<i>Setting</i>
<i>Display category</i>	<i>ECDIS Standard display</i>
<i>Selected sea area</i>	<i>Around own ship with appropriate off-set</i>
<i>Range / Scale</i>	<i>3 NM</i>
<i>Orientation</i>	<i>True motion, north-up</i>
<i>Geodetic datum, if selectable</i>	<i>WGS84</i>
<i>Manual updates</i>	<i>If applied, i.e. displayed if available</i>
<i>Mariner's notes</i>	<i>If applied, i.e. displayed if available</i>
<i>Selected route</i>	<i>Last selected route, including route parameters</i>
<i>Past track</i>	<i>On</i>
<i>Past track length, if selectable</i>	<i>Remain unchanged</i>
<i>Past track time-labels</i>	<i>Off, 30 min</i>
<i>Look-ahead time</i>	<i>6 min</i>
<i>Menu or Edit windows that overlap chart or route monitor data</i>	<i>Minimized or stacked to provide focus on chart and own ship location</i>
<i>Position data source</i>	<i>GNSS, sensor to remain unchanged if previously in use</i>
<i>Safety contour</i>	<i>Remain unchanged</i>
<i>Planned Safety depth</i>	<i>Remain unchanged</i>
<i>Planned Cross track limit</i>	<i>Remain unchanged</i>
<i>Graphical indication of crossing safety contour during route planning, if selection provided</i>	<i>On</i>
<i>Graphical indication of prohibited areas, areas with special conditions and navigational hazards during route planning, if selection provided</i>	<i>On</i>
<i>User-specified distance to prohibited areas, areas with special conditions and navigational hazards, when planning</i>	<i>Remain unchanged</i>
<i>Graphical indication of crossing safety contour during route monitoring, if selection provided</i>	<i>On</i>

Function	Setting
<i>Graphical indication of prohibited areas and areas with special conditions during route monitoring, if selection provided</i>	<i>On</i>
<i>Graphical indication of navigational hazards during route monitoring, if selection provided</i>	<i>On</i>
<i>Object highlight, selected object, track display from log</i>	<i>Cleared from display</i>
<i>Cursor pick</i>	<i>Closed</i>
<i>Any additional window (dual view, 3d, tides, etc.)</i>	<i>Closed</i>
<i>Any additional information layer, proprietary layer (weather, tides, Additional Military Layer (AML), etc.)</i>	<i>Cleared from display</i>
<i>Chart update, Chart information exchange</i>	<i>Aborted</i>
<i>Colour differentiation test diagrams</i>	<i>Closed</i>
<i>Update review</i>	<i>Off</i>
<i>Chart 1</i>	<i>Closed</i>
<i>Units</i>	<i>m, NM, kn</i>
<i>Crossing a navigational hazard in route monitoring mode</i>	<i>Alert priority set as caution</i>
<i>Vector time (length)</i>	<i>6 min</i>
<i>Vector mode</i>	<i>True</i>
<i>Vector stabilization</i>	<i>Ground</i>
<i>Collision warnings, if provided</i>	<i>On (limits, CPA = 2 NM; TCPA = 12 min)</i>
<i>Radar and AIS target association, if provided</i>	<i>On</i>
<i>Radar and AIS target association priority</i>	<i>AIS</i>
<i>AIS target filtering, if provided</i>	<i>Target range = 6 NM</i> <i>Target CPA = 4 NM</i> <i>Target TCPA = 24 min</i> <i>Target display = On</i> <i>Sleeping target display = Off</i> <i>Class A display = On</i> <i>Class B display = On</i> <i>AtoN display = On</i> <i>SART display = On</i> <i>Repeated target display = Off</i>
<i>AIS data reports display, if provided</i>	<i>On</i>
<i>AIS locating devices display, if provided</i>	<i>On</i>
<i>AIS ASM display, if provided</i>	<i>Off</i>
<i>AIS true target outline</i>	<i>Off</i>
<i>AIS AtoN dimension outline</i>	<i>Off</i>
<i>Display of Radar image overlay, if provided</i>	<i>Off</i>
<i>Display of Radar tracked targets, if provided</i>	<i>On</i>
<i>Display of AIS reported targets, if provided</i>	<i>On</i>
<i>Target past positions, if provided</i>	<i>Off</i>

Function	Setting
<i>Target trails, if provided</i>	<i>Off</i>
<i>Lost target warning, if provided</i>	<i>Off</i>
<i>AIS interrogation, if provided</i>	<i>Off</i>
<i>Own ship true outline</i>	<i>On, unless the resultant outline would be smaller than 6 mm on the screen</i>
<i>LOP source indication</i>	<i>Off</i>
<i>User selected time for warning escalation</i>	<i>60 s</i>
<i>Suppression of indication of user selected MSI messages based on first character of NAVTEX code field, if provided</i>	<i>Remain unchanged</i>
<i>Suppression of indication of user selected messages based on time and distance from own ship, monitored route or planned route</i>	<i>No</i>
<i>Brightness and contrast controls, if software controlled</i>	<i>Calibrated setting</i>

3566

3567 **I.3 Radar default settings**

3568 (MSC.1/Circ.1609/Appendix 5/5) The table I.2 lists the default settings for Radar.

3569 **Table I.2 – Radar control settings configured in response to "Default" selection (based**
3570 **on MSC.1/Circ.1609)**

Function	Setting
<i>Band ^a</i>	<i>X-band, if selectable, otherwise remain as selected</i>
<i>Gain and anti-clutter functions (Sea, Rain)</i>	<i>Radar gain automatically optimized, where provided. Anti-sea and anti-rain clutter manual controls set "as is" or set to "zero" if such functionality exists</i>
<i>Tuning</i>	<i>Automatically optimized where provided, otherwise remain as is</i>
<i>Range</i>	<i>6 NM</i>
<i>Fixed range rings</i>	<i>Off</i>
<i>VRMs</i>	<i>On</i>
<i>EBLs</i>	<i>On</i>
<i>Parallel index lines</i>	<i>Remain unchanged</i>
<i>Orientation Mode</i>	<i>North Up</i>
<i>Presentation Mode</i>	<i>True Motion</i>
<i>Vector mode</i>	<i>Relative</i>
<i>Vector time</i>	<i>6 min</i>
<i>Stabilization Sea/Ground</i>	<i>Sea</i>
<i>Off-Centre</i>	<i>Off-Centre, with appropriate look ahead</i>
<i>Target trails</i>	<i>On</i>
<i>Past positions</i>	<i>Off</i>
<i>Radar target tracking</i>	<i>Continued</i>
<i>Automatic radar target acquisition</i>	<i>Off</i>
<i>Graphical AIS reported target display</i>	<i>On</i>
<i>Graphical AIS data report display</i>	<i>On</i>
<i>Graphical AIS locating device display</i>	<i>On</i>

Function	Setting
Graphical AIS ASM display	Off
<i>Radar and AIS Target fusion</i>	<i>Association on, priority AIS</i>
<i>Operational alerts (except collision warnings)</i>	<i>On</i>
<i>Collision warnings</i>	<i>On (limits CPA 2 nm; TCPA 12 min)</i>
<i>Display of maps, navigation lines and routes</i>	<i>Last setting</i>
<i>Display of charts</i>	<i>Off</i>
^a Radar band default setting deviates from MSC.1/Circ.1609 due to alignment with IMO MSC 252(83)	

Annex J (normative)

Implementation details of AIS ASM


J.1 General

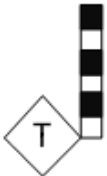

This annex describes details of implementation of AIS ASM.

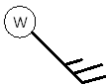

J.2 AIS ASM


Table J.1 specifies display layers and display sub-layers of AIS ASM and additionally specifies the symbols to be used from Annex A.





Table J.1 – Details of AIS ASM

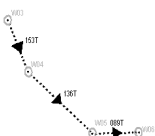

Display layer	Display sub-layer	Symbol See requirements in Annex A	AIS ASM parameters to be available from cursor pick of the symbol	Source FI
Hydrological Data	Tidal window	5.6 	Combined from Source FI 32	
			Time Stamp	32
			Position #1 Latitude	32
			Position #1 Longitude	32
			From UTC Hour	32
			From UTC Minute	32
			To UTC Hour	32
			To UTC Minute	32
			Current Direction predicted #1	32
			Current Speed predicted #1	32
			Position #2 Latitude	32
			Position #2 Longitude	32
			From UTC Hour	32
			From UTC Minute	32
			Current Direction predicted #2	32
			Current Speed predicted #2	32
			Position #3 Latitude	32
			Position #3 Longitude	32
			From UTC Hour	32
			From UTC Minute	32
			To UTC Hour	32
			To UTC Minute	32
			Current Direction predicted #3	32

Display layer	Display sub-layer	Symbol See requirements in Annex A	AIS ASM parameters to be available from cursor pick of the symbol	Source FI
			Current Speed predicted #3	32
Hydrological Data	Water level	5.6 	Combined from Source FI 26 (Site Location) 26 (Station ID report) 26 (Water level report) 31	
			Site ID (from header)	26
			Time stamp (from header)	26, 31
			Data timeout (from site location)	26
			Latitude (from site location)	26, 31
			Longitude (from site location)	26, 31
			Position Accuracy	31
			Name (Station ID report)	26
			Water Level Type	26
			Sensor Data Description	26
			Water Level / Water level (incl, tide)	26, 31
			Water Level Trend	26, 31
			Vertical Reference Datum	26
			Forecast Water Level Type	26
			Forecast Water Level	26
			Valid Time of Forecast	26
			Duration (forecast)	26
Hydrological Data	Current	5.13 	Combined from Source FI 26 (Site Location) 26 (Station ID report) 26 (Current flow report 2-D) 26 (Current flow report 3-D) 26 (Horizontal current flow report) 31	
			Site ID (from header)	26
			Time stamp (from header)	26, 31
			Data timeout (from site location)	26
			Latitude (from site location)	26, 31
			Longitude (from site location)	26, 31
			Position Accuracy	31
			Name (Station ID report)	26
			Sensor Data Description	26
			Current Measuring level #1	26
			Current Speed #1	26
			Current Direction #1	26
			Current Vector Component Up #1	26

Display layer	Display sub-layer	Symbol See requirements in Annex A	AIS ASM parameters to be available from cursor pick of the symbol	Source FI
			Surface Current Speed (incl. tide)	31
			Surface Current Direction	31
			Current Measuring level #2	26, 31
			Current Speed #2	26, 31
			Current Direction #2	26, 31
			Current Vector Component Up #2	26
			Current Measuring level #3	26, 31
			Current Speed #3	26, 31
			Current Direction #3	26, 31
<p>The “Horizontal current flow report” may include two separate locations of current values. Both locations shall be presented by symbol 5.13 for which the location shall be based on calculation using parameters “Current Reading 1 Bearing/Current Reading 1 Distance” or “Current Reading 2 Bearing/Current Reading 2 Distance” applied on “Latitude/longitude”. The alphanumeric presentation shall also present the calculated location of the symbol 5.13 instead of values used for calculation.</p> <p>The “Current flow report 3-D” may include two separate 3-D current values. The alphanumeric presentation shall be in form of “Current speed/Current direction” calculated from the parameters “Current Vector Component North/Current Vector Component East”.</p>				
Meteorological Data	Wind	<div>5.5</div> <div>Dover</div> <div></div>	Combined from Source FI	
			26 (Site Location)	
			26 (Station ID report)	
			26 (Wind report)	
			31	
			Site ID (from header)	26
			Time stamp (from header)	26, 31
			Data timeout (from site location)	26
			Latitude (from site location)	26, 31
			Longitude (from site location)	26, 31
			Altitude (from site location)	26
			Position Accuracy	31
			Name (Station ID report)	26
			Average Wind Speed	26, 31
			Wind Direction	26, 31
			Wind Gust	26, 31
			Wind Direction	26, 31
			Sensor Data Description	26
			Forecast Wind Speed	26
			Forecast Wind Direction	26
Forecast Wind Gust	26			
Forecast Wind Direction	26			
Valid Time of Forecast	26			
Duration (forecast)	26			
Environmental Data	Sea state	<div>5.13</div> <div></div>	Combined from Source FI	
			26 (Site Location)	
			26 (Station ID report)	
			26 (Sea state report)	

Display layer	Display sub-layer	Symbol See requirements in Annex A	AIS ASM parameters to be available from cursor pick of the symbol	Source FI
			31	
			Site ID (from header)	26
			Time stamp (from header)	26, 31
			Data timeout (from site location)	26
			Latitude (from site location)	26, 31
			Longitude (from site location)	26, 31
			Position Accuracy	31
			Name (Station ID report)	26
			Sea state	26, 31
			Water Temperature	26, 31
			Water Temperature Depth	26
			Sensor Data Description (water temperature)	26
			Significant Wave Height	26, 31
			Wave Period	26, 31
			Wave Direction	26, 31
			Sensor Data Description (wave)	26
			Swell Height	26, 31
			Swell Period	26, 31
			Swell Direction	26, 31
			Sensor Data Description (swell)	26
			Ice	31
			Salinity	26, 31
Meteorological Data	Weather	5.5 Dover 	Combined from Source FI 26 (Site Location) 26 (Station ID report) 26 (Weather report) 31	
			Site ID (from header)	26
			Time stamp (from header)	26, 31
			Data timeout (from site location)	26
			Latitude (from site location)	26, 31
			Longitude (from site location)	26, 31
			Name (Station ID report)	26
			Position Accuracy	31
			Air Temperature	26
			Sensor Data Description (air temperature)	26
			Relative Humidity	31
			Precipitation	26, 31
			Horizontal Visibility	26, 31
			Dew Point	26, 31
			Sensor Data Description (dew point)	26

Display layer	Display sub-layer	Symbol See requirements in Annex A	AIS ASM parameters to be available from cursor pick of the symbol	Source FI
			Air Pressure	26, 31
			Air Pressure Trend/Tendency	26, 31
			Sensor Data Description (air pressure)	26
			Salinity	26, 31
Navigational Services	Air Gap	5.12 	Combined from Source FI 26 (Site Location) 26 (Station ID report) 26 (Air gap/Air draft)	
			Site ID (from header)	26
			Time stamp (from header)	26
			Data timeout (from site location)	26
			Latitude (from site location)	26
			Longitude (from site location)	26
			Name (Station ID report)	26
			Air Gap	26
			Air Gap Trend	26
			Forecast Air Gap	26
			Valid Time of the Forecast UTC Day UTC Hour UTC Minute	26
Navigational Services	Area Notice may be sub-divided into: Caution Restricted Anchorage Distress Chart feature (see Notice description)	5.11  Default 5.14  when "Notice description = 18"	Combined from Source FI 22 23 29 30	
			Notice Description	22, 23
			Start date and time of Area	22, 23
			Duration	22, 23
			Text description – broadcast	29
			Text description – addressed	30
Navigational Services	Berthing Data	5.9 	Combined from Source FI 18 20 29 30	

Display layer	Display sub-layer	Symbol See requirements in Annex A	AIS ASM parameters to be available from cursor pick of the symbol	Source FI
			Destination	18
			Latitude	18
			Longitude	18
			Centre position of Berth, Latitude	20
			Centre position of Berth, Longitude	20
			Clearance date/time to enter port	18
			Berthing date and time	20
			Name of port and berth	18
			Name of Berth	20
			Berth Length	20
			Water Depth at Berth	20
			Mooring Position	20
			Services availability	20
			Type of Services Available	20
			Text description – broadcast	29
			Text description – addressed	30
Navigational Services	Routing	5.8 	Combined from Source FI 27 28 29 30	
			Route Type	27, 28
			Sender Classification	27, 28
			Start Date and Time	27, 28
			Duration	27, 28
			Number of Waypoints	27, 28
			Waypoints WP #n, Latitude WP #n, Longitude	27, 28
			Text description – broadcast	29
			Text description – addressed	30
Navigational Services	Signal Station	5.7 	Combined from Source FI 19 29 30	
			Name of Signal Station	19
			Position of Station, Latitude	19
			Position of Station, Longitude	19
			Signal in Service	19
			Status of Signal	19
			Time of next signal shift	19
			Expected Next Signal	19

Display layer	Display sub-layer	Symbol See requirements in Annex A	AIS ASM parameters to be available from cursor pick of the symbol	Source FI
			Text description – broadcast	29
			Text description – addressed	30
See 4.3.2 for consistent time presentation				

Annex K (informative)

Overview of AIS Messages

This Annex provides an overview of AIS Messages.

Table K.1 – AIS Messages

ITU-R M.1371 AIS standard Messages ID	AIS Message descriptions	Use in this standard
1,2,3	Position Report - 1 = autonomous(A), 2 = assigned(C), 3 = interrogated/pollled(I) - every 2, 3½, 6, or 10 sec; 3 min. <3kts or anchored	AIS target AIS data report
4	Base Station Report - every 10 sec.	AIS data report
5	Class A Report - static & voyage related data - every 6 min.	AIS target
6,8	Binary message - addressed (6) or broadcast (8)	AIS ASM AIS synthetic position
7	Binary message - acknowledgment to a Message 6	Not applicable in this standard
9	SAR aircraft position report - every 10 sec.	AIS data report
10,11	Universal Time Coordinated / Date - 10 = enquiry, 11 = response	Not applicable in this standard
12,14	Safety-related Texting - addressed (12) or broadcast (14)	AIS safety-related message
13	Safety-related text message - acknowledgment to Message 12	Not applicable in this standard
15	Interrogation - poll for specific messages	Not applicable in this standard
16	Assignment Mode Command	Not applicable in this standard
17	dGNSS Correction Binary message	Not applicable in this standard
18	Class B Position Report - 3 min <2kts - Class B"CS" every 30 sec./ Class B"SO" every 5, 15, 30 sec.	AIS target
19	Class B Extended Report (when polled by a base station)	AIS target
20	Data Link Management - reserve slots	Not applicable in this standard
21	ATON Report - position & status - every 3 min.	AIS data report
22	Channel Management	Not applicable in this standard
23	Group Assignment Command	Not applicable in this standard
24A/B	Static Data Report - every 6 min. (w/in 30 sec upon a poll)	AIS target
25	Single-Slot Binary message	AIS ASM AIS synthetic position

ITU-R M.1371 AIS standard Messages ID	AIS Message descriptions	Use in this standard
26	Multi-Slot Binary message w/Communication State	AIS ASM AIS synthetic position
27	Long-range automatic identification system broadcast message	Not applicable in this standard

3589

3590

Table K.2 – AIS ASM Messages

ITU-R M.1371 Message 8 Application Specific Message, FI	Description	Comment	Use in this standard
11	Met/Hydrological	SN/Circ.236 Trial message; not to be used after 1 Jan 2013	Not applicable
13	Fairway closed	SN/Circ.236 Trial message; not to be used after 1 Jan 2013	Not applicable
14	Tidal window	SN/Circ.236 Trial message; not to be used after 1 Jan 2013	Not applicable
15	Extended ship static and voyage-related data	SN/Circ.236 Trial message 6; not to be used after 1 Jan 2013	Not applicable
16	Number of persons on board	SN/Circ.236 Trial message 6; corrected	AIS target
17	VTS-generated/synthetic targets	SN/Circ.236 Trial message 7; SN.1/Circ.289 Renamed to "VTS-generated/Synthetic targets"	AIS synthetic positions
18	Clearance time to enter port	SN.1/Circ.289	AIS ASM
19	Marine traffic signal	SN.1/Circ.289	AIS ASM
20	Berthing data	SN.1/Circ.289	AIS ASM (from shore to ship)
21	Weather observation report from ship	SN.1/Circ.289	AIS ASM
22	Area notice – broadcast	SN.1/Circ.289	AIS ASM AIS synthetic positions
23	Area notice – addressed	SN.1/Circ.289	AIS ASM AIS synthetic positions
24	Extended ship static and voyage-related data	SN.1/Circ.289	AIS target
25	Dangerous cargo indication	SN.1/Circ.289	Not applicable
26	Environmental	SN.1/Circ.289	AIS ASM
27	Route information – broadcast	SN.1/Circ.289	AIS ASM
28	Route information – addressed	SN.1/Circ.289	AIS ASM
29	Text description – broadcast	SN.1/Circ.289	AIS ASM
30	Text description – addressed	SN.1/Circ.289	AIS ASM

ITU-R M.1371 Message 8 Application Specific Message, FI	Description	Comment	Use in this standard
31	Meteorological and Hydrographic data	SN.1/Circ.289	AIS ASM
32	Tidal window	SN.1/Circ.289	AIS ASM
33-63	Reserved for Future Use	SN.1/Circ.289	

Annex L (informative)

Overview of the use AIS AtoN status field bits

NOTE Refer to IALA A-126 for possible later versions of Table L.1.

Table L.1 provides an overview of AIS AtoN status field bits.

Table L.1 – AIS AtoN Status field

Bit Order		RACON / Light	Bit Order		Mobile AtoN & Method and Direction of Movement		Regional AtoN
8 th 7 th & 6 th	Bits	Page ID = 111	8 th 7 th & 6 th	Bits	Page ID = 011		Page ID = 001
5 th & 4 th	00	No RACON installed	5 th , 4 th , 3 rd & 2 nd	0000	Direction Not Reported	No Further Information Default	Reserved for regional use ^a
	01	RACON installed but not monitored		0001		Free-floating ABCD values denote an area (e.g. oil spill)	
	10	RACON operational		0010		Free-floating ABCD values denote an object (e.g. craft, gear, flotsam, etc.)	
	11	RACON Error		0011		Moves as defined (Synthetic) ABCD values denote an object (e.g. craft, gear, flotsam, etc.)	
3 rd & 2 nd	00	No light or no monitoring		0100		Moves as defined (Synthetic) ABCD values denote an area (e.g. dredging zone)	
	01	Light ON		0101	Tethered from a watercraft (e.g. cable, pipe, net)		
	10	Light OFF		0110	Reserved for future use		
	11	Light fail or at reduced range		0111	Self-propelled, but direction not reported or unavailable		
1 st	0	Good Health		1000	Direction of movement (COG)	000° ± 22.5°	
				1001		045° ± 22.5°	
				1010		090° ± 22.5°	
				1011		000° ± 22.5°	
			1100	135° ± 22.5°			
			1101	180° ± 22.5°			
			1110	225° ± 22.5°			
			1111	270° ± 22.5°			
	1	Alarm	1 st	0		Monitored	
				1		Unmonitored	

^a E.g. VTT-EG AIS AtoN for Inland Use standard

NOTE 8th bit is most significant and 1st bit is least significant

^a E.g. VTT-EG AIS AtoN for Inland Use standard

NOTE 8th bit is most significant and 1st bit is least significant

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