

INTERNATIONAL STANDARD



**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**



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**Maritime navigation and radiocommunication equipment and systems –
Electronic chart display and information system (ECDIS) – Operational and
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CONTENTS

FOREWORD.....	12
1 Scope.....	14
2 Normative references	14
3 Terms, definitions and abbreviations	16
3.1 Terms and definitions.....	16
3.2 Abbreviations.....	22
4 Minimum operational and performance requirements	23
4.1 General.....	23
4.2 ECDIS definitions.....	24
4.3 Display of SENC information.....	24
4.3.1 SENC	24
4.3.2 ~~Warning~~ Indication about use of non-HO source	24
4.3.3 Categories of display	24
4.3.4 Safety contour	26
4.3.5 Safety depth	26
4.3.6 Information content.....	26
4.3.7 Verification and updates	26
4.3.8 Information about chart objects.....	26
4.3.9 Display scale	26
4.4 Provision and updating of chart information	26
4.4.1 Contents of the SENC.....	26
4.4.2 Updates	27
4.5 Scale	28
4.6 Display of other navigational information.....	28
4.6.1 ~~Common reference system~~ General for all overlays	28
4.6.2 Radar ~~and plotting~~ information	28
4.6.3 AIS information	31
4.6.4 AIS target data	34
4.6.5 AIS voyage-related data	34
4.6.6 AIS CPA/TCPA alarms.....	35
4.6.7 AIS lost target warning.....	35
4.6.8 Anchor watch.....	36
4.7 Display mode and generation of the neighbouring area.....	36
4.8 Colours and symbols	37
4.9 Display requirements	37
4.9.1 Route planning and monitoring	37
4.9.2 Chart presentation size.....	37
4.9.3 Colour and resolution.....	37
4.9.4 Presentation	38
4.9.5 Removal of information categories.....	38
4.10 Route planning, monitoring and voyage recording.....	38
4.10.1 General	38
4.10.2 Route planning	38
4.10.3 Route monitoring	40
4.10.4 Position integration.....	42
4.10.5 Object information	42

4.10.6	LOP position fix	42
4.10.7	Voyage recording.....	43
4.11	Calculations and accuracy	43
4.12	Connections with other equipment (interfaces).....	44
4.12.1	Connection with navigation equipment	44
4.12.2	Connection with BAM.....	44
4.12.3	Connection with VDR.....	45
4.12.4	Connection with BNWAS.....	46
4.12.5	Connection for SENC information	46
4.12.6	Connection with NAVTEX or SafetyNET for MSI	46
4.12.7	Connection for transfer of route information	47
4.12.8	Connection with INS	47
4.13	Performance tests, malfunction ~~alarms~~ alerts and indications	47
4.14	Back-up arrangements	48
4.15	Power supply	48
4.16	Software maintenance	48
4.17	Quality management requirements	48
4.18	Default control setting and saved user control settings.....	49
5	Requirements contained in IHO ~~special~~ publications.....	52
5.1	~~Content and structure of chart data~~	
5.1	Priority of chart display	52
5.2	Display of chart information	52
5.2.1	Scale and navigation purpose	52
5.2.2	~~Text~~	
5.2.2	Units and legend.....	53
5.2.3	~~Terminology~~	54
5.3	Display functions	54
5.3.1	~~Object information~~ Cursor pick	54
5.3.2	Navigational information	55
5.3.2	~~Safety contour~~	
5.3.3	~~Navigational calculations~~	
5.3.3	Date-dependant ENC objects.....	55
5.4	Supplementary display functions.....	56
5.4.1	Additional mariner's information.....	56
5.4.2	Additional non-HO information	56
5.4.3	Tidal adjustment	57
5.5	Use of the presentation library	57
5.5.1	Presentation library.....	57
5.5.2	Test diagrams.....	58
5.6	Display characteristics	58
5.6.1	~~Display base~~	
5.6.2	~~Navigators notes~~	
5.7	Performance requirements	58
5.7.1	Redraw	58
5.7.2	Resolution	59
5.7.3	Symbols.....	59
5.7.4	Number of colours	59
5.7.5	Brightness and contrast	59
5.8	Ergonomic requirements	60

5.8.1	Mode and orientation	60
5.8.2	Windows	60
~~5.8.3~~	~~Mariner's information panel~~	~~60~~
5.9	Update of chart information	60
5.9.1	General	60
5.9.2	Manual update	62
5.9.3	Semi-automatic update	63
5.9.4	Reception of updates	63
5.9.5	Sequence check	63
5.9.6	Consistency check	63
5.9.7	Geographic applicability	64
5.9.8	Summary report	64
5.9.9	Review of ENC updates	64
5.9.10	Modification of updates	64
5.10	Operational area	64
5.11	External removable media	65
6	Methods of testing and required test results	65
6.1	EUT installation, technical documentation, and test requirements	65
6.2	Interfaces	65
6.2.1	General	65
6.2.2	BAM interface	66
6.2.3	VDR interface	67
6.2.4	BNWAS interface	68
6.3	General requirements and presentation requirements	68
6.3.1	General requirements	68
6.3.2	Presentation requirements	68
6.4	Preparation	69
6.4.1	Power-up	69
6.4.2	Initial ship parameters	69
6.4.3	Required test items	69
6.5	~~Initial data tests~~ Requirements related to ENC chart	70
6.5.1	General	70
6.5.2	Presentation library	71
6.5.3	ENC	71
6.5.4	Encrypted ENC	71
6.6	Accuracy	72
6.7	Visual requirements	72
6.7.1	Symbols	72
6.7.2	Terminology, units and legend	73
6.7.3	Colour table	73
6.7.4	Resolution	74
6.7.5	Display characteristics	74
6.8	Functional requirements	74
6.8.1	Methods of testing	74
6.8.2	Standard display	75
6.8.3	Display base	75
6.8.4	All other information	75
6.8.5	Viewing group layers and text group layers	75
6.8.6	Display priorities	76

6.8.7	Additional display functions.....	76
6.8.8	Scale and navigation purpose	77
6.8.9	Mode and orientation	77
6.8.10	Safety contour	78
6.8.11	Safety depth	78
6.8.12	~~Object information~~ Cursor pick	80
6.8.13	Navigation related functions.....	81
6.8.14	Position integration	81
6.8.15	Radar and ~~plotting other navigational~~ information	81
6.8.16	Loading of corrupted data	84
6.8.17	Automatic updates	84
6.8.18	Manual updates	86
6.8.19	Self-tests of major functions.....	86
6.8.20	Operational area	87
6.8.21	External removable media	88
6.9	Operational requirements.....	88
6.9.1	Ergonomic principles	88
6.9.2	Route planning	88
6.9.3	Route monitoring	90
6.9.4	Twelve-hour log	91
6.9.5	Voyage record	92
6.9.6	Power supply	92
6.9.7	LOP position fix	92
6.10	Software maintenance	93
6.11	Quality management	93
6.12	Default control setting and saved operator control settings	93
6.13	AIS information and AIS target data	94
6.13.1	General	94
6.13.2	AIS targets and data report capacity	94
6.13.3	AIS target filtering	94
6.13.4	Activation and deactivation of AIS targets	95
6.13.5	AIS functionality and presentation.....	95
6.13.6	AIS target data	96
6.13.7	AIS CPA/TCPA alarm	97
6.13.8	AIS lost target warning.....	97
6.14	AIS Voyage-related data	98
6.15	Anchor watch	98
6.16	NAVTEX and SafetyNET for MSI.....	98
6.17	Interface for transfer of route information	99
6.18	Interface with INS	100
Annex A (normative)	SENC information to be displayed during route planning and route monitoring.....	101
Annex B (normative)	Navigational elements and parameters.....	102
Annex C (normative)	Areas for which special conditions exist	103
Annex D (normative)	~~Alarms and indicators~~ Alerts and indications	104
Annex E (normative)	~~ENC test data set~~ Mandatory terminology and abbreviations	109
Annex F (normative)	Back-up arrangements	115
F.1	~~Introduction~~ Overview	115

F.2	Purpose	115
F.3	Functional requirements.....	115
F.3.1	Required functions and their availability.....	115
F.3.2	Reliability and accuracy	119
F.3.3	Malfunctions, warnings, ~~alarms~~ alerts and indications	119
F.4	Operational requirements.....	119
F.4.1	Ergonomics.....	119
F.4.2	Presentation of information	119
F.5	Power supply	120
F.6	~~Connections with other equipment~~ Other requirement	120
F.6.1	~~Back-up~~ Connection with other systems	120
F.6.2	Route transfer interface	121
F.6.3	Radar as back-up system	121
F.6.4	Operational area	121
F.6.5	Software maintenance	122
F.6.6	Quality management	122
F.6.7	Default Control Settings and Saved User Control Settings	122
F.6.8	External removable media	122
F.7	Methods of testing and required test results.....	122
F.7.1	EUT installation and technical documentation	122
F.7.2	Interfaces	122
F.7.3	General requirements and presentation requirements	122
F.7.4	Preparation.....	122
F.7.5	Initial data tests – Chart.....	123
F.7.6	Accuracy.....	123
F.7.7	Visual requirements	124
F.7.8	Functional requirements	124
F.7.9	Operational requirements.....	126
Annex G	(normative) ECDIS in the RCDS mode of operation	130
G.1	~~Introduction~~ Overview	130
G.2	RCDS definitions	130
G.3	Display of SRNC information.....	131
G.3.1	SRNC	131
G.3.2	Categories of display	131
G.3.3	Power failure	131
G.3.4	Information content	131
G.3.5	Verification and updates	131
G.3.6	Indication.....	132
G.4	Provision and updating of chart information	132
G.4.1	Contents of the RNC.....	132
G.4.2	Updates	132
G.5	Scale	133
G.6	Display of other navigational information.....	133
G.6.1	~~Common reference system~~ General for all overlays	133
G.6.2	Radar ~~and plotting~~ information	133
G.6.3	AS information	134
G.6.4	AIS Target Data	134
G.6.5	AIS Voyage Related Data	134
G.6.6	AIS CPA/TCPA alarms.....	134

G.6.7	AIS lost target warning.....	134
G.6.8	Anchor watch.....	134
G.7	Display mode and generation of the neighbouring area.....	134
G.8	Colours and symbols.....	135
G.9	Display requirements.....	135
G.9.1	Route planning and monitoring.....	135
G.9.2	Display characteristics.....	135
G.9.3	Chart notes.....	136
G.10	Route planning, monitoring and voyage recording.....	136
G.10.1	General.....	136
G.10.2	Route planning.....	136
G.10.3	Route monitoring.....	136
G.10.4	Position integration.....	137
G.10.5	Object information.....	138
G.10.6	LOP position fix.....	138
G.10.7	Voyage recording.....	139
G.11	Calculations and accuracy.....	139
G.12	Connections with other equipment (interfaces).....	139
G.13	Performance tests, malfunction- ~~alarms~~ alerts and indications.....	140
G.14	Back-up arrangements for RCDS mode of operation.....	140
G.15	Power supply for RCDS mode of operation.....	140
G.16	Requirements contained in IHO- ~~special~~ publications.....	141
G.16.1	Structure of RNC data.....	141
G.16.2	RNC data resolution and accuracy.....	141
G.16.3	RNC meta-data.....	141
G.16.4	RNC colours.....	141
G.16.5	RNC notes, diagrams, etc.....	142
G.16.6	Operational area.....	142
G.16.7	External removable media.....	142
G.17	Methods of testing and required test results.....	142
G.17.1	Preparation- Required test items.....	142
G.17.2	Initial data tests.....	143
G.17.3	Accuracy.....	144
G.17.4	Visual requirements.....	144
G.17.5	Functional requirements.....	145
G.17.6	Operational requirement.....	151
G.18	RNC test data set.....	154
Annex H (normative)	~~Alarms and indicators~~ Alerts and indications in the RCDS mode of operation.....	155
Annex I (normative)	Scenario definitions and plots.....	156
I.1	Overview.....	156
I.2	Scenario 1:.....	157
I.3	Scenario 2:.....	160
I.4	Scenario 3:.....	163
I.5	Scenario 4:.....	166
Annex J (informative)	~~Tests required for encrypted ENC~~	
Annex J (informative)	Guidance on geodetic calculations.....	172
J.1	Overview.....	172

J.2	Distance deviations between Great Circle (orthodrome) and Rhumb Line (loxodrome)	172
J.3	Bearing deviations at start point between Great Circle (orthodrome) and Rhumb Line (loxodrome).....	173
Annex K (informative)	Guidance for testing	175
K.1	Methods of test derived from ISO 9241-12	175
K.2	Observation	175
K.3	Inspection of documented evidence	175
K.4	Measurement.....	175
K.5	Analytical evaluation	176
~~Annex L (normative) Testing for colours and intensity~~		
Annex L (informative)	Examples of ENC Update Status Report	180
L.1	Overview	180
L.2	ENC Update Status Report – Summary.....	180
L.3	ENC Update Status Report – Full.....	181
L.4	ENC Management Report – Route Filtered	183
Annex M (~~informative~~ normative)	Elements of an electronic chart database	184
M.1	General.....	184
M.2	ECDIS implementation	184
M.3	Display base category.....	185
M.3.1	Coastline layer.....	185
M.3.2	Safety contour layer.....	186
M.3.3	Isolated underwater dangers layer	186
M.3.4	Isolated above-water dangers layer	186
M.4	Standard display category.....	187
M.4.1	Display base layer	187
M.4.2	Additional aids to navigation and fixed structures layer	187
M.4.3	Fairways layer	188
M.4.4	Conspicuous features layer.....	188
M.4.5	Prohibited and restricted areas layer.....	188
M.4.6	Ferry routes layer	188
M.4.7	Archipelagic sea lanes layer	188
M.4.8	Buoys and beacons layer	188
M.4.9	Traffic routing layer	189
M.5	All other information category	189
M.5.1	Information about the chart display layer.....	189
M.5.2	Natural and man-made features, Port features layer	189
M.5.3	Depth, currents, etc. layer.....	191
M.5.4	Seabed, obstructions, pipelines layer.....	191
M.5.5	Traffic routes layer.....	192
M.5.6	Special areas layer	192
M.5.7	Service and small craft facilities layer	192
M.6	Text grouping.....	192
M.6.1	Important Text group layer	192
M.6.2	Other Text group layer	192
~~Annex N (informative) Cross-references between IEC 61174 editions and MSC.232(82)~~		
Annex N (informative)	Use cases for safety contour and safety depth	196
Annex O (informative)	Guidelines on use of electronic chart systems in polar waters.....	198

O.1	Projection and coordinate system	198
O.2	Consistency	199
Annex P (normative)	Scenarios for polar areas above 85° North	200
Annex Q (normative)	IEC 61162 interfaces	206
Q.1	General.....	206
Q.2	VDR interface	208
Q.3	AIS interface and interrogation.....	209
Q.4	Route transfer interface	209
Q.5	BAM interface	209
Annex R (informative)	Conversion between IEC 61162-1 sentences and IEC 61162-3 parameter group numbers.....	214
Annex S (normative)	Route plan exchange format – RTZ	216
S.1	General.....	216
S.2	RTP Data container	217
S.3	High-level description of the RTZ format	218
S.4	Adaptation to third-party extensions	218
S.4.1	Generic idea	218
S.4.2	Unique identification of a waypoint.....	218
S.4.3	Creation of new waypoints	219
S.4.4	Change of geographic data for a waypoint	219
S.4.5	Waypoint removal	219
S.5	Detailed RTZ format description.....	219
S.5.1	File components	219
S.5.2	Route node description	219
S.5.3	RouteInfo node description	220
S.5.4	Waypoints node description	221
S.5.5	DefaultWaypoint node description.....	221
S.5.6	Waypoint node description.....	222
S.5.7	Storing date and time for legs	223
S.5.8	Schedules node description	223
S.5.9	Schedule node description.....	223
S.5.10	Extensions node description	225
S.5.11	Extension node description	226
S.6	XML schema to be met by RTZ route files.....	226
S.7	Basic RTZ route example	238
S.8	Example of the RTZ route with embedded extensions	239
S.9	UML model of the Route exchange format	240
Annex T (normative)	Interface for reporting route transfer.....	242
T.1	Route encapsulation format for transmitting RTZ over IEC 61162-450	242
T.2	RRT – Report route transfer.....	243
Annex U (normative)	Sentences used by SafetyNET	244
U.1	General.....	244
U.2	SM1 – SafetyNET Message, All Ships/NavArea	244
U.3	SM2 – SafetyNET Message, Coastal Warning Area	246
U.4	SM3 – SafetyNET Message, Circular Area Address	248
U.5	SM4 – SafetyNET Message, Rectangular Area Address.....	250
U.6	SMB – IMO SafetyNET Message Body.....	253
U.7	An example of use	254

Annex V (normative) Extension of TTD sentence, Protocol version 1	255
V.1 General.....	255
V.2 TTD – Tracked target data, Protocol version 1	255
Annex W (normative) Symbols	256
Bibliography.....	257
Figure F.1 – Backup system logical interfaces	121
Figure I.1 – Definition of elements of route	156
Figure I.2 – Route for scenario 1.....	159
Figure I.3 – Route for scenario 2.....	162
Figure I.4 – Route for scenario 3.....	165
Figure I.5 – Route for scenario 4.....	168
Figure J.1 – Distance deviations between Great Circle and Rhumb Line	172
Figure J.2 – Bearing deviations at start point between Great Circle and Rhumb Line	174
Figure N.1 – Original situation	196
Figure N.2 – New situation.....	197
Figure P.1 – Examples of use of the tables	200
Figure Q.1 – ECDIS logical interfaces.....	206
Figure Q.2 – Alert reporting by ECDIS without escalation of a warning	210
Figure Q.3 – Alert reporting by ECDIS with escalation of a warning as alarm	210
Figure Q.4 – Alert reporting by ECDIS in case of remote acknowledge	211
Figure Q.5 – Alert reporting by ECDIS in case of remote silence.....	212
Figure Q.6 – Alert reporting by ECDIS in case of remote silence.....	213
Figure Q.7 – Alert reporting by ECDIS in case of remote silence.....	213
Figure S.1 – Description of route plan – Distance between WP 2 and WP 3	217
Figure S.2 – Description of route plan – Leg parameters belonging to WP 3	217
Figure S.3 – UML diagram	241
Figure T.1 – Examples of timing for route transfer.....	242
~~Table 1 – Mandatory IEC 61162-1.....~~	~~29~~
Table 1 – Tracked target display capacity	29
~~Table 2 – Area, line and point objects.....~~	~~32~~
Table 2 – AIS display capacity	32
Table 3 – Control settings configured in response to ‘Default’ selection	50
Table D.1 – Alerts and indications resulting from IMO requirements.....	104
Table D.2 – Alerts and indications defined in this standard	105
Table E.1 – Chart display terminology.....	109
Table E.2 – Main function terminology	111
Table E.3 – Database terminology	112
Table E.4 – Route, route monitoring or route plan related terminology	113
Table H.1 – Alerts and indications in the RCDS mode of operation	155
Table J.1 – Rhumb Line distances	173
Table J.2 – Deviations from Great Circle distances	174

~~Table L.1 – Ambient light conditions~~	~~.....~~
Table M.1 – Minimum ECDIS mariner viewing group layer selectors	185
Table M.2 – Minimum ECDIS mariner text group layer selectors	185
Table P.1 – Spatial control points from 85°N, 0°E as origin	201
Table P.2 – Spatial control points from 87°N, 0°E as origin	202
Table P.3 – Spatial control points from 89°N, 0°E as origin	203
Table P.4 – Spatial control points from 90°N, 0°E as origin, 180°E as origin of relative bearings	204
Table Q.1 – Mandatory sentences received by ECDIS	207
Table Q.2 – Optional sentences received by ECDIS	207
Table Q.3 – Mandatory sentences transmitted by the ECDIS	208
Table Q.4 – Optional sentences transmitted by the ECDIS	208
Table Q.5 – Mandatory information transmitted to the VDR	208
Table Q.6 – Information between the ECDIS and an ECDIS backup system	209
Table R.1 – Conversion from IEC 61162-1 to IEC 61162-3	214
Table R.2 – Conversion from IEC 61162-3 to IEC 61162-1	215
Table W.1 – Anchor watch symbol	256

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**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**

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This fourth edition of IEC 61174 cancels and replaces the third edition published in 2008, of which it constitutes a technical revision.

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

- updated references are provided to IHO publications and test methods are updated to IHO test data sets;
- requirements have been added for display of radar and AIS information;
- new interface requirements have been added for BNWAS, VDR, BAM, MSI, INS and route transfer;
- a requirement for an anchor watch has been added;
- additional test methods are specified for operation of ECDIS beyond the normal range between 85 degrees South latitude and 85 degrees North latitude.

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

FDIS	Report on voting
80/761/FDIS	80/767/RVD

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

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

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

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

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

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

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

1 Scope

This International Standard specifies the performance requirements, methods of testing and required test results of equipment conforming to performance standards not inferior to those adopted by the IMO in resolution MSC.232(82).

This standard is based upon the performance standards of IMO resolution MSC.232(82), and is also associated with IMO resolution A.694(17) and IEC 60945. Reference is made, where appropriate, to IMO resolution MSC.232(82), and all subclauses whose wording is identical to that in the resolution are printed in *italics*.

In association with the above IMO resolution MSC.232(82), are the International Hydrographic Organization (IHO) ~~special~~ publications¹ IHO S-32, IHO S-52, IHO S-57, IHO S-61, IHO S-63 and IHO S-64. This standard has included extracts from the above publications where they are applicable to this equipment. Where reference is made, all subclauses whose wording is identical to that in the publications, are printed in *italics*.

(232/A2.1) These performance standards should apply to all ECDIS equipment carried on all ships as follows:

- *dedicated standalone workstation.*
- *a multifunction workstation as part of an INS.*

(232/A2.2) These performance standards apply to ECDIS mode of operation, ECDIS in RCDS mode of operation as specified in Annex G and ECDIS backup arrangements as specified in Annex F.

(232/A2.3) Requirements for structure and format of the chart data, encryption of chart data as well as the presentation of chart data are within the scope of relevant IHO standards, including those listed in the normative references.

The requirements of this standard are not intended to prevent the use of new techniques in equipment and systems, provided the facilities offered are not inferior to those stated.

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

¹ IHO publications are available from <http://www.iho.int>, together with any supplementary information.

~~IEC 61162 (all parts), Maritime navigation and radiocommunication equipment and systems – Digital interfaces~~

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

IEC 61162-450:2011 *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 450: Multiple talkers and multiple listeners – Ethernet interconnection*

IEC 61924-2:2012, *Maritime navigation and radiocommunication equipment and systems – Integrated navigation systems – Part 2: Modular structure for INS – Operational and performance requirements, methods of testing and required test results*

IEC 61996-1:2013, *Maritime navigation and radiocommunication equipment and systems – Shipborne voyage data recorder (VDR) – Part 1: Performance requirements, methods of testing and required test results*

IEC 62288:2014, *Maritime navigation and radiocommunication equipment and systems – Presentation of navigation-related information on shipborne navigational displays – General requirements – Methods of testing and required test results*

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

ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*

IHO M-3:2007, *Resolutions of the IHO, Chapter A, Section 3, Technical Resolution 3.11*

IHO S-52:2014, *Specifications for chart content and display aspects of ECDIS edition 6.1*

IHO S-52, appendix 1:2012, *Guidance on Updating the Electronic Navigational Chart edition 4.0*

IHO S-52, Annex A:2014, *Presentation library edition 4.0*

IHO S-57, *IHO transfer standard for digital hydrographic data*

IHO S-57, appendix B.1, *ENC product specification*

IHO S-61:1999, *Product specification for raster navigational charts (RNC)*

IHO S-63, *IHO data protection scheme*

IHO S-64, *Test data sets for ECDIS*

IMO, *International Convention for the safety of life at sea (SOLAS) 1974 (as amended)*

~~IMO A.424(XI):1979, Performance standards for gyro-compasses~~

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 A.821(19):1995, Performance standards for gyro-compasses for high-speed craft~~

~~IMO A.823(19):1995, Performance standards for automatic radar plotting aids~~



~~IMO A.824(19):1995, Performance standards for devices to indicate speed and distance~~

~~IMO A.830(19):1995, Code on Alarms and Indicators~~

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

~~IMO MSC.192(79), Revised performance standards for radar equipment~~

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

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

IMO MSC/Circ.982:2000, Guidelines on ergonomic criteria for bridge equipment and layout

~~IMO SN/Circ.243 (2004), Guidelines for the Presentation of Navigation-related Symbols, Terms and Abbreviations~~

IMO SN.1/Circ.266:2007, Maintenance of electronic chart display and information system (ECDIS) software

~~IHO M-3:2007, Resolutions of the IHO, Chapter A, Section 3, Technical Resolution 3.11~~

~~IHO S-32, appendix 1, Hydrographic dictionary—Glossary of ECDIS related terms~~

~~IHO S-52:1996, Specifications for chart content and display aspects of ECDIS~~

~~IHO S-52, appendix 1:1996, Guidance on updating the electronic navigational chart~~

~~IHO S-52, appendix 2:2004 Colour and symbol specifications for ECDIS~~

~~IHO S-57, appendix B.1: 2000, ENC product specification~~

~~IHO S-61:1999, Product specification for raster navigational charts (RNC)~~

~~IHO S-63:2008, IHO data protection scheme~~

~~IHO S-64, Test data sets for ECDIS~~

3 Terms, definitions and abbreviations

For the purposes of this document, the terms, definitions and abbreviations given in IEC 62288, as well as the following apply.

3.1 Terms and definitions

3.1.1

activated AIS target

(MSC.191/A) target activated for the display of additional graphically presented information

EXAMPLE Heading line, velocity vector, etc.

[SOURCE: IEC 62288:2014, 3.1]

3.1.2

appropriate portfolio of up to date paper charts

APC

a suite of paper charts of a scale to show sufficient detail of topography, depths, navigational hazards, aids to navigation, charted routes, and routeing measures to provide the mariner with information on the overall navigational environment. ~~The APC should provide adequate look-ahead capability. Coastal States will provide details of the charts which meet the~~

~~requirement of this portfolio, and these details are included in a worldwide database maintained by the IHO. Consideration should be given to the details contained in this database when determining the content of the APC.~~

[SOURCE: IMO Resolution MSC.232(82):2006, clause 3]

3.1.3

CIE colour calibration

colour calibration at the monitor performed to transform the CIE-specified colours for ECDIS into the colour coordinate system of the screen

Note 1 to entry: This confirms that the colours specified in IHO S-52, Annex A are correctly reproduced on the ECDIS display.

[SOURCE: IHO S-32]

3.1.4

common reference system

~~sensor input data, providing identical and obligatory reference pertaining to position, course, heading, bearing, speed, velocity, etc. and horizontal datum to different subsystems within an integrated navigation system~~

means provided to assure that when navigational information from sensors and other information sources is displayed together with charted information, it is referenced to a consistent common reference point (CCRP)

3.1.5

compilation scale

the scale at which the data was compiled

Note 1 to entry: This is the scale established by the producing Hydrographic Office and encoded in the ENC database at which the chart information meets the IHO requirements for chart accuracy.

[SOURCE: IHO S-32]

3.1.6

corrupted data

ENC data produced according to the IHO S-57 ENC product specification, but altered or modified during production, transmission, or retrieval

3.1.7

dangerous target

(MSC.191/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*

[SOURCE: IEC 62288:2014, 3.11]

3.1.8

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

[SOURCE: IEC 62288:2014, 3.12]

3.1.9

degrade, verb

reduce the quantity or quality of information content

3.1.10

display base

the chart content as listed in Annex A and which cannot be removed from the display. It is not intended to be sufficient for safe navigation

[SOURCE: IMO Resolution MSC.232(82):2006, clause A3.5]

3.1.11

display redraw time

interval from when the display starts to change until the new display is complete

3.1.12

display regeneration time

interval from operator action until the consequent redraw is complete

3.1.13

display scale

ratio between a distance on the display and a distance on the ground

Note 1 to entry: This ratio is normalized and expressed as, for example 1:10 000.

3.1.14

electronic chart display and information system

ECDIS

navigation information system which with adequate backup arrangements can be accepted as complying with the up-to-date chart required by regulation V/19 and V/27 of the 1974 SOLAS Convention, as amended, by displaying selected information from a system electronic navigational chart (SENC) with positional information from navigation sensors to assist the mariner in route planning and route monitoring, and if required display additional navigation-related information

[SOURCE: IMO Resolution MSC.232(82):2006, clause A3.1]

3.1.15

electronic ~~navigation~~ navigational chart

ENC

the database, standardized as to content, structure and format, issued for use with ECDIS by or on the authority of a Government authorized Hydrographic Office or other relevant government institution, and conform to IHO standards

Note 1 to entry: The ENC contains all the chart information necessary for safe navigation and may contain supplementary information in addition to that contained in the paper chart (for example sailing directions) which may be considered necessary for safe navigation.

[SOURCE: IMO Resolution MSC.232(82):2006, clause A3.2]

3.1.16

ENC cell

~~geographic division of ENC data for distributing purposes. For further information, refer to the ENC product specification in S-57~~

the basic unit of ENC data covering a defined geographical area bounded by two meridians and two parallels

[SOURCE: IHO S-32]

3.1.17

ENC data

data conforming to 3.1.15

3.1.18**ENC test data set**

~~standardized data set supplied on behalf of the IHO that is necessary to accomplish IEC testing requirements for ECDIS. This data set is encoded according to the S-57 ENC product specification and contains update information based on S-52, appendix 1. The specific requirements are listed in Annex E~~

standardized data set and testing instructions available as IHO S-64

3.1.19**estimated position****EP**

~~position of own ship determined by the common intersection of two LOPs~~

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

[SOURCE: IEC 62288:2014, 3.20]

3.1.20**fix**

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

[SOURCE: IEC 62288:2014, 3.21]

3.1.21**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

[SOURCE: IEC 62288:2014, 3.28]

3.1.22**lost target**

(MSC.191/A) tracked radar or reported AIS *target* for which the system is no longer receiving *valid position data*

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

[SOURCE: IEC 62288:2014, 3.29]

3.1.23**non-ENC data**

data not conforming to 3.1.5

3.1.24**non-HO source**

database containing chart information for navigation similar to ENC but the source is not recognized as government authorized Hydrographic Office or other relevant government institution

Note 1 to entry: See IHO S-62 chapter I. IHO Member states and chapter II. Other States.

3.1.25**official**

by, or on authority of a government, authorized Hydrographic Office or other relevant government institution

3.1.26

overscale

display of the chart information at a display scale larger than the compilation scale

Note 1 to entry: Overscaling may arise from deliberate overscaling by the mariner, or from automatic overscaling by ECDIS in compiling a display when the data included is at various ~~scales~~ *navigational purposes*.

[SOURCE: IHO S-32]

3.1.27

permanent indication

indication that is displayed visually and continuously and cannot be removed from the display other than by eliminating the cause of the indication

3.1.28

readily available indication

indication that can be, at any moment, immediately displayed by a single operator action

3.1.29

presentation library

implementation of the display specifications in IHO S-52, Annex A ~~“Colour and Symbol Specifications for ECDIS”~~, by de-coding and symbolizing the SENC.

It contains:

- ~~a) the ECDIS symbol library for chart features;~~
- ~~b) the ECDIS colour tables for day, dusk, and night viewing;~~
- ~~c) look-up tables, linking ENC objects to the appropriate colour and symbology;~~
- ~~d) conditional symbology procedures for~~
 - ~~— cases where symbolizing depends on circumstances, such as the mariner’s choice of safety contour, date or time;~~
 - ~~— cases where symbolizing is too complex to be defined in a direct look-up table;~~
- ~~e) description of symbology instructions;~~
- ~~f) supplementary features, for example ECDIS chart 1 colour differentiation test diagrams and colour calibration software~~

3.1.30

raster chart display system

RCDS

a navigation information system displaying RNCs with positional information from navigation sensors to assist the mariner in route planning and route monitoring and, if required, display additional navigation-related information

[SOURCE: IMO Resolution MSC.232(82):2006, Appendix 7 3.1]

3.1.31

raster navigational chart

RNC

a facsimile of a paper chart originated by, or distributed on the authority of, a government-authorized Hydrographic Office

Note 1 to entry: RNC is used in these standards to mean either a single chart or a collection of charts.

[SOURCE: IMO Resolution MSC.232(82):2006, Appendix 7 3.2]

3.1.32

RTS

Reported Target Simulator as defined in Annex F of IEC 62388:2013

3.1.33**route**

series of waypoints connected by one or more legs including both straight and curved segments

3.1.34**RNC data**

data conforming to 3.1.30

3.1.35**RNC test data set**

~~standardized data set supplied on behalf of the IHO that is necessary to accomplish IEC testing requirements for RCDS mode of operation. This data set is encoded according to the S-61 RNC product specification. Test RNCs are specified by the HO providing the RNC service or on whose behalf the RNC service is provided~~

standardized data set and testing instructions available as IHO S-64

3.1.36**single operator action**

~~single operation shall be achieved by activating a hardkey or softkey, including any necessary cursor movement~~

(MSC.252/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

[SOURCE: IEC 62288:2014, 3.42]

3.1.37**safety contour**

borderline between safe and unsafe water based on depth defined by the mariner

Note 1 to entry: The safety contour includes, for example, the ships draft plus under keel clearance.

3.1.38**safety depth**

depth defined by the mariner, e.g. the ships draft plus under keel clearance, to be used by ECDIS to emphasise sounding on the display equal to or less than this value

[SOURCE: IHO S-32]

3.1.39**selected target**

(MSC.191/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

[SOURCE: IEC 62288:2014, 3.40]

3.1.40**sleeping AIS target**

(MSC.191/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

[SOURCE: IEC 62288:2014, 3.43]

3.1.41

standard display

the display mode intended to be used as a minimum during route planning and route monitoring

Note 1 to entry: The chart content is listed in Annex A.

[SOURCE: IMO Resolution MSC.232(82):2006, clause A3.4]

3.1.42

system electronic navigational chart

SENC

a database in the manufacturer's internal ECDIS format, resulting from the lossless transformation of the entire ENC contents and updates

Note 1 to entry: It is this database that is actually accessed by ECDIS for the display generation and other navigational functions, and is the equivalent of an up-to-date paper chart.

Note 2 to entry: The SENC may also contain information added by the mariner and information from other sources.

[SOURCE: IMO Resolution MSC.232(82):2006, clause A3.3]

3.1.43

system raster navigational chart ~~database~~

SRNC

a database resulting from the transformation of the RNC by the RCDS to include updates to the RNC by appropriate means

[SOURCE: IMO Resolution MSC.232(82):2006, Appendix 7 3.3]

3.2 Abbreviations

AIS Automatic Identification System

~~ARPA Automatic radar plotting aid~~

BAM Bridge Alert Management

BNWAS Bridge Navigational Watch Alarm System

CCRP Consistent Common Reference Point

~~CIE Comité International de l'Eclairage~~ International Commission on Illumination

~~DR Dead reckoned~~

COG Course Over Ground

DAC Designated Area Code

EBL Electronic Bearing Line

~~ECDIS Electronic Chart Display~~

EP Estimated Position

EPFS Electronic Position-Fixing System

EUT Equipment Under Test

~~FI Function Indicator~~

GMDSS Global Maritime Distress And Safety System

HO Hydrographic Office

IHO International Hydrographic Organization

IMO International Maritime Organization

~~ISO International Organization for Standardization~~

LAN	Local Area Network
MMSI	Maritime Mobile Service Identity
MSI	Maritime Safety Information
ROT	Rate Of Turn
SOG	Speed Over Ground
SOLAS	International Convention for the Safety of Life at Sea (SOLAS), 1974 as amended
TT	Target Tracking
USB	Universal Serial Bus
URI	Uniform Resource Identifier
VDL	AIS VHF Data Link
VDM	AIS VHF Data link Message
VDR	Voyage Data Recorder
VRM	Variable Range Marker

4 Minimum operational and performance requirements

4.1 General

(232/A1.1) *The primary function of the ECDIS is to contribute to safe navigation.*

(232/A1.2) *ECDIS with adequate back-up arrangements may be accepted as complying with the up-to-date charts required by regulations V/19 and V/27 of the 1974 SOLAS Convention, as amended. (See Annex F.)*

(232/A2.4) *In addition to the general requirements set out in resolution A.694(17) as further specified in IEC 60945 and the presentation requirements set out in resolution MSC.191(79) as further specified in IEC 62288, ECDIS equipment shall meet the requirements of MSC.232(82) and follow the relevant guidelines on ergonomic principles adopted by the IMO in MSC/Circ.982. (See 5.3, 6.3, 6.9.1)*

(232/A1.3) *ECDIS shall be capable of displaying all chart information necessary for safe and efficient navigation originated by, and distributed on the authority of, government authorized hydrographic offices. (See 4.3, Clause 5)*

(232/A1.4) *ECDIS shall facilitate simple and reliable updating of the electronic navigational chart. (See 4.4, 5.9)*

(232/A1.5) *ECDIS shall reduce the navigational workload compared to using the paper chart. It shall enable the mariner to execute in a convenient and timely manner all route planning, route monitoring and positioning currently performed on paper charts. It shall be capable of continuously plotting the ship's position. (See 4.10)*

(232/A1.7) *ECDIS shall have at least the same reliability and availability of presentation as the paper chart published by government authorized hydrographic offices. (See 4.3, 4.8, 4.9, Clause 5)*

(232/A1.8) *ECDIS shall provide appropriate ~~alarms~~ alerts or indications with respect to the information displayed or malfunction of the equipment. (See Annex D)*

(232/A1.9) *When the relevant chart information is not available in the appropriate form, (See 4.4) some ECDIS equipment may operate in the Raster Chart Display System (RCDS) mode as defined in Annex G. The RCDS mode of operation shall conform to performance standards not inferior to those set out in Annex G.*

(232/A1.6) *The ECDIS display may also be used for the display of radar, radar tracked target information, AIS and other appropriate data layers to assist in route monitoring in accordance with requirements of 232/A2.4, 232/A7.4, and 232/A9.2, as further specified herein. (See 4.6, 4.8, 4.12)*

4.2 ECDIS definitions

(232/A3.6) *Further information on ECDIS definitions may be found in IHO S-32.*

4.3 Display of SENC information

4.3.1 SENC

(232/A5.1a) *ECDIS shall be capable of displaying all SENC information. An ECDIS shall be capable of accepting and converting an ENC and its updates into a SENC. ~~(See 5.1 and Annex E.)~~*

(232/A5.1b) *The ECDIS may also be capable of accepting a SENC resulting from conversion of ENC to SENC ashore, in accordance with IHO Technical Resolution A3.11 (IHO Miscellaneous Publication M-3). This method of ENC supply is known as SENC delivery.*

NOTE 1 IHO Technical Resolution A3.11 is now referred to as IHO Resolution 4/2002.

NOTE 2 In addition to IHO S-57 format, Governments, government-authorized Hydrographic Offices or other relevant government institutions may allow the distribution of HO data (ENC) for their waters in a SENC format, ~~in accordance with IHO M-3 Technical Resolution A3.11.~~ This requires distributors of HO data (ENC) in SENC format to obtain approval from the issuing authority and to operate under the regulations of that authority. ~~(Refer to IHO M-3, TR A3.11.2 and A3.11.2.3.)~~

For ENC data delivered in SENC format, the chart update mechanism provided by the ECDIS shall not be inferior to the ENC update mechanism. (See 4.4)

4.3.2 **Warning** Indication about use of non-HO source

(See 6.5.3)

If SENC data from a ~~private non-HO~~ source is in use, ~~warning a permanent~~ indication of “non-ENC data” shall be provided.

4.3.3 Categories of display

(See 6.8.2 to 6.8.5)

(232/A5.2) *SENC information available for display during route planning and route monitoring shall be subdivided into the following three categories, Display base, Standard display and All Other Information. (See Annex A and Annex M)*

(232/A5.3) *ECDIS shall present the Standard Display at any time by a single operator action.*

Selection of Standard display shall not change any user setting other than selection of viewing groups for the display of charted objects. When Standard Display (Clause M.4) is selected, all viewing groups of that category shall be visible in the chart display and additional viewing groups of All Other Information (Clause M.5) shall not be visible in the chart display.

(232/A5.5) *It shall be easy to add or remove information from the ECDIS display. It shall not be possible to remove information contained in the Display Base.*

Each IMO SENC information category is divided into sub-classes called viewing group layers and viewing groups as specified in Annex M. The details of viewing group layers and subsets of viewing groups within each layer are available in Annex M.

ECDIS shall provide means to add or remove information from the display by selection of any of the viewing group layers except those of the Display Base (see IHO S-52 Annex A:2014, 14.3).

Any additional selection capability that may be provided shall be described in the user manual and shall be derived from the viewing group layers and viewing groups specified in Annex M.

The association of multiple viewing groups from different viewing group layers may be combined into an additional selection. However, the selection of viewing group layers and viewing groups of the Standard display category shall not be combined with those unique to the All Other category.

More detailed chart display control selectors than those based on viewing group layers may be provided but the addition or removal of information shall be limited to individual IHO viewing groups (for example "Soundings" from the viewing group layer "Depth, currents, etc." could be provided as a selection) not selection of individual items, for example an individual area or an individual sounding.

(S-52, Annex A, Part 1/9.1) *The display of text shall be controlled independently of the display of the object it applies to. The mariner shall have full control over the display of text. All text is in the IMO Category "All other Information".*

NOTE 1 The text group layers specified in Annex M are intended as a framework on which the ECDIS manufacturers can base their own method of providing this capability. Each text group layer is divided into sub-classes called text groups. The details of text group layers and subsets of text groups within each layer are specified in Clause M.6.

(S-52, Annex A, Part 1/9.1) *ECDIS shall provide at least the capability to select "Important Text" and "Other Text", and ECDIS may provide further text groupings.*

Such further text group selectors shall be a subset of the parent text group layer (for example "Geographic names" from text group layer "Other text" could be provided with a dedicated display selector). ECDIS may provide also combined text display control selectors, but such selectors can only combine text groups from the same text group layer (i.e. it is not allowed to combine text groups from both "Important Text" and "Other Text" text group layers).

NOTE 2 As a guide for organizing the display of text, the last two digits of the SHOWTEXT instruction give a text classification that distinguishes between "Important" and "Other" text, and gives further suggested text groupings.

(S-52, Annex A/14.5) *National text* (text group 31, see Clause M.6.2) *is a supplementary option for ECDIS. If provided, the style shall be similar to that of the Presentation Library* (see IHO S-52, Annex A, Part 1/9.1).

(232/A5.4) *When an ECDIS is switched on following a switch off or power failure, it shall return to the most recently manually selected settings for the display of SENC information.*

~~(232/A5.5) It shall be easy to add or remove information from the ECDIS display. It shall not be possible to remove information contained in the Display Base.~~

~~The addition or removal of information shall be limited to categories of information, for example prohibited and restricted areas, spot soundings; not individual items, for example an individual area or an individual sounding. (See Clauses A.2 and A.3.)~~

4.3.4 Safety contour

(See 6.8.10, 6.9.2, 6.9.3)

(232/A5.8) *It shall be possible for the mariner to select a safety contour from the depth contours provided by the SENC. ECDIS shall emphasize the safety contour over other contours on the display, however:*

- a) *if the mariner does not specify a safety contour, this shall default to 30 m. If the safety contour specified by the mariner or the default 30 m contour is not in the displayed SENC, the safety contour shown shall default to the next deeper contour;*
- b) *if the safety contour in use becomes unavailable due to a change in source data, the safety contour shall default to the next deeper contour; and*
- c) *in each of the above cases, an indication shall be provided. (See 5.4.3)*

NOTE More information about usage of safety contour and safety depth is available in informative Annex N.

4.3.5 Safety depth

(See 6.8.11)

(232/A5.9) *It shall be possible for the mariner to select a safety depth. ECDIS shall emphasize soundings equal to or less than the safety depth whenever spot soundings are selected for display.*

4.3.6 Information content

(See 6.8.)

(232/A5.10) *The ENC and all updates to it shall be displayed without any degradation of their information content.*

Degradation shall be understood as degradation in information quantity as well as quality with respect to the IHO S-64 test data set.

4.3.7 Verification and updates

(See 6.8.7, 6.8.17.2)

(232/A5.11) *ECDIS shall provide a means to ensure that the ENC and all updates to it have been correctly loaded into the SENC.*

(232/A5.12) *The ENC data and updates to it shall be clearly distinguishable from other displayed information, including those listed in Annex B.*

4.3.8 Information about chart objects

(232/A5.6) *For any operator identified geographical position (for example by cursor picking) ECDIS shall display on demand the information about the chart objects associated with such a position. (See 5.3.1)*

4.3.9 Display scale

(232/A5.7) *It shall be possible to change the display scale by appropriate steps for example by means of either chart scale values or ranges in nautical miles. (See 5.2.1)*

4.4 Provision and updating of chart information

4.4.1 Contents of the SENC

(See 6.5.3)

(232/A4.1) The chart information to be used in ECDIS shall be the latest edition, as corrected by official updates, of that issued by or on the authority of a Government, government-authorized Hydrographic Office or other relevant government institution, and conform to IHO standards.

In order to identify the date and origin of the ENC in use, the ECDIS shall include a graphical index of ENC data available, presented upon the mariner's request and providing access to the edition and date of each cell. (See 4.3.7 and 5.2.1)

A new edition of an ENC will supersede a previous ENC and its integrated updates issued by a government authorized Hydrographic Office.

(232/A4.2) The contents of the SENC shall be adequate and up-to-date to comply with regulation V/27 of the 1974 SOLAS Convention as amended.

(232/A4.3) It shall not be possible to alter the contents of the ENC or SENC information transformed from the ENC.

4.4.2 Updates

(See 6.5.4, 6.8.17, 6.8.18)

(232/A4.4) Updates shall be stored separately from the ENC.

Separate storage of updates may utilize the same data storage area.

(232/A4.5) ECDIS shall be capable of accepting official updates to the ENC data provided in conformity with IHO standards. These updates shall be automatically applied to the SENC. By whatever means updates are received, the implementation procedure shall not interfere with the display in use.

The contents of an update assume that all earlier updates have been applied to the SENC.

(232/A4.6) ECDIS shall also be capable of accepting updates to the ENC data entered manually with simple means for verification prior to the final acceptance of the data. They shall be distinguishable on the display from ENC information and its official updates and not affect display legibility.

(232/A4.7) ECDIS shall keep and display on demand a record of updates including time of application to the SENC. This record shall include updates for each ENC until it is superseded by a new edition.

(232/A4.8) ECDIS shall allow the mariner to display updates in order to review their contents and to ascertain that they have been included in the SENC.

(S-52/10.7.2) On mariner's demand automatic chart corrections of ENC information shall be highlighted in accordance with IHO S-52/10.7.2.

(232/A4.9) ECDIS shall be capable of accepting both non-encrypted ENCs and ENCs encrypted in accordance with the IHO Data Protection Scheme (IHO Special Publication S-63).

NOTE Non-encrypted ENCs can be available in plain IHO S-57 format or in accordance with the IHO S-63.

Means shall be provided for a full ENC Update Status Report in accordance with IHO S-63. Optionally means may be provided for Route Filtered ENC Update Status Report in accordance with IHO S-63. Optionally means may be provided for an ENC Management Report in accordance with the IHO S-63. (See Annex L)

4.5 Scale

(See 6.8.8)

(232/A6.1) ECDIS shall provide a *permanent* indication if:

- a) the information is displayed at a larger scale than that contained in the ENC; or
- b) own ship's position is covered by an ENC at a larger scale than that provided by the display.

4.6 Display of other navigational information

4.6.1 ~~Common reference system~~ General for all overlays

(See 6.8.15, 6.8.13)

(232/A7.1) Radar information and/or AIS information may be transferred from systems compliant with the relevant standards of IMO. Other navigational information may be added to the ECDIS display. However, it shall not degrade the displayed SENC information, and it shall be clearly distinguishable from the SENC information. (See also IEC 62288:2014, 6.3.3 and 6.3.8).

(232/A7.4.1) Transferred radar information may contain a radar image and/or tracked target information.

The ECDIS shall not track targets, calculate CPA/TCPA values, provide target related alerts or provide target association functionality unless it is fully compliant with relevant sections of IEC 62388.

(See 6.8.14 g).)

(232/A7.3) ECDIS and added navigational information shall use a common reference system. If this is not the case, a *permanent* indication shall be provided.

Such advice shall be included in the manufacturer's installation manual.

(See 6.8.15.2)

(232/A7.2) It shall be possible to remove the radar information, AIS information and other navigational information by a single operator action.

4.6.2 Radar ~~and plotting~~ information

4.6.2.1 General for radar information

(See 6.8.15.2, 6.8.15.3)

Target information may be provided by a radar target tracking system and/or by the AIS.

As far as practical, the radar video image and target information shall be presented in accordance with the radar Performance Standards (see IEC 62388:2013, Annex A) and with the presentation standards (see IEC 62288:2014, 5.4.1, 5.4.2 for radar image and 5.5.1 through 5.6.4 and 6.3.2 for target information).

As far as practical, the user interface and data format for operating and presenting tracked radar target information and reported AIS target information shall be consistent. (See IEC 62288:2014, 5.5.2.2).

4.6.2.2 Radar image information

~~(232/A7.1) Radar information and/or AIS information may be transferred from systems compliant with the relevant standards of IMO. Other navigational information may be added to the ECDIS display. However, it shall not degrade the displayed SENC information, and it shall be clearly distinguishable from the SENC information.~~

~~(232/A7.2) It shall be possible to remove the radar information, AIS information and other navigational information by a single operator action.~~

~~(232/A7.4.1) Transferred radar information may contain a radar image and/or tracked target information.~~

~~Where plotting information is added, it shall be indicated to the operator whether the vectors are relative or true, and if true whether they are sea or ground stabilized.~~

(See 6.8.15.3)

~~(232/A7.4.2) If the radar image is added to the ECDIS display, the chart and the radar image shall match in scale, projection and in orientation.~~

~~(232/A7.4.3) The radar image and the position from the position sensor shall both be adjusted automatically for antenna offset from the conning position (i.e. CCRP).~~

The requirements of IEC 62288 for presentation of radar video images shall be met. (See IEC 62288:2014, 5.4.1)

4.6.2.3 Tracked target information

(See 6.8.15.4)

The requirements of this subclause apply if tracked target information is provided.

If tracked target information is available it shall be possible to display and provide full presentation functionality for a minimum number of tracked radar target reports according to Table 1.

Table 1 – Tracked target display capacity

Minimum tracked target capacity	40
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NOTE 1 Unlike the radar ECDIS does not have multiple categories therefore minimum tracked target capacity is equivalent to CAT 1 as defined in IEC 62388.

Where tracked target vector information is added, it shall be indicated to the operator whether the vectors are relative or true, and if true whether they are sea or ground stabilized.

The system shall process all tracked radar targets reported across the interfaces provided for that purpose. Data sources may report a greater number of tracked targets than capacity provided for ECDIS. To avoid exceeding the tracked target capacity of the ECDIS, means shall be provided to filter tracked target data received from external sources as specified in IEC 62288 for AIS targets.

There shall be an indication when the reported target processing or display capacity is about to be exceeded.

There shall be an indication when the reported target processing or display capacities have been exceeded.

The system shall present reported tracked targets information in accordance with IEC 62288:2014, 5.5.1.

Alert conditions included in the tracked target data, e.g. lost target warning and CPA/TCPA alarm shall not be repeated by ECDIS as an alert but may be graphically indicated using the appropriate symbols as defined in IEC 62288.

If the interface does not provide all details for CPA/TCPA or if some details are not available from the interface then the ECDIS may derive such details from the available details. If ECDIS derives CPA/TCPA from available values in the interface then the ECDIS shall meet the CPA/TCPA requirements of IEC 62388:2013, 11.3.14.7.

NOTE 2 Combination of TTD (protocol version 0), TLB and TTM sentences provides all details including CPA/TCPA available from radar for tracked targets, but TTM is not a requirement of IEC 62388 and may not be available from all radars. A combination of TTD (protocol versions 0 and 1) and TLB includes the CPA/TCPA values. TTD protocol version 1 is described in Annex V. Alternatively, the CPA/TCPA values may be derived using own ship speed and course from the OSD sentence.

An ECDIS that provides facilities for radar target detection and tracking that are independent of a shipborne radar system shall comply with the target tracking requirements of IEC 62388:2013, 11.3. For presentation of radar video images the requirements of IEC 62288 on radar presentation shall be met.

If facilities are provided for radar target detection and tracking that are independent of a shipborne radar system, then if the CPA and TCPA values of a tracked target are less than the set limits, a CPA/TCPA alarm shall be given and the target causing the alarm shall be clearly indicated.

Past positions for radar targets may be provided.

The last reported or predicted position of a lost target shall be clearly marked by a lost target symbol on the display as set forth in IEC 62288:2014, Annex A. If facilities are provided for radar target detection and tracking that are independent of a shipborne radar system, then 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 or disable the lost target warning function. The default shall be disabled. There shall be a clear indication whether the lost target warning function for tracked targets is enabled or disabled. If a tracked radar target is excluded by a pre-determined range or pre-set parameter (if this feature is provided), then no warning shall be generated.

4.6.2.4 Target association

(See 6.8.15.5)

4.6.2.4.1 Target association – External

The requirements of this subclause apply if tracked target information is provided and if ECDIS uses target association information provided by radar using TTD and TLB sentences.

If both tracked target information and AIS target information are displayed at the same time on the ECDIS, then ECDIS shall display them as a single target according to Annex A of IEC 62288:2014. Where ECDIS also receives reported targets directly from AIS, ECDIS shall filter the display of the reported AIS targets using the MMSI to avoid duplicated targets.

If target information from AIS and radar tracking are both displayed at the same time and where the AIS and radar information is considered 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 IEC 62288:2014, 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.

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 IEC 62288:2014, Annex A. Where the AIS and radar information become sufficiently different so as to be considered as two distinct targets no alert shall be raised.

4.6.2.4.2 Target association – Internal

The requirements of this subclause apply if tracked target information is provided and if ECDIS provides an internal solution for target association.

If both tracked target information and AIS target information are displayed at the same time on the ECDIS and if ECDIS 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 shall comply with IEC 62388:2013, 11.8.

If target information from AIS and radar tracking are both displayed at the same time and where the AIS and radar information are considered 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 IEC 62288:2014, 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.

Where the AIS and radar information are considered two distinct targets, one activated AIS target symbol and one tracked radar target symbol shall be displayed as set forth in IEC 62288:2014, Annex A. Where the AIS and radar information become sufficiently different so as to be considered as two distinct targets no alert shall be raised.

4.6.3 AIS information

4.6.3.1 General

(See 6.13)

The requirements for AIS information apply if an AIS interface is provided.

Reported targets provided by the AIS may be filtered according to user-defined parameters. Targets may be sleeping, or may be activated. Activated targets are treated in a similar way to radar tracked targets.

NOTE 1 Class A AIS is provided for SOLAS ships and provides full data. Class B AIS is for non-SOLAS craft providing a subset of that data.

NOTE 2 The AIS target state diagram is shown in Annex G of IEC 62388:2013.

4.6.3.2 AIS targets and data report capacity

(See 6.13.2)

It shall be possible to display and provide full presentation functionality for a minimum number of sleeping and activated AIS targets and AIS data reports according to Table 2.

A caution shall be generated when the capacity of processing/display of AIS targets and data reports is about to be exceeded.

A warning shall be generated when the AIS reported target processing/display capacity has been exceeded.

The AIS target display capacity defines the minimum number of AIS targets which can be displayed. The equipment shall provide the capability to display a minimum number of AIS targets and AIS data reports according to Table 2.

The AIS target 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 targets and AIS data reports shall be maintained. The worst case conditions result from a very large number of anchored targets or a smaller number of fast moving targets and/or manoeuvring targets.

The user manual shall describe the display capacity and the processing capacity for the equipment and, in addition, shall describe the operation in the event that capacity is at, or close to, the maximum provided in each case.

NOTE 1 The AIS interface has a maximum data rate of 4 500 messages per minute.

Table 2 – AIS display capacity

Minimum part of the total capacity which may be activated AIS ship targets, Class A and Class B.	40
Minimum total capacity for all Class A (active and sleeping), Class B AIS (active and sleeping), AIS AtoN, AIS Base Station, AIS-SART and SAR Aircraft.	240

NOTE 2 Unlike the radar ECDIS does not have multiple categories therefore AIS display capacity is equivalent to CAT 1 as defined in IEC 62388.

NOTE 3 AIS-SART includes AIS search and rescue transmitters (SARTs) and other devices using AIS burst transmission technology, including AIS Man Overboard devices (AIS-MOB) and EPIRB-AIS devices.

4.6.3.3 AIS target filtering

(See 6.13.3)

To reduce display clutter, a means to filter the presentation of sleeping AIS targets shall be provided, together with an indication of the filter status (e.g. by target range, CPA/TCPA or AIS target Class A/B, etc.). It shall not be possible to remove individual AIS targets from the display. AIS target filtering provides means for an operator to control the number of displayed AIS targets and data reports within the limits of the display capacity.

If a filter is applied, then there shall be a permanent indication. The filter criteria in use shall be readily available.

Criteria for filtering to reduce display clutter shall only include sleeping Class A or sleeping Class B when combined with one or more other factors, for example including: CPA/TCPA, Speed, Range, Course and Bearing.

For ECDIS the criteria for filtering shall include the possibility to filter all active and sleeping AIS targets.

NOTE The above would allow the ECDIS to display for example only AIS AtoN without any other AIS targets or information.

AIS Base Stations may 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 repeated and direct AIS reports are received for the same target, the repeated reports shall not be processed for CPA/TCPA or display of AIS target or information. A repeated target report from own ship shall not be processed for CPA/TCPA or display.

4.6.3.4 Activation and deactivation of AIS targets

(See 6.13.4)

A means to activate a sleeping AIS target and to deactivate an activated AIS target shall be provided. If zones for the automatic activation of AIS targets are provided, they shall be the

same as for automatic radar target acquisition, if available. In addition, sleeping AIS targets may be automatically activated when meeting user defined parameters (e.g. target range, CPA/TCPA or AIS target Class A/B). Automatic activation is independent of AIS target filtering. If means are provided for automatic activation of AIS targets, then means for disabling that function shall be provided and the disable status shall be indicated. The manufacturer shall state what user defined parameters are available and shall show that they are described in the user manual.

Any user defined zones (for example, acquisition/activation zones) in use shall be presented in graphical form with their relevant symbols set forth in IEC 62288:2014, Annex A.

4.6.3.5 AIS functionality and presentation

(See 6.13.5)

The presentation of reported AIS targets and AIS data reports shall be in accordance with the requirements of IEC 62288.

AIS information shall be graphically presented as sleeping or activated targets.

AIS targets that are displayed shall be presented as sleeping targets by default.

The course and speed of a tracked radar target or reported AIS target shall be indicated by a predicted motion vector. The vector time (i.e. length) shall be adjustable and valid for presentation of any target regardless of its source.

A permanent indication of vector mode, time and stabilisation shall be provided. The AIS vector properties shall be generally consistent with those of tracked target vectors, if tracked target is provided.

The consistent common reference point shall be used for the alignment of tracked radar and AIS symbols with other information on the same display.

On large scale/low range displays, a means to present the true scale outline of an activated AIS target shall be provided in accordance with IEC 62288:2014, Annex A.

It shall be possible to display the past position of activated targets.

The reported AIS targets shall be time-referenced so that AIS symbology shall be progressively positioned according to its reported course and speed.

ECDIS shall be able to process and display the following VDL messages for AIS targets and AIS data reports:

- a) Messages: 1, 2, 3 and 5 (Class A AIS and AIS-SART);
- b) Messages: 18, 19 and 24 (Class B AIS);
- c) Message 9 (AIS on Airborne SAR craft);
- d) Message 21 (AIS AtoN);
- e) Messages 12 and 14 (Safety related messages).

Optionally ECDIS may process and display additional VDL messages for AIS data reports (for example Messages 6 and 8, AIS application specific messages). The manufacturer shall declare in the user manual the supported AIS application specific messages including description of their functionality. The presentation shall be according to IEC 62288.

NOTE Messages 6 and 8 consist of a 16-bit application identifier (AI) and data content. The AI consist of a 10-bit designated area code (DAC) and a 6-bit function identifier (FI). DAC value 0 is for test purposes, DAC values 1 to 9 are for international use, DAC values 10 to 999 are for regional use and DAC values 1 000 to 1 023 are reserved

for future use. The supported AIS application specific messages are identified as combination of DAC and FI. For example DAC set as 1 to 9 and FI set as 2, 3, 4, 5, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31 or 32 (see IMO SN.1/Circ.289).

4.6.4 AIS target data

(See 6.13.6)

Requirements for AIS target data apply, if an AIS interface is provided.

It shall be possible to select any AIS target for the alphanumeric display of its data. An AIS target selected for the display of its alphanumeric information shall be identified by the relevant symbol set forth in IEC 62288:2014, Annex A. If more than one target is selected for data display, the relevant symbols and the corresponding data shall be clearly identified. There shall be a clear indication to show that the target data is derived from AIS.

For each selected AIS target the following data shall be presented in alphanumeric form: source(s) of data, ship's identification, navigational status, position and where available its quality, range, bearing, COG, SOG, CPA, and TCPA. Target heading and reported rate of turn shall also be made available. Additional target information shall be provided on request.

An indication shall be provided in the alphanumeric display when additional information is available.

For ECDIS the sea stabilization of speed vectors is an option. If provided and selected, the CTW and STW shall be presented in place of COG and SOG. If both optional AIS interface and tracked target interface is provided, the speed vectors shall share common operator selection for vector time (length), relative/true and ground/sea stabilization. If provided, the vector time (length), relative/true selection and ground sea stabilization selection shall be indicated. The default selections shall be as indicated in Table 3.

For ECDIS the bow crossing is an option. If provided bow crossing range and bow crossing time (BCR/BCT) may be presented.

NOTE The AIS transponder provides for each AIS target the position and may provide COG, SOG and heading. Range, bearing, CTW, STW, CPA, TCPA, bow crossing range and bow crossing time (BCR/BCT) are calculation results against own ship data and they are not provided by the AIS transponder.

If ECDIS derives CPA/TCPA from available values in the interface then the ECDIS shall meet the CPA/TCPA requirements of IEC 62388:2013, 11.3.14.7.

Manufacturer's documentation shall include a description of which AIS data if received on the interface is used and which information and indications presented to the user are derived from the values available on the interface and the values available for own ship.

If the received AIS information is incomplete, the absent information shall be clearly indicated as "missing" within the target data field.

The data shall be displayed and continually updated, until another target is selected for data display or until the window is closed.

Means shall be provided to present own ship AIS data on request.

4.6.5 AIS voyage-related data

(See 6.14)

Requirements for AIS voyage related data apply, if an AIS interface is provided.

Means shall be provided for on demand display of the following own ship data. Means shall be provided for the user entry of the following data and output of this data via the interface to AIS. (See Table Q.4, VSD).

a) Cargo category

The descriptions of ship and cargo are indicated by a number, which correspond to textual description. Refer to ITU-R M.1371-5 Annex 8, Message 5.

b) Navigation status

The description of navigation status is indicated by a number, which corresponds to the textual description. Refer to ITU-R M.1371-5 Annex 8, Messages 1, 2, 3.

c) Ship's draft (maximum actual static)

The ship's maximum draft is indicated by a number. Refer to ITU-R M.1371-5 Annex 8, Message 5.

d) Destination

The description of destination is a maximum 20 character string. Refer to ITU-R M.1371-5 Annex 8, Message 5.

e) ETA date and time

Month, day, hours, minutes, universal coordinated universal time (UTC). Refer to ITU-R M.1371-5 Annex 8, Message 5.

4.6.6 AIS CPA/TCPA alarms

(See 6.13.7)

If ECDIS provides facilities for radar target tracking that are independent of a shipborne radar system, means may be provided to create a common CPA/TCPA alarm function for AIS. If provided, the collision avoidance alarm criteria shall be the same for both AIS and tracked targets. It shall be possible to enable or disable a common CPA/TCPA alarm function for both AIS and tracked targets. An indication shall be given if the CPA/TCPA alarm function for AIS is disabled.

If the CPA/TCPA alarm function is activated, and if the calculated CPA and TCPA values of an activated AIS target are less than the set limits, a CPA/TCPA alarm shall be given and shall be identified as such and the target causing the alarm shall be clearly indicated.

If the ECDIS provides CPA/TCPA alarm function for tracked targets then the preset CPA/TCPA limits applied to targets from radar and AIS shall be identical. As a default state, the CPA/TCPA alarm functionality shall be applied to all activated AIS targets. On user request, the CPA/TCPA alarm functionality may also be applied to sleeping targets.

AIS ship outline dimension data is not required to be considered in CPA/TCPA for AIS targets. Such capabilities, if provided, should be described in the user manual.

4.6.7 AIS lost target warning

(See 6.13.8)

If ECDIS provides facilities for a CPA/TCPA alarm function for AIS targets, means may be provided to create a lost target warning function for AIS. The enabled state of the lost target warning function for AIS shall be available only when the CPA/TCPA alarm function is enabled.

It shall be possible to enable or disable the lost target warning function for activated AIS targets. A clear indication shall be given if the lost target warning function is disabled. A lost target warning function for sleeping targets may be provided.

If the following conditions are met for a lost AIS target:

- the AIS lost target warning function is enabled;
- the target is of interest, according to lost target filter criteria;
- a message is not received for a set time, depending on the nominal reporting rate of the AIS target (see IEC 62388:2013, Table 27);

then the following applies:

- the last known (or predicted) position shall be clearly indicated within the operational area as a lost target and warning shall be given;
- the indication of the lost target shall disappear if the signal is received again, or after the warning has been acknowledged;
- a means of recovering historical data from previous AIS reports shall be provided.

4.6.8 Anchor watch

(See 6.15)

NOTE This requirement derives from an IMO formal safety assessment of general cargo ship safety (see IMO MSC.88/19/2).

Means shall be provided for the operator to specify an anchor location as position offset from the common reference point to the anchor location.

Means shall be provided for the operator to specify the radius of the swing circle. When activated, the anchor watch function shall display the swing circle. The centre of the swing circle shall be at the position derived from the anchor location and the own ship position at the time when the operator activated the function, i.e. when the anchor was dropped. An anchor symbol shall be displayed at the centre of this swing circle.

While the function is activated, the system shall monitor the outline of own ship. If any part of the outline moves outside the swing circle the system shall raise a warning. If this warning is not acknowledged within 2 min, and own ship remains outside the swing circle, the alert shall be escalated to an alarm (see 4.12.2.2).

If the anchor watch function is deactivated while this alert is present, the alert shall be cleared.

The swing circle and anchor symbol shall be as described in Annex W. The colour shall be red while any part of the outline of own ship remains outside of the circle.

4.7 Display mode and generation of the neighbouring area

(See 6.8.9)

(232/A8.1) *It shall always be possible to display the SENC information in a 'north-up' orientation. Other orientations are permitted. When such orientations are displayed, the orientation shall be altered in steps large enough to avoid unstable display of the chart information.*

NOTE An unstable condition that changes orientation rapidly is distracting and can make text or symbols difficult to read.

(232/A8.2) *ECDIS shall provide for true motion mode. Other modes are permitted.*

(232/A8.3) *When true motion mode is in use, reset and generation of the chart display of the neighbouring area shall take place automatically at own ship's distance from the edge of the display as determined by the mariner.*

(232/A8.4) *It shall be possible to manually change the displayed chart area and the position of own ship relative to the edge of the display.*

(232/A8.5) *If the area covered by the ECDIS display includes waters for which no ENC at a scale appropriate for navigation is available, the areas representing those waters shall carry an indication (see Annex D) to the mariner to refer to the paper chart or to the RCDS mode of operation (see Annex G).*

4.8 Colours and symbols

(See 6.7.1, 6.7.3, 6.8.6)

(232/A9.1) *IHO recommended colours and symbols shall be used to represent SENC information (See S-52, Annex A).*

If SENC data from a non-HO source is in use, it may use other colours or symbols than specified by IHO S-52. In this case a permanent indication “non-ENC data” shall be provided.

NOTE “Non-ENC data” indicates that the equipment does not comply with carriage requirement of ECDIS.

If SENC data from HO source is in use and if the representation uses colours or symbols different from IHO S-52 then a permanent indication “non-ECDIS presentation, non SOLAS mode” shall be provided.

NOTE “Non-ECDIS presentation” indicates that the equipment does not comply with carriage requirement of ECDIS.

(232/A9.2) *The colours and symbols other than those mentioned in 232/A9.1 shall comply with the applicable requirements contained in the IMO standards for navigational symbols (see IEC 62288).*

(232/A9.3) *SENC information, when displayed at the scale specified in the ENC, shall use the specified size of symbols, figures and letters (See S-52, Annex A).*

(232/A9.4) *ECDIS shall allow the mariner to select whether own ship is displayed in true scale or as a symbol.*

4.9 Display requirements

4.9.1 Route planning and monitoring

(232/A10.1) *ECDIS shall be capable of displaying information for:*

- 1) *route planning and supplementary navigation tasks (see 4.10.2);*
- 2) *route monitoring (see 4.10.3).*

4.9.2 Chart presentation size

(See 6.3.2)

(232/A10.2) *The effective size of the chart presentation for route monitoring shall be at least 270 mm by 270 mm.*

4.9.3 Colour and resolution

(See 6.7.3, 6.7.4)

(232/A10.3) *The display shall be capable of complying with the colour and resolution recommendations of IHO (See IHO S-52, Annex A).*

4.9.4 Presentation

(See 6.7.5)

(232/A10.4) *The method of presentation shall ensure that the displayed information is clearly visible to more than one observer in the conditions of light normally experienced on bridge of the ship by day and by night.*

4.9.5 Removal of information categories

(See 6.8.3)

(232/A10.5) *If information categories included in the Standard Display (see Annex A and Annex M) are removed to customize the display, this shall be permanently indicated. Identification of categories which are removed from the Standard Display shall be shown on demand. (See 4.3.3)*

4.10 Route planning, monitoring and voyage recording

4.10.1 General

(See 6.9.2, 6.9.3)

(232/A11.1) *It shall be possible to carry out route planning and route monitoring in a simple and reliable manner.*

(232/A11.2) *The largest scale data available in the SENC for the area given shall always be used by the ECDIS for all ~~alarms~~ alerts or indications of crossing the ship's safety contour, **of being too close to a point object, such as a fixed or floating aid to navigation or isolated danger (navigational hazard)** and of entering a prohibited area, and for ~~alarms~~ alerts and indications according to Annex D.*

4.10.2 Route planning

4.10.2.1 Route plan

(See 6.9.2)

(232/A11.3.1) *It shall be possible to carry out route planning including both straight and curved segments.*

(232/A11.3.2) *It shall be possible to adjust a planned route alphanumerically and graphically including:*

- 1) *adding waypoints to a route;*
- 2) *deleting waypoints from a route;*
- 3) *changing the position of a waypoint.*

(232/A11.3.3) *It shall be possible to plan one or more alternative routes in addition to the selected route. The selected route shall be clearly distinguishable from the other routes.*

(232/A11.3.4) *An indication is required if the mariner plans a route across an own ship's safety contour.*

The indication shall be both graphical in the chart area using IEC 62288:2014, Table A.3, graphical symbol 3.5 b and textual in the user dialog area of the route plan.

The graphical highlight shall be the intersection between the planned route and the charted feature/object.

The charted feature/object which is the origin of the indication shall be displayed on demand together with the IEC 62288:2014, Table A.3, graphical symbol 3.5 b. This may require temporary override of the user selected viewing group layers (see Annex M) or temporary display of a charted feature/object from the largest scale available.

Optionally, the graphical indication in the chart area may be selectable between on and off state. When selected for off state, a permanent indication shall be provided that the "Indication of crossing safety contour is Off".

(232/A11.3.5) An indication shall be given if the mariner plans a route closer than a user-specified distance from the boundary of a prohibited area or a geographic area for which special conditions exist (see Annex C). An indication shall also be given if the mariner plans a route closer than a user-specified distance from a point object, such as a fixed or floating aid to navigation or isolated danger (navigational hazard).

This distance limit may be the same applied to the proximity of all dangers and identical to the distance limit applied for approaching the boundary of a prohibited area, area with special conditions.

The indication shall be both graphical in the chart area using IEC 62288:2014, Table A.3, graphical symbol 3.5 c and textual in the user dialog area of the route plan.

The graphical highlight shall be the intersection between the planned route and the charted feature/object.

The charted feature/object which is the origin of the indication shall be displayed on demand together with the IEC 62288:2014, Table A.3, graphical symbol 3.5 c. This may require temporary override of the user selected viewing group layers (see Annex M) or temporary display of a charted feature/object from the largest scale available.

Graphical indication in the chart area shall be selectable between on and off states separately for navigational hazards and for each prohibited area or each area with special conditions (see Annex C). If any of the selectable indications is in the off state, there shall be a relevant permanent indication: "Indication of navigational hazards is Off" or "Indication of some prohibited areas or areas with special conditions is Off". The full list of prohibited areas or areas with special conditions in the off state shall be available on demand.

(232/A11.3.6) It shall be possible for the mariner to specify a cross track limit of deviation from the planned route at which an automatic off-track alarm shall be activated.

4.10.2.2 Annotated Route plan

(See 6.9.2)

NOTE An annotated route plan combines a route plan with additional mariner's information (see 6.4.1). It includes some of the information required by the guidelines for voyage planning (IMO A.893(21)).

Annotated route plan may be provided. If provided, the following rules apply:

- 1) additional mariner's information shall be organized in similar way to route plans, which means separately named entities such as files or databases;
- 2) annotation means that a route plan shall be linked to such separately named entities;
- 3) annotated route plan shall provide a textual document in electronic form. A paper version may be provided. The document shall list all items from both route plan and additional mariner's information in the same sequence as they will appear when the ship sails the planned route.

EXAMPLE The sequence could be: waypoint 1 with ETD, caution (dangerous area), waypoint 2 with ETA, caution (danger), information (leave pilot), waypoint 3 with ETA, information (speed limit), etc.

4.10.2.3 Route plan exchange with other equipment

(See 6.9.2)

Optionally, means may be provided to export and import route plans and annotated route plans with other equipment. The media used may be a removable memory device (for example USB memory stick, SD card, etc.) or a fixed wired interface (for example IEC 61162-450, see 4.12.7 and Annex T). The format of the route plan exchange for export and import is described in Annex S.

4.10.3 Route monitoring

(See 6.8.13, 6.9.3)

(232/A11.4.1) *For route monitoring the selected route and own ship's position shall appear whenever the display covers that area.*

(232/A11.4.2) *It shall be possible to display a sea area that does not have the ship on the display (for example for look ahead, route planning), while route monitoring. If this is done on the display used for route monitoring, the automatic route monitoring functions (for example. updating ship's position, and providing ~~alarms~~ alerts and indications) shall be continuous. It shall be possible to return to the route monitoring display covering own ship's position immediately by single operator action.*

The system shall allow the user to select a route for monitoring only if the pre-planned route has been checked that the radius of planned turns allows each turn to complete before the next turn.

(232/A11.4.3) *ECDIS shall give an alarm if, within a specified look-ahead time or distance set by the mariner, own ship will cross the safety contour.*

The visual indication of the alarm shall be graphical in the chart area using IEC 62288:2014, Table A.3, graphical symbol 3.5 b and textual in the user dialog area of the alert management.

The graphical highlight shall be the intersection between the own ship look-ahead area and the charted feature/object.

The charted feature/object which is the origin of the alarm shall be displayed on demand together with the IEC 62288:2014, Table A.3, graphical symbol 3.5 b. This may require temporary override of the user selected viewing group layers (see Annex M) or temporary display of a charted feature/object from the largest scale available.

Optionally, the graphical indication in the chart area may be selectable between on and off state. When selected for off state, a permanent indication shall be provided that the "Indication of crossing safety contour is Off".

(232/A11.4.4) *ECDIS shall give ~~an alarm or indication~~ a warning or caution, as selected by the mariner, if, within a specified look-ahead time or distance set by the mariner, own ship will cross the boundary of a prohibited area or of a geographic area for which special conditions exist. (See Annex C)*

The visual indication of the warning or caution shall be graphical in the chart area using IEC 62288:2014, Table A.3, graphical symbol 3.5 c and textual in the user dialog area of the alert management.

The graphical highlight shall be the intersection between the own ship look-ahead area and the charted feature/object.

The charted feature/object which is the origin of the warning or caution shall be displayed on demand together with the IEC 62288:2014, Table A.3, graphical symbol 3.5 c. This may require temporary override of the user selected viewing group layers (see Annex M) or temporary display of a charted feature/object from the largest scale available.

Graphical indication in the chart area shall be selectable between on and off states separately for each prohibited area or area with special condition (see Annex C). If any indication is in the off state, a permanent indication: "ProhAre" shall be provided. The full list of prohibited areas or areas with special conditions in the off state shall be available on demand.

(232/A11.4.5) *An alarm shall be given when the specified cross track limit for deviation from the planned route is exceeded.*

NOTE Route monitoring will only provide an automatic alarm if the mariner has entered the appropriate data in 4.10.2.

(232/A11.4.6) ~~An indication~~ *A caution shall be given to the mariner if, continuing on its present course and speed, over a specified look-ahead time or distance set by the mariner, own ship will pass closer than a user-specified distance from a danger (for example obstruction, wreck, rock) that is shallower than the mariner's safety contour or an aid to navigation (navigational hazard).*

The visual indication of the caution shall be graphical in the chart area using IEC 62288:2014, Table A.3, graphical symbol 3.5 c and textual in the user dialog area of the alert management.

The graphical highlight shall be the intersection between the own ship look-ahead area and the charted feature/object.

The charted feature/object which is the origin of the caution shall be displayed on demand together with the IEC 62288:2014, Table A.3, graphical symbol 3.5 c. This may require temporary override of the user selected viewing group layers (see Annex M) or temporary display of a charted feature/object from the largest scale available.

Optionally, the graphical indication in the chart area may be selectable between on and off states. When selected for off state, a permanent indication shall be provided that the "Indication of navigational hazards is Off".

The look-ahead range, expressed as time or distance, is set by the mariner to control how far in advance an alert will be given before a distance limit is violated. The same look-ahead range shall be applied for approaching the boundary of a prohibited area, area with special conditions, crossing safety contour or proximity to a danger. The distance limit set by the mariner shall be the same applied to the proximity of all dangers and aids to navigation.

(232/A11.4.9) ~~An alarm~~ *A warning shall be given by ECDIS when the ship reaches a specified time or distance, set by the mariner, in advance of a critical point on the planned route.*

ECDIS shall permit the mariner to define critical points and the time or distance at which ~~an alarm~~ *a warning* shall be given. The words "to reach a critical point" shall be considered as passing abeam of the critical point on the planned route.

(232/A11.4.11) *It shall be possible to display alternative routes in addition to the selected route, where any have been planned. The selected route shall be clearly distinguishable from the other routes. During the voyage, it shall be possible for the mariner to modify the selected sailing route or to change to an alternative route.*

(232/A11.4.12) *It shall be possible to display:*

- a) *time-labels along a ship's track manually on demand and automatically at intervals selected between 1 min and 120 min; and*

- b) *an adequate number of points, free movable electronic bearing lines (EBL), variable and fixed range markers (VRM), and other symbols required for navigation purposes and as specified in Annex B.*

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

NOTE Note that an “adequate number” of EBL and VRM implies at least one of each.

4.10.4 Position integration

(See 6.8.14, 6.9.4)

(232/A11.4.7) *The ship's position shall be derived from a continuous positioning system of an accuracy consistent with the requirements of safe navigation. Whenever possible, a second independent positioning source, preferably of a different type shall be provided. In such cases ECDIS shall be capable of identifying discrepancies between the two sources.*

The ECDIS shall have means to display the position from at least two positioning methods, to identify **to the operator** which method is being used, and provide a means for the operator to select the method to use. **Visual Manually obtained** position fix and dead reckoning functions are required as one secondary independent positioning source, **but these are not considered to be continuous even if it is based on continuous heading and speed sources. Refer to 4.10.6.**

ECDIS shall permanently indicate using a yellow colour the source of the position whenever the source is from non continuous position system or method.

NOTE Yellow indicates here information with doubtful integrity in accordance with IEC 62288:2014, 4.8.2.1.

(232/A11.4.8) *ECDIS shall provide ~~an alarm a warning~~ when the input from the continuous position, heading or speed sources is lost. ECDIS shall also repeat, but only as an indication, any ~~alarm alert~~ or indication passed to it from position, heading or speed sources.*

(232/A11.4.10) *The positioning system and the SENC shall be on the same geodetic datum. ECDIS shall give ~~an alarm a warning~~ if this is not the case.*

(232/A11.4.15.2) *ECDIS shall indicate discrepancies between the positions obtained by continuous positioning systems and positions obtained by manual observations.*

(232/A11.4.14) *It shall be possible to adjust the displayed geographic position of the ship manually. This manual adjustment shall be noted alpha-numerically on the screen (i.e. permanently indicated), maintained until altered by the mariner, and automatically recorded.*

4.10.5 Object information

(See 6.8.12)

(232/A11.4.13) *It shall be possible to enter the geographic coordinates of any position and then display that position on demand. It shall also be possible to select any point (feature, symbol or position) on the display and read its geographical co-ordinates on demand.*

4.10.6 LOP position fix

(See 6.9.7)

(232/A11.4.15.1) *ECDIS shall provide the capability to enter and plot manually obtained bearing and distance lines of position (LOP), and calculate the resulting position of own ship. It shall be possible to use the resulting position as an origin for dead-reckoning.*

Position plots shall indicate the time the plot was accepted and, in the case of estimated position, **fix** or dead-reckoned position plot (EP, **fix** or DR), the type of plot. Indication of the source of data used for the position may be selectable, on or off, by the operator.

Data for accepted position plots and the associated LOPs shall be recorded in the voyage recording (see 4.10.7).

4.10.7 Voyage recording

(See 6.9.4, 6.9.5)

(232/A11.5.1) *ECDIS shall store and be able to reproduce certain minimum elements required to reconstruct the navigation and verify the official database used during the previous 12 hours. The following data shall be recorded at one minute intervals:*

- 1) *to ensure a record of own ship's past track: time, position (from the position source in use), heading and speed; and*
- 2) *to ensure a record of official data used: ENC source, edition, date, cell and update history.*

The same data recording requirements apply to the use of any RNC or unofficial chart database.

(232/A11.5.2) *In addition, ECDIS shall record the complete track for the entire voyage, with time marks at intervals not exceeding 4 hours.*

For the purposes of logging, the entire voyage is defined as a maximum period of three months.

(232/A11.5.3) *It shall not be possible to manipulate or change the recorded information.*

(232/A11.5.4) *ECDIS shall have a capability to preserve the record of the previous 12 hours and of the voyage track.*

4.11 Calculations and accuracy

(See 6.6)

(232/A12.1) *The accuracy of all calculations performed by ECDIS shall be independent of the characteristics of the output device and shall be consistent with the SENC accuracy.*

The output device includes the ECDIS display, stored memory, and/or printout.

(232/A12.2) *Bearings and distances drawn on the display, or those measured between features already drawn on the display, shall have accuracy no less than that afforded by the resolution of the display.*

(232/A12.3) *The system shall be capable of performing and presenting the results of at least the following calculations:*

- 1) *true distance and azimuth (i.e. bearing) between two geographical positions;*
- 2) *geographic position from known position and distance/azimuth (i.e. bearing); and*
- 3) *geodetic calculations such as spheroidal distance, rhumb line, and great circle ~~(see 5.4.4).~~*

Accuracy of geodetic calculations shall be for distance within 1 % or 30 m, whichever is the greater distance and shall be for bearings within 1° (see Annex J).

4.12 Connections with other equipment (interfaces)

4.12.1 Connection with navigation equipment

(See 6.2.1, 6.6)

(232/A15.1) *ECDIS shall not degrade the performance of any equipment providing sensor inputs. Nor shall the connection of optional equipment degrade the performance of ECDIS below this standard.*

(232/A15.2) *ECDIS shall be connected to the ship's position fixing system, to the gyro compass and to the speed and distance measuring device. For ships not fitted with a gyro compass, ECDIS shall be connected to a marine transmitting heading device.*

ECDIS shall also be capable to be connected to BAM equipment, BNWAS, ECDIS back-up system and VDR. Optionally ECDIS may be connected to other navigational and communication equipment, for example Radar, AIS, Autopilot, Track Control, Echo sounder, SafetyNET, and NAVTEX.

As a minimum, the ECDIS shall support the ~~sentences from IEC 61162-1 given in Table 1~~ interfaces as given in Annex Q. The manufacturer shall specify which physical interfaces are supported. In addition, suitable alternative input or output interfaces may be used.

Table 1 — ~~Mandatory IEC 61162-1 sentences~~

Parameter	Sentence-format	Comments
~~Time and date~~	~~\$--ZDA~~	~~Input-1~~
~~Geographic position~~	~~\$--GLL~~ ~~\$--GGA~~ ~~\$--GNS~~ ~~\$--RMC~~	~~Input-1~~
~~Datum~~	~~\$--DTM~~	~~Input-1~~
~~Heading~~	~~\$--HDT~~ ~~\$--THS~~	~~Input-1 and -2 (up to 50 Hz)~~ ~~Input-2 (up to 50 Hz)~~
~~Speed~~	~~\$--VBW~~ ~~\$--VHW~~ ~~\$--VTG~~	~~Input-1 from SDME~~ ~~Input-1~~ ~~Input-1 (from ground stabilised system)~~

4.12.2 Connection with BAM

(See 6.2.2)

4.12.2.1 BAM compliant interface

NOTE The performance standards for Bridge Alert Management (BAM) tailor the IMO Code on Alerts and Indicators to harmonize the priority, classification, handling, distribution and presentation of alerts on bridge equipment.

ECDIS shall provide an alert management handling and interface compliant with the requirements of BAM Module A and C further specified for ECDIS in the Annex Q, the state diagram of IEC 61924-2:2012, Annex J and the detailed sentence definitions of IEC 61924-2:2012, Annex K (see Annex D).

Alert management requires:

- classification of all alerts available in the EUT;
- presentation of the alerts;

- c) reporting of alerts;
- d) handling of unacknowledged warnings, see 4.12.2.2;
- e) functionality of remote acknowledge and remote silencing, see 4.12.2.3.

4.12.2.2 Unacknowledged warnings

An unacknowledged warning shall be:

- a) repeated as a warning after a limited time period not exceeding 5 min; or
- b) changed to alarm priority after a limited time period not exceeding 5 min; or
- c) changed to alarm priority after a user selectable time not more than 5 min.

If a user selectable time setting is provided, the default time for the user selected period shall be 60 s.

4.12.2.3 Remote acknowledgments and silencing of alerts

Remote temporary silencing and remote acknowledgement shall be possible via alert related communication described in Annex Q and the detailed sentence definitions of IEC 61924-2:2012, Annex K.

Remote acknowledgement shall only be possible for category B alerts, see IEC 61924-2:2012, Annex C.

Remote silencing of the relevant audible alerts of the ECDIS shall be possible at any time.

4.12.3 Connection with VDR

(See 6.2.3)

4.12.3.1 VDR interface

An interface with VDR shall be provided based on IEC 61162-450 and IEC 61996-1:2013, Annex E and Annex G.

4.12.3.2 Transfer of screen image

A subjectively lossless graphic algorithm shall be used as defined in IEC 61996-1:2013, 5.8 (VDR).

Means shall be provided to configure at installation the header data for the following information in the “Status and information text field” as described in IEC 61996-1:2013, Annex E:

- a) identity of the class of image including source type together with identifier, for example “Source:ECDIS.2”;
- b) identity of the display location.

The Ethernet interface shall provide digital file transfers of one screen capture each 15 s. Means may be provided to configure the use of higher update rates.

Means shall be provided to change the synchronization of the image message transfer to the local clock within the 15 s update period. The default synchronization shall be ECDIS.1 local clock +8 i.e. send at:08,:23,:38,:53, ECDIS.2 local clock +12 i.e. send at:12,:27,:42,:57.

4.12.3.3 Transfer of ECDIS display source information

ECDIS display source information shall be transferred to VDR as defined in IEC 61996-1:2013, Annex G, Table G.1. Items defined in IEC 61996-1:2013, Annex G,

Table G.2 may be included. The transfer shall happen at least every 10 min if the reported information is unchanged from previous transfer. The transfer shall happen within 2 s when any of the reported information has been changed.

The content of ECDIS display source information shall include charts used for display purposes and charts used for alert purposes (i.e. largest scales available).

4.12.4 Connection with BNWAS

To provide user activity information to BNWAS, an EVE sentence as specified in IEC 61162-1 shall be output in response to user-interaction with the ECDIS under conditions described in the user manual.

It is a requirement of BNWAS that it shall not be possible to initiate the reset function or cancel any audible alarm from any device, equipment or system not physically located in areas of the bridge providing proper look out. The ECDIS installation manual shall contain instructions about installation locations and/or configuration of the possibility of resetting the BNWAS timer from the ECDIS when the BNWAS interface can be connected or configured to reset the dormant period of the BNWAS.

4.12.5 Connection for SENC information

(232/A15.3) *ECDIS may provide a means to supply SENC information to external equipment.*

NOTE Test of this interface, if provided, is not required. The format of SENC data is by definition a manufacturer's internal ECDIS format and the data interface between an ECDIS and the external equipment for SENC data transfer is not defined in IEC 61162.

4.12.6 Connection with NAVTEX or SafetyNET for MSI

(See 6.16)

If provided, an interface with either NAVTEX (IEC 61097-6) or SafetyNET (IEC 61097-4) shall comply with the following requirements for processing and presentation of MSI messages received via NAVTEX or SafetyNET.

- a) Provide an indication when a new MSI message is received until it has been displayed or 24 h have passed.
- b) This indication may be suppressed if the MSI message does not meet criteria set by the mariner.
- c) Means shall be provided for the operator to enter criteria for suppression of indication of new MSI messages based on time and distance from own ship, monitored route or planned route. Default setting is no suppression.

NOTE The criteria set for ECDIS indication of new MSI messages are independent of such settings on the MSI receiver which may optionally be controllable by NRM sentence for NAVTEX.

- d) Details of the coverage areas and message categories which have been excluded by the operator from reception and/or display should be readily available.
- e) For NAVTEX ECDIS shall provide means to view the receiver INS mask set inside the NAVTEX (see IEC 61097-6). Optionally ECDIS may provide means to set the NAVTEX receiver mask(s). The elements of the INS mask are: Frequency, transmitter coverage area and message type (see NRM sentence). The elements of the INS mask shall be provided for display as characters 'A', 'B', etc.. ECDIS shall send a query sentence requesting an NRM sentence prior to display of the INS mask.
- f) Capability for data storage of MSI messages for at least 255 most recent messages per each source of MSI shall be provided.
- g) The user shall be able to tag individual messages for permanent retention. These messages may occupy up to 25 % of the available memory and shall not be overwritten by new messages. When no longer required, the user shall be able to remove these messages.

- h) Means shall be provided to view the most recent message, past messages, and to view messages associated with selection of MSI symbols in the graphical display area.
- i) Means for viewing MSI messages shall provide at least 16 lines of message text at a time with a minimum of 40 characters/line..

4.12.7 Connection for transfer of route information

(See 6.17)

If a fixed wire interface is provided (see 4.10.2.3) means shall be provided based on IEC 61162-450 to send and to receive information on a monitored route and alternate routes with other navigation equipment; for example, backup ECDIS, planning workstation, radar, etc. (see Annex T). The data shall comply with the appropriate parts of Annex S for this purpose, as a minimum.

Means shall include:

- a) bidirectional transfer of route(s) for editing purposes. The reported type of transferred route is A in the RRT sentence;
- b) transfer of route for monitoring purpose. The reported type of transferred route is M in the RRT sentence;
- c) sending of RRT sentences using IEC 61162-450 to inform another party about the transfer of a route, and reception of RRT sentences using IEC 61162-450 for file transfer status and intended application status (see Annex T);
- d) for sending:
 - a method to initiate transfer of a route;
 - indication of the status of the IEC 61162-450 file transfer and the status of the intended application based on the received RRT sentence;
 - indication of no response if the RRT sentence is not received within the manufacturer's specified timeout;
- e) for receiving:
 - a method to accept or reject a received route at application;
 - reporting to the sender the status of the IEC 61162-450 file transfer and the status of the intended application based on the received RRT sentence. This reporting can be either by one or two RRT sentences. In a one sentence report a single RRT sentence reports both file transfer status and application level status. In a two sentence report the first RRT sentence reports only the file transfer status and the second RRT sentence reports the application level status;
 - if the receiver is an ECDIS, a method to perform a safety check of the received route against chart database and a method to perform a geometry check at application level;
 - a method to request a route from another ECDIS after power on (See Annex T, Q=Query for transmitting any monitored route or alternative route for editing);
- f) a log of these interactions.

4.12.8 Connection with INS

(See 6.18)

The ECDIS shall indicate the received integrity and plausibility of the basic CCRS values using the information in the NSR sentence. Colour coding of the values as specified in IEC 62288 shall be used.

4.13 Performance tests, malfunction-alarms alerts and indications

(See 6.8.19)

(232/A13.1) *ECDIS shall be provided with means for either automatically or manually carrying out on-board tests of major functions. In case of a failure, the test shall display information to indicate which module is at fault.*

~~On-board tests of major functions include the integrity of sensor input. If there is any detectable reason why the information presented to the operator is invalid, adequate and clear warnings shall be given to the operator.~~

Major functions of ECDIS are: the ECDIS equipment itself, interface to electronic position fixing system, interface to the gyro compass, interface to the speed and distance measuring device, optional interface to the radar and optional interface to the AIS.

(232/A13.2) *ECDIS shall provide suitable ~~alarm~~ alert (i.e. warning) or indication of system malfunction.*

4.14 Back-up arrangements

(232/A14) *Adequate independent back-up arrangements shall be provided to ensure safe navigation in case of an ECDIS failure: (See F.3)*

- 1) *Facilities enabling a safe take-over of the ECDIS functions shall be provided in order to ensure that an ECDIS failure does not result in a critical situation. (See 4.12.7)*
- 2) *A back-up arrangement shall be provided facilitating means for safe navigation of the remaining part of the voyage in case of an ECDIS failure. (See 4.12.7)*

4.15 Power supply

(See 6.9.6)

(232/A16.1) *It shall be possible to operate ECDIS and all equipment necessary for its normal functioning when supplied by an emergency source of electrical power in accordance with the appropriate requirements of regulation II/1 of the 1974 SOLAS convention, as amended.*

(232/A16.2) *Changing from one source of power supply to another, or any interruption of the supply for a period of up to 45 s, shall not require the equipment to be manually re-initialized.*

The equipment is not required to remain operational during this interruption of the power supply.

4.16 Software maintenance

(See 6.10)

Adequate software maintenance arrangements shall be supported by the ECDIS manufacturer in accordance with IMO SN.1/Circ.266, **rev1**. ECDIS equipment shall provide means to display on demand the current software version.

Means shall be provided to replace or install updates to software in systems aboard ship.

Manufacturers shall provide customers with timely access, ~~for example at least~~ by a website which is linked to the IHO website, to a list showing the IHO standards currently in effect for ECDIS, ECDIS application software versions, compliance status and regulatory approvals for the listed configurations/versions. **The procedures for providing timely access shall be part of the recognized quality system of the manufacturer.**

4.17 Quality management requirements

(See 6.11)