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Entwurf

**Navigations- und Funkkommunikationsgeräte und -systeme für die Seeschifffahrt –
Elektronisches Kartendarstellungs- und Informationssystem (ECDIS) –
Betriebs- und Leistungsanforderungen, Prüfverfahren und geforderte Prüfergebnisse
(IEC 80/706/CD:2013), Text in Englisch**

Maritime navigation and radiocommunication equipment and systems –
Electronic chart display and information system (ECDIS) –
Operational and performance requirements, methods of testing and required test results
(IEC 80/706/CD:2013), Text in English

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2014-06-20 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses Entwurfes besonders zu vereinbaren.

Stellungnahmen werden erbeten

- vorzugsweise online im Norm-Entwurfs-Portal des DIN unter www.entwuerfe.din.de bzw. für Norm-Entwürfe der DKE auch im Norm-Entwurfs-Portal der DKE unter www.entwuerfe.normenbibliothek.de, sofern dort wiedergegeben;
- oder als Datei per E-Mail an dke@din.de möglichst in Form einer Tabelle. Die Vorlage dieser Tabelle kann im Internet unter www.din.de/stellungnahme oder für Stellungnahmen zu Norm-Entwürfen der DKE unter www.dke.de/stellungnahme abgerufen werden;
- oder in Papierform an die DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE (Hausanschrift: Stresemannallee 15, 60596 Frankfurt am Main).

Die Empfänger dieses Norm-Entwurfs werden gebeten, mit ihren Kommentaren jegliche relevanten Patentrechte, die sie kennen, mitzuteilen und unterstützende Dokumentationen zur Verfügung zu stellen.

Gesamtumfang 158 Seiten

DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE
Normenstelle Schiffs- und Meerestechnik (NSMT) im DIN

Nationales Vorwort

Die englische Originalfassung des internationalen Dokuments IEC 80/706/CD:2013 „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“ (CD, en: Committee Draft) ist unverändert in diesen Norm-Entwurf übernommen worden.

Das internationale Dokument wurde vom TC 80 „Maritime navigation and radiocommunication equipment and systems“ der Internationalen Elektrotechnischen Kommission (IEC) erarbeitet und den nationalen Komitees zur Stellungnahme vorgelegt.

Die IEC und das Europäische Komitee für Elektrotechnische Normung (CENELEC) haben vereinbart, dass ein auf IEC-Ebene erarbeiteter Entwurf für eine Internationale Norm zeitgleich (parallel) bei IEC und CENELEC zur Umfrage (CDV-Stadium) und Abstimmung als FDIS (en: Final Draft International Standard) bzw. Schluss-Entwurf für eine Europäische Norm gestellt wird, um eine Beschleunigung und Straffung der Normungsarbeit zu erreichen. Dokumente, die bei CENELEC als Europäische Norm angenommen und ratifiziert werden, sind unverändert als Deutsche Normen zu übernehmen.

Da der Abstimmungszeitraum für einen FDIS bzw. Schluss-Entwurf prEN nur 2 Monate beträgt, und dann keine sachlichen Stellungnahmen mehr abgegeben werden können, sondern nur noch eine „JA/NEIN“-Entscheidung möglich ist, wobei eine „NEIN“-Entscheidung fundiert begründet werden muss, wird bereits der CD als DIN-Norm-Entwurf veröffentlicht, um die Stellungnahmen aus der Öffentlichkeit frühzeitig berücksichtigen zu können.

Für dieses Dokument ist das nationale Arbeitsgremium K 738 „Elektronische Navigationsinstrumente“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE (www.dke.de) zuständig.

Für den Fall einer undatierten Verweisung im normativen Text (Verweisung auf eine Norm ohne Angabe des Ausgabedatums und ohne Hinweis auf eine Abschnittsnummer, eine Tabelle, ein Bild usw.) bezieht sich die Verweisung auf die jeweils neueste gültige Ausgabe der in Bezug genommenen Norm.

Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe der Norm.

Der Zusammenhang der zitierten Normen mit den entsprechenden Deutschen Normen ergibt sich, soweit ein Zusammenhang besteht, grundsätzlich über die Nummer der entsprechenden IEC-Publikation. Beispiel: IEC 60068 ist als EN 60068 als Europäische Norm durch CENELEC übernommen und als DIN EN 60068 ins Deutsche Normenwerk aufgenommen.

Das Präsidium des DIN hat mit Präsidialbeschluss 1/2004 festgelegt, dass DIN-Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der Informationsverarbeitung gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Diese Bedingungen sind für den vorliegenden Normentwurf erfüllt.

Da sich die Benutzer des vorliegenden Normentwurfs der englischen Sprache als Fachsprache bedienen, wird die Englische Fassung der IEC 61174 veröffentlicht. Zu deren Abschnitt 3, der die Begriffe festlegt, wurde eine Übersetzung angefertigt und als informativer Nationaler Anhang NA des vorliegenden Normentwurfs hinzugefügt. Für viele der verwendeten Begriffe existieren keine gebräuchlichen deutschen Benennungen, da sich die deutschen Anwender in der Regel ebenfalls der englischen Benennungen bedienen. Dieser Normentwurf steht nicht in unmittelbarem Zusammenhang mit Rechtsvorschriften und ist nicht als Sicherheitsnorm anzusehen.

Es ist vorgesehen, auch bei der entsprechenden zukünftigen Deutschen Norm auf die deutsche Sprachfassung zu verzichten und diese in der englischsprachigen Fassung zu veröffentlichen.

Das Original-Dokument enthält Bilder in Farbe, die in der Papierversion in einer Graustufen-Darstellung wiedergegeben werden. Elektronische Versionen dieses Dokuments enthalten die Bilder in der originalen Farbdarstellung.

Es wird auf die Möglichkeit hingewiesen, dass einige Elemente dieses Dokuments Patentrechte berühren können. ISO [und/oder] IEC sind nicht dafür verantwortlich, einige oder alle diesbezüglichen Patentrechte zu identifizieren.

Änderungen

Gegenüber DIN EN 61174:2009-05 wurden folgende Änderungen vorgenommen:

- a) IMO änderte die Reihenfolge der Leistungsanforderungen in MSC.232(82), verglichen mit den vorherigen nach Resolution A.817(19). Anhang M enthält die Zuordnung der Abschnittsnummern.
- b) Weitere Änderungen folgen im nächsten Normentwurf.

Nationaler Anhang NA (informativ)

3 Begriffe und Abkürzungen

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

Die deutschen Übersetzungen haben Empfehlungscharakter und können nur die ungefähre Begrifflichkeit in Deutsch wiedergeben. Unter Experten wird empfohlen, ausschließlich die englischen Fachbegriffe zu verwenden, um die Gefahr von Missverständnissen zu reduzieren.

3.1 Begriffe

3.1.1

geeignete Sammlung aktueller Papier-Seekarten

(en: appropriate portfolio of up to date paper charts, APC)

(232/App.7 3.7) Satz von Papierseekarten mit einem Maßstab, der ausreichend Details der Topographie, Tiefenangaben, Gefahren für die Schifffahrt, Seezeichen, kartierte Routen und Verkehrslenkungsmaßnahmen darstellt, um dem Nautiker Informationen zur gesamten Navigationsumgebung zu geben. Der APC soll eine ausreichende Vorausschau ermöglichen. Küstenstaaten stellen Details der Seekarten bereit, die den Anforderungen dieser Sammlung entsprechen, und diese Details sind in einer weltweiten Datenbank enthalten, die durch das IHO unterhalten wird. Wenn der Inhalt der APC bestimmt wird, dann sollten die in dieser Datenbank enthaltenen Details berücksichtigt werden.

3.1.2

CIE-Farbkalibrierung

(en: CIE colour calibration)

Verfahren zur Bestätigung, dass die Farbe nach S-52, Annex A auf der ECDIS-Anzeige korrekt wiedergegeben wird

3.1.3

gemeinsames Bezugssystem

(en: common reference system)

Sensor-Eingangsdaten, die einen identischen und verbindlichen Bezug für Position, Kurs, Rechtvorrichtung, Peilung, Entfernung, Geschwindigkeit usw. und horizontalem Geoidmodell bei verschiedenen Subsystemen innerhalb eines Integrierten Navigationssystems bereitstellen

3.1.4

Zusammenstellungsmaßstab

(en: compilation scale)

Maßstab, mit dem die Seekarteninformation den IHO-Anforderungen für Seekartengenauigkeit entspricht. Er wird durch das erstellende hydrografische Büro festgelegt und in der ENC kodiert

3.1.5

verfälschte Daten

(en: corrupted data)

nach der S-57 ENC-Produktspezifikation erstellte ENC-Daten, die während der Erstellung, Übertragung oder Wiederherstellung geändert oder modifiziert wurden

3.1.6

gekoppelte Position

(en: dead-reckoned position, DR)

von der letzten akzeptierten Positionsaktualisierung hochgerechnete Position, die auf gegenwärtigem Kurs und Geschwindigkeit basiert und in einem durch den Anwender gewählten Zeitintervall aktualisiert wird

3.1.7

verschlechtern

(en: degrade)

vermindern von Quantität oder Qualität des Informationsgehalts

3.1.8

Basisanzeige

(en: display base)

(232/A3.5) *Seekarteninhalt, wie im Annex A gelistet, der nicht von der Anzeige gelöscht werden kann. Für die sichere Navigation wird dieser Inhalt nicht als ausreichend angesehen.*

3.1.9

Bildaufbauzeit

(en: display redraw time)

Zeitintervall vom Beginn einer Bildänderung bis zum vollständigen Neuaufbau des Bildes

3.1.10

Bilderneuerungszeit

(en: display regeneration time)

Zeitintervall von der Anwendereingabe bis zum daraus folgenden vollständigen Neuaufbau des Bildes

3.1.11

Anzeigemaßstab

(en: display scale)

normiertes Verhältnis zwischen einer Entfernung auf der Anzeige und einer Entfernung auf der Erde, das zum Beispiel als 1:10 000 ausgedrückt wird

3.1.12

elektronisches Kartendarstellungs- und Informationssystem

(en: electronic chart display and information system, ECDIS)

(232/A3.1) *ein Navigationssystem, das bei Vorhandensein geeigneter Ausfallsicherungseinrichtungen den Vorschriften über das Mitführen von auf dem neusten Stand befindlichen Seekarten gemäß den Regeln V/19 und V/27 des SOLAS-Abkommens von 1974, in der jeweils geltenden Fassung, entspricht und aufgrund dessen anerkannt werden kann, da es den Nautiker bei der Routenplanung und -überwachung unterstützt, indem es ausgewählte Informationen aus einer elektronischen Systemseekarte (SENC) mit von Navigationssensoren übermittelten Positionsinformationen sowie auf Anforderung zusätzliche navigationsbezogene Information anzeigt.*

3.1.13

Elektronische Seekarte

(en: electronic navigational chart, ENC)

(232/A3.2) der nach *Inhalt, Struktur und Format* normierte Datenbestand, der von einem durch oder im Auftrag einer Regierung autorisierten hydrographischen Dienst oder einer anderen zuständigen staatlichen Stelle für die Verwendung im ECDIS herausgegeben wird und den IHO-Normen entspricht. Die ENC enthält alle für die sichere Schiffsführung erforderlichen Kartendaten und kann außer den Papierseekartendaten zusätzliche Informationen enthalten, die für die sichere Schiffsführung benötigt werden (z. B. aus nautischen Handbüchern).

3.1.14

ENC-Zelle

(en: ENC cell)

geografischer Teil der ENC-Daten zu Verteilzwecken. Für weitere Information, siehe ENC-Produktspezifikation in S-57.

3.1.15

ENC-Daten

(en: ENC data)

Daten entsprechend 3.1.13

3.1.16

ENC-Prüfdatensatz

(en: ENC test data set)

normierter Datensatz und Prüfanweisungen, verfügbar als IHO S-64

3.1.17

geschätzte Position

(en: estimated position, EP)

höchstwahrscheinliche Position, die durch Addition von Kurs und Geschwindigkeit zur letzten Positionsbestimmung entstanden ist und jeden geschätzten Einfluss, wie Wind, Strom usw., berücksichtigt. Für diese ECDIS-Norm ist EP eine mittels Standlinienfunktion (LOP) bestimmte Position des eigenen Schiffs und versiegelt mit Koppeln und Wind und Strom.

3.1.18

Positionsbestimmung

(en: fix)

durch Informationsverarbeitung einer Anzahl von Navigationsbeobachtungen, ohne Verweisung auf irgend eine andere frühere Position, durch den gemeinsamen Kreuzungspunkt von zwei oder mehreren Standlinien bestimmte und entstandene Position des eigenen Schiffs. Die Positionsbestimmung schließt auch Beobachtungen zu unterschiedlichen Zeiten mit ein, die dann durch DR oder EP auf einen gemeinsamen Zeitpunkt versiegelt werden.

3.1.19

Standlinie

(en: line of position, LOP)

durch Beobachtung und Messung von Entfernung oder Peilung zu einem Seezeichen oder einem anderen kartierten Element bestimmte, eingezeichnete Linie, auf der sich das eigene Schiff befindet

3.1.20

Nicht-ENC-Daten

(en: non-ENC data)

Daten die 3.1.13 nicht entsprechen

3.1.21**Überskalierung**

(en: overscale)

Anzeige von Karteninformation mit einem größeren Maßstab, als dem Erfassungsmaßstab. Überskalierung kann durch absichtliche Überskalierung durch den Nautiker oder durch automatisches Überskalieren durch das ECDIS in der Zusammenstellung einer Ansicht entstehen, wenn die verwendeten Daten in unterschiedlichen Maßstäben vorliegen.

3.1.22**Präsentationsbibliothek**

(en: presentation library)

Implementierung der Anzeigespezifikationen in S-52, Annex A durch Dekodierung und Symbolisierung der SENC. Diese enthält:

- a) ECDIS-Symbolbibliothek für Seekartenobjekte;
- b) ECDIS-Farbtabelle für Tages-, Dämmerungs- und Nachtsicht;
- c) Nachschlagetabellen, die ENC-Objekte mit den jeweils geeigneten Farben und Symbolen verknüpfen;
- d) bedingte Symbolisierungsverfahren für
 - Fälle, bei denen die Symbolisierung von Umständen, wie der vom Nautiker gewählten Sicherheitskontur, Datum oder Uhrzeit, abhängig ist;
 - Fälle, bei denen die Symbolisierung zu komplex ist, um mit einer direkten Nachschlagetabelle festgelegt zu werden;
- e) Beschreibung von Symbolisierungsanweisungen;
- f) ergänzendes Material, zum Beispiel ECDIS Karte 1, Prüfdiagramme zur Farbunterscheidung und Software zur Farbkalibrierung.

3.1.23**Rasterkarten-Darstellungssystem**

(en: raster chart display system, RCDS)

(232/App.7 3.1) *Navigationsinformationssystem, das RNCs mit Positionsinformation von Navigationssensoren anzeigt, um den Nautiker bei der Routenplanung und Routenüberwachung zu unterstützen und, wenn erforderlich, zusätzliche navigationsbezogene Information anzeigt*

3.1.24**Rasterseekarte**

(en: raster navigational chart, RNC)

(232/App.7 3.2) *originalgetreue Kopie einer Papierseekarte, die von einem offiziellen staatlichen hydrografischen Dienst oder in dessen Auftrag herausgegeben oder verteilt wurde. RNC bedeutet in diesen Normen entweder eine einzelne Seekarte oder eine Sammlung von Seekarten.*

3.1.25**RNC-Daten**

(en: RNC data)

Daten entsprechend 3.1.24

3.1.26**RNC-Prüfdatensatz**

(en: RNC test data set)

für das IHO bereitgestellter, normierter Datensatz, der notwendig ist, um die IEC-Prüfanforderungen für die RCDS-Betriebsart zu erfüllen. Dieser Datensatz ist entsprechend der RNC-Produktspezifikation S-61 kodiert. Prüf-RNCs sind durch das HO spezifiziert, das den RNC-Dienst bereitstellt, oder in dessen Namen der RNC-Dienst angeboten wird.

3.1.27

einzelne Bedieneraktivität

(en: single operator action)

Einzelaktivität, die durch die Aktivierung eines physikalischen Bedienelements oder einer Schaltfläche einschließlich einer notwendigen Cursor-Bewegung erreicht werden soll.

3.1.28

Sicherheitskontur

(en: safety contour)

Grenzlinie zwischen unsicherem und sicherem Bereich, wie unter Anwendung von Flächenobjekten der S-57 Objektklassen der Erdoberfläche analysiert. Die Sicherheitskontur ist nicht notwendigerweise identisch mit einer Tiefenlinie.

3.1.29

Standardanzeige

(en: standard display)

(232/A3.4) *Anzeigebetriebsart, die während der Routenplanung und Routenüberwachung als Minimum benutzt werden soll. Der Seekarteninhalt ist im Anhang A aufgelistet.*

3.1.30

Elektronische Systemseekarte

(en: system electronic navigational chart, SENC)

(232/A3.3) *Datenbasis in des Herstellers internem ECDIS-Format, die aus der verlustlosen Umsetzung des gesamten ENC-Inhalts mit Aktualisierungen resultiert. Es ist die Datenbasis, auf die eigentlich vom ECDIS zur Bildschirmdarstellung und für andere Navigationsfunktionen zugegriffen wird, und sie ist äquivalent zu einer aktuellen Papierseekarte. Die SENC kann auch vom Nautiker ergänzte Informationen und Informationen aus anderen Quellen enthalten.*

3.1.31

Raster-Systemseekarten

(en: system raster navigational chart database, SRNC)

(232/App.7 3.3) *Datenbasis, die von der Umsetzung der RNC durch das RCDS resultiert und Aktualisierungen der RNC durch geeignete Mittel mit einschließt*

3.2 Abkürzungen

AIS	Automatisches Identifikationssystem	(en: Automatic identification system)
ARPA	Automatische Radarzielverfolgung	(en: Automatic radar plotting aid)
CIE	Internationale Beleuchtungskommission	(en: Comité International de l'Eclairage)
DR	gekoppelte Position	(en: Dead-reckoned)
EBL	elektronische Peillinie	(en: Electronic bearing line)
EP	geschätzte Position	(en: Estimated position)
EPFS	elektronisches Positionsbestimmungssystem	(en: Electronic position-fixing system)
EUT	Gerät im Test	(en: Equipment under test)
GMDSS	Weltweites Seenot- und Sicherheitsfunksystem	(en: Global maritime distress and safety system)
HO	Hydrographisches Büro	(en: Hydrographic office)
IHO	Internationale Hydrographische Organisation	(en: International Hydrographic Organization)
IMO	Internationale Seeschiffahrtsorganisation	(en: International Maritime Organization)
SOLAS	Internationales Übereinkommen zum Schutz des menschlichen Lebens auf See, 1974 geändert	(en: International Convention for the Safety of Life at Sea (SOLAS), 1974 as amended)
VRM	variabler Entfernungskennzeichner	(en: Variable range marker)
VDR	Schiffsdatenschreiber	(en: Voyage Data Recorder)

IEC TC80/MT7 convenor note

IEC and IHO are working in parallel to clarify all chart related ECDIS requirements and methods of test. As part of this process IHO is going to publish new editions of the IHO S-52 and IHO S-64. The time schedule of IEC is intentionally set a little bit behind the IHO time schedule. Current IHO plan is to prepare everything ready for final approval by IHO HSSC meeting in Nov 2013. After IHO HSSC approval of the technical content the IHO will have voting by member states of the IHO, for which the result is assumed to be available in Jan 2014. Current IEC schedule is last

TC80/MT7 meeting for completion of the CDV in Mar 2014. However if the IHO cannot meet the planned schedule then the IEC TC80/MT7 schedule shall be adjusted for the new plan of the IHO.

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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**

FOREWORD

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International Standard IEC 61174 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

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

The main changes with respect to the previous edition are listed below:

- TBD

IMO changed the order of the performance standards in MSC.232(82) compared with the previous standards in resolution A.817(19). Annex M gives a cross-referencing of clause numbering.

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

FDIS	Report on voting
80/535/FDIS	80/542/RVD

405

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

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

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

- 412 • reconfirmed,
- 413 • withdrawn,
- 414 • replaced by a revised edition, or
- 415 • amended.

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

417

418

**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 publications S-32, S-52, S-57, S-61, S-63 and 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 referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

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

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

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

- 467 IMO A.424(XI):1979, *Performance standards for gyro-compasses*
- 468 IMO A.694(17):1991, *General requirements for shipborne radio equipment forming part of the*
 469 *global maritime distress and safety system (GMDSS) and for electronic navigational aids*
- 470 IMO A.821(19):1995, *Performance standards for gyro-compasses for high-speed craft*
- 471 IMO MSC.116(73): 2000: *Performance standards for marine transmitting heading devices*
 472 *(THDs)*
- 473 IMO A.824(19):1995, *Performance standards for devices to indicate speed and distance*
- 474 IMO A.1021(26):2009, *Code on Alerts and Indicators*
- 475 IMO MSC.191(79): 2004, *Performance standards for the presentation of navigation-related*
 476 *information on shipborne navigational displays*
- 477 IMO MSC.192(79): 2004, *Revised performance standards for radar equipment*
- 478 IMO MSC.232(82):2006, *Revised Performance standards for electronic chart display and*
 479 *information systems (ECDIS)*
- 480 IMO MSC.252(83):2007, *Performance standards for integrated navigation systems (INS)*
- 481 IMO MSC.302(87):2010, *Performance standards for bridge alert management (BAM)*
- 482 IMO MSC.333(90):2012, *Adoption of revised performance standards for shipborne voyage*
 483 *data recorders (VDRs)*
- 484 IMO MSC/Circ.982 (2000), *Guidelines on ergonomic criteria for bridge equipment and layout*
- 485 IMO SN/Circ.243 (2004), *Guidelines for the Presentation of Navigation-related Symbols,*
 486 *Terms and Abbreviations*
- 487 IMO SN.1/Circ.266 (2007), *Maintenance of electronic chart display and information system*
 488 *(ECDIS) software*
- 489 IHO M-3:2007, *Resolutions of the IHO, Chapter A, Section 3, Technical Resolution 3.11*
- 490 IHO S-32, appendix 1, *Hydrographic dictionary – Glossary of ECDIS related terms*
- 491 IHO S-52:2010, *Specifications for chart content and display aspects of ECDIS edition 6.0*
- 492 IHO S-52, Appendix 1:2012, *Guidance on Updating the Electronic Navigational Chart edition*
 493 *4.0*
- 494 IHO S-52, Annex A:2008, *Presentation library edition 3.4*
- 495 IHO S-52, Annex B:2008, *Procedures for initial calibration of displays*
- 496 IHO S-52, Annex C:2008, *Procedures for maintaining the calibration of displays*
- 497 IHO S-57, appendix B.1: 2000, *ENC product specification*
- 498 IHO S-61:1999, *Product specification for raster navigational charts (RNC)*
- 499 IHO S-63:2008, *IHO data protection scheme*
- 500 IHO S-64, *Test data sets for ECDIS*

501 **3 Terms, definitions and abbreviations**

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

503 **3.1 Definitions**

504 **3.1.1**

505 **appropriate portfolio of up to date paper charts** 506 **(APC)**

507 (232/App.7 3.7) *a suite of paper charts of a scale to show sufficient detail of topography,*
 508 *depths, navigational hazards, aids to navigation, charted routes, and routing measures to*
 509 *provide the mariner with information on the overall navigational environment. The APC should*
 510 *provide adequate look-ahead capability. Coastal States will provide details of the charts within*

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

514 **3.1.2**

515 **CIE colour calibration**

516 procedure to confirm that the colour specified in S-52, Annex A is correctly reproduced on the
517 ECDIS display

518 **3.1.3**

519 **common reference system**

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

523 **3.1.4**

524 **compilation scale**

525 scale with which the chart information meets the IHO requirements for chart accuracy. It is
526 established by the producing hydrographic office and encoded in the ENC

527 **3.1.5**

528 **corrupted data**

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

531 **3.1.6**

532 **dead-reckoned position**

533 **DR**

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

536 **3.1.7**

537 **degrade**

538 reduce the quantity or quality of information content

539 **3.1.8**

540 **display base**

541 *(232/A3.5) the chart content as listed in Annex A and which cannot be removed from the*
542 *display. It is not intended to be sufficient for safe navigation*

543 **3.1.9**

544 **display redraw time**

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

546 **3.1.10**

547 **display regeneration time**

548 interval from operator action until the consequent redraw is complete

549 **3.1.11**

550 **display scale**

551 ratio between a distance on the display and a distance on the ground, normalized and
552 expressed as, for example 1:10 000

553 **3.1.12**

554 **electronic chart display and information system**
555 **(ECDIS)**

556 *(232/A3.1) a navigation information system which with adequate backup arrangements can be*
557 *accepted as complying with the up-to-date chart required by regulation V/19 and V/27 of the*
558 *1974 SOLAS Convention, as amended, by displaying selected information from a system*
559 *electronic navigational chart (SENC) with positional information from navigation sensors to*
560 *assist the mariner in route planning and route monitoring, and if required display additional*
561 *navigation-related information*

- 562 **3.1.13**
563 **electronic navigational chart**
564 **(ENC)**
565 *(232/A3.2) the database, standardized as to content, structure and format, issued for use with*
566 *ECDIS by or on the authority of a Government authorized Hydrographic Office or other*
567 *relevant government institution, and conform to IHO standards. The ENC contains all the*
568 *chart information necessary for safe navigation and may contain supplementary information in*
569 *addition to that contained in the paper chart (for example sailing directions) which may be*
570 *considered necessary for safe navigation*
- 571 **3.1.14**
572 **ENC cell**
573 geographic division of ENC data for distributing purposes. For further information, refer to the
574 ENC product specification in S-57
- 575 **3.1.15**
576 **ENC data**
577 data conforming to 3.1.13
- 578 **3.1.16**
579 **ENC test data set**
580 standardized data set and testing instructions available as IHO S-64.
- 581 **3.1.17**
582 **estimated position**
583 **(EP)**
584 most probable position obtained by adding to the last fix, course and speed, considering all
585 estimated influence like wind, current etc. For this ECDIS standard the EP is a position of
586 own ship determined by the LOP feature and transferred by dead reckoning and set & drift.
- 587 **3.1.18**
588 **fix**
589 a position of own ship established by processing information from a number of navigation
590 observations and determined, without reference to any other former position, by the common
591 intersection of two or more LOPs
592 The case of fix includes also observations from different times and transferred by DR or EP
593 into a common time event
- 594 **3.1.19**
595 **line of position**
596 **(LOP)**
597 plotted line on which own ship is located determined by observation or measurement of the
598 range or bearing to an aid to navigation or other charted element
- 599 **3.1.20**
600 **non-ENC data**
601 data not conforming to 3.1.13
- 602 **3.1.21**
603 **overscale**
604 display of the chart information at a display scale larger than the compilation scale.
605 Overscaling may arise from deliberate overscaling by the mariner, or from automatic
606 overscaling by ECDIS in compiling a display when the data included is at various scales
- 607 **3.1.22**
608 **presentation library**
609 implementation of the display specifications in S-52, Annex A, by de-coding and symbolizing
610 the SENC. It contains:
611 a) the ECDIS symbol library for chart features;
612 b) the ECDIS colour tables for day, dusk, and night viewing;

- 613 c) look-up tables, linking ENC objects to the appropriate colour and symbology;
614 d) conditional symbology procedures for
615 – cases where symbolizing depends on circumstances, such as the mariner's choice of
616 safety contour, date or time;
617 – cases where symbolizing is too complex to be defined in a direct look-up table;
618 e) description of symbology instructions;
619 f) supplementary features, for example ECDIS chart 1 colour differentiation test diagrams
620 and colour calibration software

621 **3.1.23**

622 **raster chart display system**
623 **(RCDS)**

624 *(232/App.7 3.1) a navigation information system displaying RNCs with positional information*
625 *from navigation sensors to assist the mariner in route planning and route monitoring and, if*
626 *required, display additional navigation-related information*

627 **3.1.24**

628 **raster navigational chart**
629 **(RNC)**

630 *(232/App.7 3.2) a facsimile of a paper chart originated by, or distributed on the authority of, a*
631 *government-authorized hydrographic office. RNC is used in these standards to mean either a*
632 *single chart or a collection of charts*

633 **3.1.25**

634 **RNC data**

635 data conforming to 3.1.24

636 **3.1.26**

637 **RNC test data set**

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

642 **3.1.27**

643 **single operator action**

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

646 **3.1.28**

647 **Safety contour**

648 safety contour is the borderline between unsafe and safe area as analyzed using area objects from the
649 skin of the earth S57 object classes. Safety contour is not necessarily same as a depth contour.

650 **3.1.29**

651 **standard display**

652 *(232/A3.4) the display mode intended to be used as a minimum during route planning and*
653 *route monitoring. The chart content is listed in Annex A*

654 **3.1.30**

655 **system electronic navigational chart**
656 **(SENC)**

657 *(232/A3.3) a database in the manufacturer's internal ECDIS format, resulting from the*
658 *lossless transformation of the entire ENC contents and updates. It is this database that is*
659 *actually accessed by ECDIS for the display generation and other navigational functions, and*
660 *is the equivalent of an up-to-date paper chart. The SENC may also contain information added*
661 *by the mariner and information from other sources*

662 **3.1.31**663 **system raster navigational chart database**
664 **(SRNC)**

665 (232/App.7 3.3) *a database resulting from the transformation of the RNC by the RCDS to*
666 *include updates to the RNC by appropriate means*

667 **3.2 Abbreviations**

668	AIS	Automatic identification system
669	ARPA	Automatic radar plotting aid
670	CIE	Comité International de l'Eclairage
671	DR	Dead-reckoned
672	EBL	Electronic bearing line
673	EP	Estimated position
674	EPFS	Electronic position-fixing system
675	EUT	Equipment under test
676	GMDSS	Global maritime distress and safety system
677	HO	Hydrographic office
678	IHO	International Hydrographic Organization
679	IMO	International Maritime Organization
680	SOLAS	International Convention for the Safety of Life at Sea (SOLAS), 1974 as amended
681	VRM	Variable range marker
682	VDR	Voyage Data Recorder

683 **4 Minimum operational and performance requirements**684 **4.1 General**

685 (232/A1.1) *The primary function of the ECDIS is to contribute to safe navigation.*

686 (232/A1.2) *ECDIS with adequate back-up arrangements may be accepted as complying with*
687 *the up-to-date charts required by regulations V/19 and V/27 of the 1974 SOLAS Convention,*
688 *as amended. (See Annex F.)*

689 (232/A2.4) *In addition to the general requirements set out in resolution A.694(17) as further*
690 *specified in IEC 60945 and the presentation requirements set out in resolution MSC.191(79)*
691 *as further specified in IEC 62288, ECDIS equipment shall meet the requirements of*
692 *MSC.232(82) and follow the relevant guidelines on ergonomic principles adopted by the IMO*
693 *in MSC/Circ.982. (See 5.3, 6.3, 6.9.1.).*

694 (232/A1.3) *ECDIS shall be capable of displaying all chart information necessary for safe and*
695 *efficient navigation originated by, and distributed on the authority of, government authorized*
696 *hydrographic offices. (See 4.3, Clause 5.)*

697 (232/A1.4) *ECDIS shall facilitate simple and reliable updating of the electronic navigational*
698 *chart. (See 4.4, 5.10)*

699 (232/A1.5) *ECDIS shall reduce the navigational workload compared to using the paper chart.*
700 *It shall enable the mariner to execute in a convenient and timely manner all route planning,*
701 *route monitoring and positioning currently performed on paper charts. It shall be capable of*
702 *continuously plotting the ship's position. (See 4.10.)*

703 (232/A1.7) *ECDIS shall have at least the same reliability and availability of presentation as*
704 *the paper chart published by government authorized hydrographic offices. (See 4.3, 4.8, 4.9,*
705 *Clause 5.)*

706 (232/A1.8) *ECDIS shall provide appropriate alerts or indications with respect to the*
707 *information displayed or malfunction of the equipment. (See Annex D.)*

708 (232/A1.9) *When the relevant chart information is not available in the appropriate form, (See*
 709 *4.4) some ECDIS equipment may operate in the Raster Chart Display System (RCDS) mode*
 710 *as defined in Annex G. The RCDS mode of operation shall conform to performance standards*
 711 *not inferior to those set out in Annex G.*

712 (232/A1.6) *The ECDIS display may also be used for the display of radar, radar tracked target*
 713 *information, AIS and other appropriate data layers to assist in route monitoring in accordance*
 714 *with requirements of 232/A2.4, 232/A7.4, and 232/A9.2, as further specified herein. (See 4.6,*
 715 *4.8, 4.12.)*

716 **4.2 ECDIS definitions**

717 (232/A3.6) *Further information on ECDIS definitions may be found in IHO S-32.*

718 **4.3 Display of SENC information**

719 **4.3.1 SENC**

720 (See 6.8.4, 6.5, 6.7)

721 (232/A5.1a) *ECDIS shall be capable of displaying all SENC information (See 5.1). An ECDIS*
 722 *shall be capable of accepting and converting an ENC and its updates into a SENC.*

723 (232/A5.1b) *The ECDIS may also be capable of accepting a SENC resulting from conversion*
 724 *of ENC to SENC ashore, in accordance with IHO Technical Resolution A3.11 (IHO Miscellaneous*
 725 *Publication M-3). This method of ENC supply is known as SENC delivery.*

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

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

733 **4.3.2 Indication about use of private source**

734 (See 6.5.2 a.)

735 If SENC data from a private source is in use, a permanent and persisting indication shall be
 736 provided.

737 **4.3.3 Categories of display**

738 (See 6.8.1 to 6.8.3.)

739 (232/A5.2) *SENC information available for display during route planning and route monitoring*
 740 *shall be subdivided into the following three categories, Display base, Standard display and All*
 741 *Other Information. (See Annex A.)*

742 (232/A5.3) *ECDIS shall present the Standard Display at any time by a single operator action.*

743 Selection of Standard display shall not change any user setting other than selection of
 744 viewing groups for the display of charted objects. When Standard Display (Annex L.3) is
 745 selected, all viewing groups of that category shall be visible in the chart display and additional
 746 viewing groups of All Other Information (Annex L.4) shall not be visible in the chart display.

747 (232/A5.5) *It shall be easy to add or remove information from the ECDIS display. It shall not*
 748 *be possible to remove information contained in the Display Base.*

749 Each IMO SENC information category is divided into sub-classes called viewing group layers
 750 and viewing groups as specified in Annex L. The details of viewing group layers and subsets
 751 of viewing groups within each layer are available in L.2, L.3 and L.4.

752 ECDIS shall provide means to add or remove information from the display by independent
 753 selection of any of the viewing group layers except those of the Display Base (for example:
 754 L.3.2. Additional aids to navigation and fixed structures, L.3.3 Fairways, L.3.4 Conspicuous
 755 features, etc.).

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 L.

The association of multiple viewing groups from different viewing group layers might 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 may be provided than those based on viewing group layers 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/7.1.3.1) *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".*

The text group layers specified in Annex L 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 Annex L.5.

(S-52, Annex A/7.1.3.1) 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 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: As a guide to 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/13.3) *National text* (text group 31, see Annex L.5.2) *is a supplementary option for ECDIS. If provided, the style shall be similar to that of the Presentation Library* (see S-52, Annex A/7.1.3.1).

(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.*

4.3.4 Safety contour

(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:*

.1 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;

.2 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

.3 in each of the above cases, an indication shall be provided. (See 5.4.3.)

Means shall be provided to prevent selection or entry of a user selected value of safety contour deeper than the value of safety depth (See 4.3.5).

4.3.5 Safety depth

(See 6.8.9.)

(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.*

805 Means shall be provided to prevent selection or entry of a value of safety depth shallower
806 than the user selected the value of safety contour, ref above (See 4.3.4).

807 **4.3.6 Information content**

808 (See 6.8.)

809 (232/A5.10) *The ENC and all updates to it shall be displayed without any degradation of their*
810 *information content.*

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

813 **4.3.7 Verification and updates**

814 (See 6.8.5, 6.8.15.2.)

815 (232/A5.11) *ECDIS shall provide a means to ensure that the ENC and all updates to it have*
816 *been correctly loaded into the SENC.*

817 (232/A5.12) *The ENC data and updates to it shall be clearly distinguishable from other*
818 *displayed information, including those listed in Annex B.*

819 **4.3.8 Information about chart objects**

820 (232/A5.6) *For any operator identified geographical position (for example by cursor picking)*
821 *ECDIS shall display on demand the information about the chart objects associated with such*
822 *a position. (See 5.4.1.)*

823 **4.3.9 Display scale**

824 (232/A5.7) *It shall be possible to change the display scale by appropriate steps for example*
825 *by means of either chart scale values or ranges in nautical miles. (See 5.3.1.)*

826 **4.4 Provision and updating of chart information**

827 **4.4.1 Contents of the SENC**

828 (See 6.5.2.)

829 (232/A4.1) *The chart information to be used in ECDIS shall be the latest edition, as corrected*
830 *by official updates, of that issued by or on the authority of a Government, government-*
831 *authorized Hydrographic Office or other relevant government institution, and conform to IHO*
832 *standards.*

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

836 A new edition of an ENC will supersede a previous ENC and its integrated updates issued by
837 a government authorized hydrographic office.

838 (232/A4.2) *The contents of the SENC shall be adequate and up-to-date to comply with*
839 *regulation V/27 of the 1974 SOLAS Convention as amended.*

840 (232/A4.3) *It shall not be possible to alter the contents of the ENC or SENC information*
841 *transformed from the ENC.*

842 **4.4.2 Updates**

843 (See 6.5.3, 6.8.15, 6.8.16.)

844 (232/A4.4) *Updates shall be stored separately from the ENC.*

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

846 (232/A4.5) *ECDIS shall be capable of accepting official updates to the ENC data provided in*
847 *conformity with IHO standards. These updates shall be automatically applied to the SENC. By*

848 *whatever means updates are received, the implementation procedure shall not interfere with*
849 *the display in use.*

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

851 (232/A4.6) *ECDIS shall also be capable of accepting updates to the ENC data entered*
852 *manually with simple means for verification prior to the final acceptance of the data. They*
853 *shall be distinguishable on the display from ENC information and its official updates and not*
854 *affect display legibility.*

855 (232/A4.7) *ECDIS shall keep and display on demand a record of updates including time of*
856 *application to the SENC. This record shall include updates for each ENC until it is superseded*
857 *by a new edition.*

858 (232/A4.8) *ECDIS shall allow the mariner to display updates in order to review their contents*
859 *and to ascertain that they have been included in the SENC.*

860 (232/A4.9) *ECDIS shall be capable of accepting both non-encrypted ENCs and ENCs*
861 *encrypted in accordance with the IHO Data Protection Scheme (IHO Special Publication S-*
862 *63).*

863 Note: Non-encrypted ENCs can be available in plain S-57 format or in accordance with the IHO S-63

864 Means shall be provided for full ENC Update Status Report in accordance with the IHO S-63.
865 Optionally means may be provided for Route Filtered ENC Update Status Report [in
866 accordance with the IHO S-63]. Optionally means may be provided for ENC Management
867 Report [in accordance with the IHO S-63]. (See Annex S)

868 **4.5 Scale**

869 (See 6.8.6.)

870 (232/A6.1) *ECDIS shall provide a permanent and persistent indication if:*

871 *.1 the information is displayed at a larger scale than that contained in the ENC; or*

872 *.2 own ship's position is covered by an ENC at a larger scale than that provided by the*
873 *display.*

874 **4.6 Display of other navigational information**

875 **4.6.1 Common reference system**

876 (See 6.8.12 g.)

877 (232/A7.3) *ECDIS and added navigational information shall use a common reference system.*
878 *If this is not the case, a permanent and persistent indication shall be provided.*

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

880 **4.6.2 Radar and plotting information**

881 (See 6.8.13.)

882 (232/A7.1) *Radar information and/or AIS information may be transferred from systems*
883 *compliant with the relevant standards of IMO. Other navigational information may be added to the*
884 *ECDIS display. However, it shall not degrade the displayed SENC information, and it shall be*
885 *clearly distinguishable from the SENC information.*

886 (232/A7.2) *It shall be possible to remove the radar information, AIS information and other*
887 *navigational information by a single operator action.*

888 (232/A7.4.1) *Transferred radar information may contain a radar image and/or tracked target*
889 *information.*

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

892 (232/A7.4.2) *If the radar image is added to the ECDIS display, the chart and the radar image*
893 *shall match in scale, projection and in orientation.*

894 (232/A7.4.3) *The radar image and the position from the position sensor shall both be adjusted*
895 *automatically for antenna offset from the conning position.*

896 **4.6.3 AIS information**

897 (See 6.13.)

898 Requirements of this clause including all sub-clauses apply, if optional AIS interface is
899 provided.

900 **4.6.3.1 General**

901 (MSC.192/5.26.1) *Reported targets provided by the AIS may be filtered according to user-*
902 *defined parameters. Targets may be sleeping, or may be activated. Activated targets are*
903 *treated in a similar way to radar tracked targets.*

904 AIS can assist in safe navigation and can provide additional information to support the task of
905 collision avoidance. Class A AIS is provided for SOLAS ships and provides full data. Class B
906 AIS is for non-SOLAS craft providing a subset of that data. Different messages for Class A
907 and Class B allow the target category to be identified. The AIS data reporting rate varies
908 according to the navigational status and motion of the ship.

909 AIS Base Stations may provide a repeater function so that ships can receive AIS information
910 about other vessels that are not within line-of-sight. However, this can also result in
911 reception of duplicate messages with different latency and different update rates for the same
912 ship as well as reception of delayed AIS messages from own ship.

913 Where reported AIS targets are provided on a navigational display and the purpose of that
914 display is for collision avoidance, radar video shall be provided and tracked target data from a
915 radar system shall be used. In this case, the reported AIS information shall be time-stamped
916 and the position of the AIS symbology shall be progressively moved according to lapsed time.
917 The navigational display shall not track targets or provide target association functionality
918 unless it is fully compliant with this standard.

919 NOTE The AIS target state diagram is shown in Annex G of IEC 62388.

920 **4.6.3.2 AIS targets and data report capacity**

921 (See 6.13.1.)

922 (MSC.192/5.26.2) *It shall be possible to display and provide full presentation functionality for*
923 *a minimum number of sleeping and activated AIS targets and AIS data reports according to*
924 *Table 1.*

925 (MSC.192/5.26.2) (MSC.192/5.24.4) *There shall be a caution indication when the capacity of*
926 *processing/display of AIS targets and data reports is about to be exceeded.*

927 (MSC.191/6.4.2.2) *There shall be a warning alert when the AIS reported target*
928 *processing/display capacity has been exceeded,*

929 The AIS target display capacity defines the minimum number of AIS targets which can be
930 displayed. The equipment shall provide the capability to display a minimum number of AIS
931 target and data reports according to Table 1.

932 The AIS target processing capacity of the equipment shall provide the capability to process
933 the number of VDM (VHF Data-link Messages) corresponding to 90% of fully loaded VDL
934 (VHF Data-link). In that condition, continuous and smooth update of displayed targets and AIS
935 data reports shall be maintained. The worst case conditions result from a very large number
936 of anchored targets or a smaller number of fast moving targets and/or manoeuvring targets.

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

940 Note: IEC 61162-1 describes the AIS interface as having a maximum data rate of 4500 messages per minute.

941

Table 1 – AIS display capacity

	Category of ship/craft		
	CAT 3	CAT 2	CAT 1
Size of ship/craft	<500 gt	500 gt to <10 000 gt, and HSC<10 000 gt	All ships/craft ≥10 000 gt
Minimum part of the total capacity which may be <u>activated</u> AIS ship targets, <u>Class A and Class B</u>	20	30	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.	120	180	240

942

943 **4.6.3.3 AIS target filtering**

944 (See 6.13.2.)

945 (MSC.192/5.26.3) *To reduce display clutter, a means to filter the presentation of sleeping AIS*
 946 *targets shall be provided, together with an indication of the filter status (e.g. by target range,*
 947 *CPA/TCPA or AIS target class A/B, etc.). It shall not be possible to remove individual AIS*
 948 *targets from the display. AIS target filtering provides means for an operator to control the*
 949 *number of displayed AIS targets and data reports within the limits of the display capacity.*

950 (MSC.191/6.4.3.2) *The filter criteria in use shall be readily available.*

951 A persistent indication of the filter status shall be provided when the filter is active.

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

955 AIS Base Stations may relay or repeat AIS information and target reports with a lower update
 956 rate than transmitted from the sending vessel and with latency that is significant and variable.
 957 If both relayed and direct AIS reports are received for the same target, the relayed reports
 958 shall not be processed for CPA/TCPA or display of AIS target or information. A relayed target
 959 report from own ship shall not be processed for CPA/TCPA or display.

960 **4.6.3.4 Activation and deactivation of AIS targets**

961 (See 6.13.3.)

962 (MSC.192/5.26.4) *A means to activate a sleeping AIS target and to deactivate an activated*
 963 *AIS target shall be provided. If zones for the automatic activation of AIS targets are provided,*
 964 *they shall be the same as for automatic radar target acquisition. In addition, sleeping AIS*
 965 *targets may be automatically activated when meeting user defined parameters (e.g. target*
 966 *range, CPA/TCPA or AIS target Class A/B). Automatic activation is independent of AIS target*
 967 *filtering. If means are provided for automatic activation of AIS targets, then means for*
 968 *disabling that function shall be provided and the disable status shall be indicated. The*
 969 *manufacturer shall state what user defined parameters are available and shall show that they*
 970 *are described in the user manual.*

971 **4.6.3.5 AIS functionality and presentation**

972 (See 6.13.4.)

973 (MSC.192/5.27) *Targets shall be presented with their relevant symbols according to the*
 974 *performance standards for the Presentation of Navigation-related Information on Shipborne*
 975 *Displays adopted by the IMO MSC.191(79) and SN/Circ.243.*

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

978 NOTE Table 4 in MSC.192/5.26.5, AIS presentation status, is not duplicated here as the functionality is included
979 within clauses in this standard.

980 (MSC.191/6.4.5.5) *The orientation of the AIS target symbol shall indicate its heading. If the*
981 *heading information is not received, the orientation of the AIS symbol shall be aligned to the*
982 *COG. When available, the turn or rate of turn (ROT) indicator and/or the path prediction shall*
983 *indicate the manoeuvre of an activated AIS target.*

984 (MSC.191/6.4.5.2) *AIS information shall be graphically presented as sleeping or activated*
985 *targets.*

986 (MSC.192/5.27.1) *AIS targets that are displayed shall be presented as sleeping targets by*
987 *default.*

988 (MSC.192/5.27.2) *The course and speed of a tracked radar target or reported AIS target shall*
989 *be indicated by a predicted motion vector. The vector time shall be adjustable and valid for*
990 *presentation of any target regardless of its source.*

991 (MSC.192/5.27.3) *A permanent indication of vector mode, time and stabilisation shall be*
992 *provided. The AIS vector properties shall be generally consistent with those of TT vectors.*

993 (MSC.192/5.27.4) *The consistent common reference point shall be used for the alignment of*
994 *tracked radar and AIS symbols with other information on the same display.*

995 (MSC.192/5.27.5) *On large scale / low range displays, a means to present the true scale*
996 *outline of an activated AIS target shall be provided.*

997 (MSC.192/5.27.5) *It shall be possible to display the past track of activated targets.*

998 To provide co-location for radar video and for AIS symbology, the reported AIS information
999 shall be time-referenced so that AIS symbology shall be progressively positioned according to
1000 its velocity.

1001 The co-location for radar video and for AIS symbology shall be provided independently from
1002 the selected speed reference.

1003 Radar shall be able to handle and display the following VDL messages for AIS targets and
1004 AIS data reports:

- 1005 a) Messages: 1, 2, 3 and 5 (Class A AIS and AIS SART);
- 1006 b) Messages: 18, 19 and 24 (Class B AIS);
- 1007 c) Message 4 (AIS Base stations);
- 1008 d) Message 9 (AIS on Airborne SAR craft);
- 1009 e) Message 21 (AIS for ATON);
- 1010 f) Messages 12 and 14 (Safety related messages).

1011 **4.6.4 AIS target data**

1012 (See 6.13.5.)

1013 Requirements of this clause including all sub-clauses apply, if optional AIS interface is
1014 provided.

1015 **4.6.4.1 General**

1016 The selection and content of target data is defined in this clause.

1017 **4.6.4.1.1 Requirement**

1018 (MSC.192/5.28.1) *It shall be possible to select any AIS target for the alphanumeric display of*
1019 *its data. An AIS target selected for the display of its alphanumeric information shall be*
1020 *identified by the relevant symbol. If more than one target is selected for data display, the*
1021 *relevant symbols and the corresponding data shall be clearly identified. There shall be a clear*
1022 *indication to show that the target data is derived from AIS.*

1023 (MSC.192/5.28.3) *For each selected AIS target the following data shall be presented in*
1024 *alphanumeric form: source(s) of data, ship's identification, navigational status, position where*
1025 *available and its quality, range, bearing, COG, SOG, CPA, and TCPA. Target heading and*
1026 *reported rate of turn shall also be made available. Additional target information shall be*
1027 *provided on request.*

1028 An indication shall be provided in the alphanumeric display when additional information is
1029 available.

1030 Where sea stabilisation is selected, the CTW and STW shall be presented in place of COG
1031 and SOG.

1032 Optionally bow crossing range and bow crossing time (BCR/BCT) may be provided.

1033 NOTE: AIS transponder provides for each AIS target position and may provide COG, SOG and heading. Range,
1034 bearing, CTW, STW, CPA, TCPA, bow crossing range and bow crossing time (BCR/BCT) are calculation results
1035 against own ship data and they are not provided by the AIS transponder.

1036 The calculation of data from AIS information shall be verified.

1037 (MSC.192/5.28.4) *If the received AIS information is incomplete, the absent information shall*
1038 *be clearly indicated as "missing" within the target data field.*

1039 (MSC.192/5.28.5) *The data shall be displayed and continually updated, until another target is*
1040 *selected for data display or until the window is closed.*

1041 (MSC.192/5.28.6) *Means shall be provided to present own ship AIS data on request.*

1042 **4.6.5 AIS Voyage-related data**

1043 (See 6.14)

1044 Requirements of this clause including all sub-clauses apply, if optional AIS interface is
1045 provided.

1046 **4.6.5.1 Requirement**

1047 Means shall be provided for on demand display of the following data. Means shall be provided
1048 for the user entry of the following data and output of this data via the interface to AIS. . (See
1049 Annex E, Table E.4. VSD).

1050 a) Cargo category

1051 b) Navigation status

1052 c) Ships' draft (max actual static)

1053 d) Destination

1054 e) ETA date & time

1055 f) Regional application flags

1056

1057 **4.7 Display mode and generation of the neighbouring area**

1058 (See 6.8.7.)

1059 (232/A8.1) *It shall always be possible to display the SENC in a 'north-up' orientation. Other*
1060 *orientations are permitted. When such orientations are displayed, the orientation shall be*
1061 *altered in steps large enough to avoid unstable displays of the chart information.* An unstable
1062 condition that changes orientation rapidly is distracting and can make text or symbols difficult
1063 to read.

1064 (232/A8.2) *ECDIS shall provide for true motion mode. Other modes are permitted.*

1065 (232/A8.3) *When true motion mode is in use, reset and generation of the chart display of the*
1066 *neighbouring area shall take place automatically at own ship's distance from the edge of the*
1067 *display as determined by the mariner.*

1068 (232/A8.4) *It shall be possible to manually change the displayed chart area and the position of*
1069 *own ship relative to the edge of the display.*

1070 (232/A8.5) *If the area covered by the ECDIS display includes waters for which no ENC at a*
1071 *scale appropriate for navigation is available, the areas representing those waters shall carry an indication*
1072 *(see Annex D) to the mariner to refer to the paper chart or to the RCDS mode of operation*
1073 *(see Annex G).*

1074 **4.8 Colours and symbols**

1075 (See 6.7.1, 6.7.3.)

1076 (232/A9.1) *IHO recommended colours and symbols shall be used to represent SENC*
1077 *information (See S-52, Annex A).*

1078 (232/A9.2) *The colours and symbols other than those mentioned in 232/A9.1 shall comply with*
1079 *the applicable requirements contained in the IMO standards for navigational symbols.*

1080 (232/A9.3) *SENC information, when displayed at the scale specified in the ENC, shall use the*
1081 *specified size of symbols, figures and letters (See S-52, Annex A).*

1082 (232/A9.4) *ECDIS shall allow the mariner to select whether own ship is displayed in true scale*
1083 *or as a symbol.*

1084 **4.9 Display requirements**

1085 **4.9.1 Route planning and monitoring**

1086 (232/A10.1) *ECDIS shall be capable of displaying information for:*

1087 *.1 route planning and supplementary navigation tasks; (See 4.10.2.)*

1088 *.2 route monitoring. (See 4.10.3.)*

1089 **4.9.2 Chart presentation size**

1090 (See 6.3.2.)

1091 (232/A10.2) *The effective size of the chart presentation for route monitoring shall be at*
1092 *least 270 mm by 270 mm.*

1093 **4.9.3 Colour and resolution**

1094 (See 6.7.3, 6.7.4.)

1095 (232/A10.3) *The display shall be capable of complying with the colour and resolution*
1096 *recommendations of IHO (See S-52, Annex A).*

1097 **4.9.4 Presentation**

1098 (See 6.7.5.)

1099 (232/A10.4) *The method of presentation shall ensure that the displayed information is clearly*
1100 *visible to more than one observer in the conditions of light normally experienced on bridge of*
1101 *the ship by day and by night.*

1102 **4.9.5 Removal of information categories**

1103 (See 6.8.2.)

1104 (232/A10.5) *If information categories included in the Standard Display (see Annex A and*
1105 *Annex L) are removed to customize the display, this shall be permanently indicated.*
1106 *Identification of categories which are removed from the Standard Display shall be shown on*
1107 *demand. (See 4.3.3)*

1108 **4.10 Route planning, monitoring and voyage recording**

1109 **4.10.1 General**

1110 (See 6.9.2, 6.9.3.)

1111 (232/A11.1) *It shall be possible to carry out route planning and route monitoring in a simple*
1112 *and reliable manner.*

1113 (232/A11.2) *The largest scale data available in the SENC for the area given shall always be*
1114 *used by the ECDIS for all alerts or indications of crossing the ship's safety contour, of being*
1115 *too close from a point object, such as a fixed or floating aid to navigation or isolated danger*
1116 *(navigational hazard) and of entering a prohibited area, and for alerts and indications*
1117 *according to Annex D.*

1118 **4.10.2 Route planning**

1119 (See 6.9.2.)

1120 (232/A11.3.1) *It shall be possible to carry out route planning including both straight and*
1121 *curved segments.*

1122 (232/A11.3.2) *It shall be possible to adjust a planned route alphanumerically and graphically*
1123 *including:*

1124 .1 *adding waypoints to a route;*

1125 .2 *deleting waypoints from a route;*

1126 .3 *changing the position of a waypoint.*

1127 (232/A11.3.3) *It shall be possible to plan one or more alternative routes in addition to the*
1128 *selected route. The selected route shall be clearly distinguishable from the other routes.*

1129 (232/A11.3.4) *An indication is required if the mariner plans a route across an own ship's*
1130 *safety contour.*

1131 The indication shall be both graphical in chart area using IEC 62288 symbol 3.5b and textual
1132 in user dialog area of the Route plan.

1133 The graphical highlight shall be the intersection between the planned route and the charted
1134 feature/object.

1135 The charted feature/object which is the origin of the indication shall be displayed together with
1136 the IEC 62288 graphical symbol 3.5b. This may require temporary override of the user
1137 selected viewing group layers (See Annex L) or temporary display of a charted feature/object
1138 from the largest scale available.

1139 Optionally, the graphical indication in chart area may be selectable between on and off state.
1140 When selected for off state, a persistent indication shall be provided that the "Indication of
1141 crossing safety contour is Off".

1142 (232/A11.3.5) *An indication shall be given if the mariner plans a route closer than a user-*
1143 *specified distance from the boundary of a prohibited area or a geographic area for which*
1144 *special conditions exist (see Annex C). An indication shall also be given if the mariner plans a route*
1145 *closer than a user-specified distance from a point object, such as a fixed or floating aid to*
1146 *navigation or isolated danger (navigational hazard). This distance limit may be the same*
1147 *applied to the proximity of all dangers and identical to the distance limit applied for*
1148 *approaching the boundary of a prohibited area, area with special conditions.*

1149 The indication shall be both graphical in chart area using IEC 62288 symbol 3.5b and textual
1150 in user dialog area of the Route plan.

1151 The graphical highlight shall be the intersection between the planned route and the charted
1152 feature/object.

1153 The charted feature/object which is the origin of the indication shall be displayed together with
1154 the IEC 62288 graphical symbol 3.5b. This may require temporary override of the user
1155 selected viewing group layers (See Annex L) or temporary display of a charted feature/object
1156 from the largest scale available.

1157 Optionally, the graphical indication in chart area may be selectable between on and off state.
1158 When selected for off state, a persistent indication shall be provided that the "Indication of
1159 prohibited areas, areas with special conditions and navigational hazards is Off".

1160 (232/A11.3.6) *It shall be possible for the mariner to specify a cross track limit of deviation*
1161 *from the planned route at which an automatic off-track alarm shall be activated.*

1162 **4.10.2.1 Route plan exchange with other equipment**

1163 (See 6.9.2.)

1164 Optionally, means may be provided to export and import Route plans with other equipment.
1165 The media used may be removable memory device (for example UBS memory stick, SD card,
1166 etc.) or fixed wired interface (for example IEC 61162-450). The format of the Route Plan for
1167 export and import is described in Annex Q.

1168 **4.10.2.2 Annotated Route plan**

1169 (See 6.9.2.)

1170 Annotated Route plan combines a Route plan with additional mariner's information (see
1171 5.5.1). It includes some of the information required by guidelines for Voyage planning (IMO A.
1172 893(21)).

1173 Annotated Route plan may be provided, if provided, following rules applies.

1174 .1 additional mariner's information shall be organized in similar way as Route plans, which
1175 means separately named entities such as files or databases;

1176 .2 annotation means that a Route plan shall be linked to such separately named entities;

1177 .3 annotated Route plan shall provide a textual document in electronic form. A paper version
1178 may be provided. The document shall list all items from both Route plan and additional
1179 mariner's information in same sequence as they will appear when the ship sails the
1180 planned Route.

1181 NOTE For example the sequence could be: waypoint 1 with ETD, caution (dangerous area), waypoint 2 with
1182 ETA, caution(danger), information (leave pilot), waypoint 3 with ETA, information (speed limit), etc.

1183

1184 **4.10.3 Route monitoring**

1185 (See 6.8.11, 6.9.3.)

1186 (232/A11.4.1) *For route monitoring the selected route and own ship's position shall appear*
1187 *whenever the display covers that area.*

1188 (232/A11.4.2) *It shall be possible to display a sea area that does not have the ship on the*
1189 *display (for example for look ahead, route planning), while route monitoring. If this is done on*
1190 *the display used for route monitoring, the automatic route monitoring functions (for example.*
1191 *updating ship's position, and providing alerts and indications) shall be continuous. It shall be*
1192 *possible to return to the route monitoring display covering own ship's position immediately by*
1193 *single operator action.*

1194 The system shall allow the user to select a route for monitoring only if the pre-planned route
1195 has been checked that radius of planned turn allows each turn to complete before the next
1196 turn.

1197 (232/A11.4.3) *ECDIS shall give an alarm if, within a specified look-ahead time set by the*
1198 *mariner, own ship will cross the safety contour.*

1199 The alarm shall be both graphical in chart area using IEC 62288 symbol 3.5a and textual in
1200 user dialog area of the alert management.

1201 The graphical highlight shall be the intersection between the own ship look-ahead area and
1202 the charted feature/object.

1203 The charted feature/object which is the origin of the alarm shall be displayed together with the
1204 IEC 62288 graphical symbol 3.5a. This may require temporary override of the user selected
1205 viewing group layers (See Annex L) or temporary display of a charted feature/object from the
1206 largest scale available.

- 1207 Optionally, the graphical indication in chart area may be selectable between on and off state.
1208 When selected for off state, a persistent indication shall be provided that the “Indication of
1209 crossing safety contour is Off”.
- 1210 (232/A11.4.4) *ECDIS shall give a warning or caution, as selected by the mariner, if, within a*
1211 *specified look-ahead time set by the mariner, own ship will cross the boundary of a prohibited*
1212 *area or of a geographic area for which special conditions exist. (See Annex C.)*
- 1213 The warning or caution shall be both graphical in chart area using IEC 62288 symbol 3.5b and
1214 textual in user dialog area of the alert management.
- 1215 The graphical highlight shall be the intersection between the own ship look-ahead area and
1216 the charted feature/object.
- 1217 The charted feature/object which is the origin of the warning or caution shall be displayed
1218 together with the IEC 62288 graphical symbol 3.5b. This may require temporary override of
1219 the user selected viewing group layers (See Annex L) or temporary display of a charted
1220 feature/object from the largest scale available.
- 1221 Optionally, the graphical indication in chart area may be selectable between on and off state.
1222 When selected for off state, a persistent indication shall be provided that the “Indication of
1223 prohibited areas and areas with special conditions is Off”.
- 1224 (232/A11.4.5) *An alarm shall be given when the specified cross track limit for deviation from*
1225 *the planned route is exceeded.*
- 1226 NOTE Route monitoring will only provide an automatic alarm if the mariner has entered the appropriate data in
1227 4.10.2.
- 1228 (232/A11.4.6) *An caution shall be given to the mariner if, continuing on its present course and*
1229 *speed, over a specified look-ahead time or distance set by the mariner, own ship will pass closer*
1230 *than a user-specified distance from a danger (for example obstruction, wreck, rock) that is*
1231 *shallower than the mariner's safety contour or an aid to navigation (navigational hazard).*
- 1232 The caution shall be both graphical in chart area using IEC 62288 symbol 3.5b and textual in
1233 user dialog area of the alert management.
- 1234 The graphical highlight shall be the intersection between the own ship look-ahead area and
1235 the charted feature/object.
- 1236 The charted feature/object which is the origin of the caution shall be displayed together with
1237 the IEC 62288 graphical symbol 3.5b. This may require temporary override of the user
1238 selected viewing group layers (See Annex L) or temporary display of a charted feature/object
1239 from the largest scale available.
- 1240 Optionally, the graphical indication in chart area may be selectable between on and off state.
1241 When selected for off state, a persistent indication shall be provided that the “Indication of
1242 navigational hazards is Off”.
- 1243 The look-ahead range, expressed as time or distance, is set by the mariner to control how far
1244 in advance an alert will be given before a distance limit is violated. The same look-ahead
1245 range shall be applied for approaching the boundary of a prohibited area, area with special
1246 conditions, crossing safety contour or proximity to a danger. The distance limit set by the
1247 mariner shall be the same applied to the proximity of all dangers and aids to navigation.
- 1248 (232/A11.4.9) *A warning shall be given by ECDIS when the ship reaches a specified time or*
1249 *distance, set by the mariner, in advance of a critical point on the planned route.*
- 1250 ECDIS shall permit the mariner to define critical points and the time or distance at which a
1251 warning shall be given. The words “to reach a critical point” shall be considered passing
1252 abeam of the critical point on the planned route.
- 1253 (232/A11.4.11) *It shall be possible to display alternative routes in addition to the selected*
1254 *route, where any have been planned. The selected route shall be clearly distinguishable from*
1255 *the other routes. During the voyage, it shall be possible for the mariner to modify the selected*
1256 *sailing route or to change to an alternative route.*

1257 (232/A11.4.12) *It shall be possible to display:*

1258 *.1 time-labels along a ship's track manually on demand and automatically at intervals*
1259 *selected between 1 and 120 minutes; and*

1260 *.2 an adequate number of: points, free movable electronic bearing lines (EBL), variable and*
1261 *fixed range markers (VRM), and other symbols required for navigation purposes and*
1262 *specified in Annex B.*

1263 NOTE An "adequate number" of EBL and VRM implies at least one of each.

1264 **4.10.4 Position integration**

1265 (See 6.8.12, 6.9.4.)

1266 (232/A11.4.7) *The ship's position shall be derived from a continuous positioning system of an*
1267 *accuracy consistent with the requirements of safe navigation. Whenever possible, a second*
1268 *independent positioning source, preferably of a different type shall be provided. In such cases*
1269 *ECDIS shall be capable of identifying discrepancies between the two sources.*

1270 The ECDIS shall have means to display the position from at least two positioning methods, to
1271 identify which method is being used, and provide a means for the operator to select the
1272 method he wants to use. Visual position fix and dead reckoning functions are required as one
1273 secondary independent positioning source. Refer to 4.10.6.

1274 (232/A11.4.8) *ECDIS shall provide a warning when the input from the position, heading or*
1275 *speed sources is lost. ECDIS shall also repeat, but only as an indication, any alarm or*
1276 *indication passed to it from position, heading or speed sources.*

1277 (232/A11.4.10) *The positioning system and the SENC shall be on the same geodetic datum.*
1278 *ECDIS shall give a warning if this is not the case.*

1279 (232/A11.4.15.2) *ECDIS shall indicate discrepancies between the positions obtained by*
1280 *continuous positioning systems and positions obtained by manual observations.*

1281 (232/A11.4.14) *It shall be possible to adjust the displayed geographic position of the ship*
1282 *manually. This manual adjustment shall be noted alpha-numerically on the screen, maintained*
1283 *until altered by the mariner, and automatically recorded.*

1284 **4.10.5 Object information**

1285 (See 6.8.10.)

1286 (232/A11.4.13) *It shall be possible to enter the geographic coordinates of any position and*
1287 *then display that position on demand. It shall also be possible to select any point (feature,*
1288 *symbol or position) on the display and read its geographical co-ordinates on demand.*

1289 **4.10.6 LOP position fix**

1290 (See 6.9.7.)

1291 (232/A11.4.15.1) *ECDIS shall provide the capability to enter and plot manually obtained*
1292 *bearing and distance lines of position (LOP), and calculate the resulting position of own ship.*
1293 *It shall be possible to use the resulting position as an origin for dead-reckoning.*

1294 Position plots shall indicate the time the plot was accepted and, in the case of estimated
1295 position or dead-reckoned position plot (EP or DR), the type of plot. Indication of the source of
1296 data used for the position may be selectable, on or off, by the operator.

1297 Data for accepted position plots and the associated LOPs shall be recorded in the voyage
1298 recording (See 4.10.7.).

1299 **4.10.7 Voyage recording**

1300 (See 6.9.4, 6.9.5.)

1301 (232/A11.5.1) *ECDIS shall store and be able to reproduce certain minimum elements required*
1302 *to reconstruct the navigation and verify the official database used during the previous 12*
1303 *hours. The following data shall be recorded at one minute intervals:*

- 1304 .1 to ensure a record of own ship's past track: time, position, heading and speed; and
1305 .2 to ensure a record of official data used: ENC source, edition, date, cell and update history.

1306 The same data recording requirements apply to the use of any RNC or unofficial chart
1307 database.

1308 (232/A11.5.2) In addition, ECDIS shall record the complete track for the entire voyage, with
1309 time marks at intervals not exceeding 4 hours.

1310 For the purposes of logging, the entire voyage is defined as a maximum period of three
1311 months.

1312 (232/A11.5.3) It shall not be possible to manipulate or change the recorded information.

1313 (232/A11.5.4) ECDIS shall have a capability to preserve the record of the previous 12 hours
1314 and of the voyage track.

1315 4.11 Calculations and accuracy

1316 (See 6.6.)

1317 (232/A12.1) The accuracy of all calculations performed by ECDIS shall be independent of
1318 the characteristics of the output device and shall be consistent with the SENC accuracy.

1319 The output device includes ECDIS display, stored memory, and/or printout.

1320 (232/A12.2) Bearings and distances drawn on the display, or those measured between
1321 features already drawn on the display, shall have accuracy no less than that afforded by the
1322 resolution of the display.

1323 (232/A12.3) The system shall be capable of performing and presenting the results of at least
1324 the following calculations:

- 1325 .1 true distance and azimuth (i.e. bearing) between two geographical positions;
1326 .2 geographic position from known position and distance/azimuth (i.e bearing); and
1327 .3 geodetic calculations such as spheroidal distance, rhumb line, and great circle. (see
1328 5.4.4).

1329 Accuracy of geodetic calculations shall be for distance within 1% or 30m, whichever is greater
1330 distance and shall be for bearings within 1° (see Annex R).

1331 4.12 Connections with other equipment (interfaces)

1332 4.12.1 Connection with navigation equipment

1333 (See 6.2, 6.6.)

1334 (232/A15.1) ECDIS shall not degrade the performance of any equipment providing sensor
1335 inputs. Nor shall the connection of optional equipment degrade the performance of ECDIS
1336 below this standard.

1337 (232/A15.2) ECDIS shall be connected to the ship's position fixing system, to the gyro
1338 compass and to the speed and distance measuring device. For ships not fitted with a gyro
1339 compass, ECDIS shall be connected to a marine transmitting heading device.

1340 ECDIS shall be capable to be connected to the BAM, BNWAS and VDR. Optionally ECDIS
1341 may be connected with AIS and NAVTEX.

1342 As a minimum, the ECDIS shall support the IEC 61162 series interfaces as given in Annex E.
1343 In addition, suitable alternative input or output interfaces may be used. The manufacturer
1344 shall specify which IEC 61162 series each physical interface supports.

1345 4.12.2 Alert Management Interface with BAM

1346 4.12.2.1 Requirement

1347 (See 6.2)

1348 The performance standards for Bridge Alert Management (BAM) tailor the IMO Code on Alerts
1349 and Indicators to harmonize the priority, classification, handling, distribution and presentation
1350 of alerts on bridge equipment.

1351 ECDIS shall provide an alert management handling and interface compliant with the
1352 requirements of BAM Module A and C further specified for ECDIS in the Annex E, the state
1353 diagram of IEC 61924-2 Annex J and the detailed sentence definitions of IEC 61924-2 Annex
1354 K.

1355 Alert management requires:

- 1356 1) classification of all alerts available in the EUT, see 6.2.1
- 1357 2) presentation of the alerts, see 6.2.1
- 1358 3) reporting of alerts, see 6.2.1
- 1359 4) handling of unacknowledged warnings, see 4.12.2.2 and 6.2.1.2
- 1360 5) handling of unacknowledged alarms, see 4.12.2.3 and 6.2.1.3
- 1361 6) functionality of remote acknowledge and remote silencing, see 4.12.2.4 and 6.2.1.1

1362 **4.12.2.2 Unacknowledged warnings**

1363 (See 6.2.1.2)

1364 (MSC.302/7.62) *An unacknowledged warning shall be:*

- 1365 *.1 repeated as a warning after a limited time period not exceeding 5 min; or*
- 1366 *.2 changed to alarm priority after a limited time period not exceeding 5 min; or*
- 1367 *.3 changed to alarm priority after a user selectable time not more than 5 min.*

1368 The default time for the user selected period shall be 60 s.

1369 **4.12.2.3 Unacknowledged alarms**

1370 (See 6.2.1.3)

1371 If ECDIS is part of INS, then ECDIS shall provide the capability to transfer unacknowledged
1372 alarms from the ECDIS to BNWAS after a time defined by the user, in accordance with IEC
1373 62616 as defined by the applicable requirements of IEC 61924-2 Clause 7. Interface
1374 sentences of IEC 61162 shall be as defined in Annex E.

1375 **4.12.2.4 Remote acknowledgments and silencing of alerts**

1376 (See 6.2)

1377 Remote temporary silencing and remote acknowledgement shall be possible via alert related
1378 communication described in annex E and the detailed sentence definitions of IEC 61924-2
1379 Annex K.

1380 Remote acknowledgement shall only be possible for category B alerts, see IEC 61924-2
1381 Annex C.

1382 Remote silencing of the relevant audible alarms of the ECDIS shall be possible at any time.

1383 **4.12.3 Interface with VDR**

1384 The interface with VDR shall be based on IEC 61162-450 and IEC 61996-1 Ed.2 Annex E and
1385 Annex G

1386 **4.12.3.1 Transfer of screen image**

1387 (See 6.2.2.1)

1388 A subjectively lossless graphic algorithm shall be used as defined in IEC 61996-1 (VDR). The
1389 video image data should be in one of the following formats:

- 1390 a) ".bmp" – (Microsoft GDI – bitmap reference),

1391 NOTE The ".bmp" format image file is efficiently reduced by ".zip" compression.

1392 b) ".png" – (ISO/IEC 15948), or

1393 c) ".jpg" – (ISO/IEC 10918) or

1394 d) ".jp2" – (JPEG 2000 – ISO/IEC 15444 in a lossless format).

1395 Means shall be provided to configure at installation the header data for the following
1396 information in the "Status and information text field" as described in IEC 61996-1:2012, Annex
1397 E:

1398 a) Identify the display location

1399 b) Identify the class of image including source type together with identifier, for example
1400 "Source:ECDIS.2"

1401 The Ethernet interface shall provide digital file transfers of one screen capture each 15 s.
1402 Means may be provided to configure use of higher update rates.

1403 Means shall be provided to change the synchronization of the image message to the local
1404 clock (i.e. ECDIS.1, send at :08, :23, :38, :53, ECDIS.2 send at :12, :27, :42, :57).

1405 4.12.3.2 Transfer of ECDIS display source information

1406 (See 6.2.2.1)

1407 ECDIS display source information shall be transferred to VDR as defined in IEC 61996-1 Ed.2
1408 Annex G Table G.1. Items defined in IEC 61996-1 Ed.2 Annex G Table G.2 may be included.
1409 The transfer shall happen at least every 10 min if the reported information is unchanged from
1410 previous transfer. The transfer shall happen within 2 seconds when any of the reported
1411 information has been changed.

1412 The content of ECDIS display source information shall include charts used for display
1413 purposes and charts used for alert purposes (i.e. largest scales available).

1414 4.12.4 Rule for resetting dormant period of BNWAS

1415 (See 6.2)

1416 To provide user activity information to BNWAS, an EVE sentence as specified in IEC 61162-1
1417 shall be output in response to user-interaction with the ECDIS under conditions described in
1418 the user manual.

1419 (MSC.128/4.1.3.1) *It shall not be possible to initiate the reset function or cancel any audible*
1420 *alarm from any device, equipment or system not physically located in areas of the bridge*
1421 *providing proper look out.*

1422 ECDIS installation manual shall contain instructions about installation locations when the
1423 BNWAS interface can be connected or configured to reset the dormant period of the BNWAS.

1424 4.12.5 Connection for SENC information

1425 (232/A15.3) *ECDIS may provide a means to supply SENC information to external equipment.*

1426 NOTE Test of this interface, if provided, is not required. The format of SENC data is by definition a
1427 manufacturer's internal ECDIS format and the data interface between an ECDIS and the external equipment for
1428 SENC data transfer is not defined in IEC 61162.

1429 4.13 Performance tests, malfunction alerts and indications

1430 (See 6.8.17.)

1431 (232/A13.1) *ECDIS shall be provided with means for either automatically or manually carrying*
1432 *out on-board tests of major functions. In case of a failure, the test shall display information to*
1433 *indicate which module is at fault.*

1434 On board tests of major functions include the integrity of interfaces. If there is any detectable
1435 reason why the information presented to the operator is invalid, warning shall be given to the
1436 operator.

1437 Major functions of ECDIS are: the ECDIS equipment itself, interface to electronic position
1438 fixing system, interface to the gyro compass and interface to the speed and distance measuring
1439 device.

1440 (232/A13.2) *ECDIS shall provide suitable alert (i.e. warning) or indication of system malfunction.*

1441 **4.14 Back-up arrangements**

1442 (232/A14) *Adequate independent back-up arrangements shall be provided to ensure safe*
1443 *navigation in case of an ECDIS failure: (See Annex F.)*

1444 *.1 Facilities enabling a safe take-over of the ECDIS functions shall be provided in order to*
1445 *ensure that an ECDIS failure does not result in a critical situation.*

1446 *.2 A back-up arrangement shall be provided facilitating means for safe navigation of the*
1447 *remaining part of the voyage in case of an ECDIS failure.*

1448 **4.15 Power supply**

1449 (See 6.9.6.)

1450 (232/A16.1) *It shall be possible to operate ECDIS and all equipment necessary for its normal*
1451 *functioning when supplied by an emergency source of electrical power in accordance with the*
1452 *appropriate requirements of regulation II/1 of the 1974 SOLAS convention, as amended.*

1453 (232/A16.2) *Changing from one source of power supply to another, or any interruption of the*
1454 *supply for a period of up to 45 s, shall not require the equipment to be manually re-initialized.*

1455 The equipment is not required to remain operational during this interruption of the power
1456 supply.

1457 **4.16 Software maintenance**

1458 (See 6.10.)

1459 Adequate software maintenance arrangements shall be supported by the ECDIS manufacturer
1460 in accordance with IMO SN.1/Circ. 266, rev1. ECDIS equipment shall provide means to
1461 display on demand the current software version.

1462 Means shall be provided to replace or install updates to software in systems aboard ship.

1463 Manufacturers shall provide customers with timely access, at least by website which is linked
1464 to IHO website, to a list showing the IHO standards currently in effect for ECDIS, ECDIS
1465 application software versions, compliance status and regulatory approvals for the listed
1466 configurations/versions. This information shall be available for customers at least for 10
1467 years after end of software or hardware maintenance. The procedures to do above shall be
1468 part of the recognized quality system of the manufacturer.

1469 **4.17 Quality management requirements**

1470 (See 6.11.)

1471 The equipment and documentation shall be developed, produced and written in accordance
1472 with a recognised quality procedure, for example ISO 9001 or an equivalent recognised
1473 quality standard.

1474 NOTE: See also IEC 60945 4.2.3 Software development.

1475 **4.18 Default Control Setting and Saved User Control Settings**

1476 (See 6.12.)

1477 A default setting speeds familiarisation by quickly putting operator controls in a known state, a
1478 uniform starting-point for all ECDIS from which further adjustments can be made to suit the
1479 conditions at hand. The configuration specified in Table 2 shall be selectable by a single
1480 operator action followed by an action to confirm the selection.

1481 A facility shall be provided to store and recall user-specific settings that result after
1482 adjustments to suit the conditions at hand. At least two such configurations shall be available

1483 to be stored for recall. Selection for recalling a stored configuration shall be followed by an
 1484 action to confirm the selection.

Table 2 – Control settings configured in response to ‘Default’ selection

(Appendix 6 of IMO resolution MSC.252(83))

Function	Setting
Display category	ECDIS Standard display
Selected sea area	Around own ship with appropriate off-set
Range	3 NM
Orientation	True motion, north-up
Manual updates	If applied
Operator's notes	If applied
Past track	On
Look-ahead time	6 min

5 Requirements contained in IHO special publications

5.1 Priority of chart display

(See 6.8.3, 6.8.4.)

(S-52/2.3.2a) Layers are required to establish the priority of data on the display. The general rule for the priority between different categories of information is given below:

- .1 ECDIS visual alerts/indications (for example caution, overscale);
- .2 HO-data: points/lines and areas plus official updates;
- .3 Notices to mariners, manual input and radio navigational warnings;
- .4 HO-caution (ENC cautions);
- .5 HO-colour-fill area data;
- .6 HO's on demand data;
- .7 radar information;
- .8 mariners data: points/lines and areas;
- .9 manufacturer's data: points/lines and areas;
- .10 mariners colour-fill area data.

NOTE This list is not intended to indicate a drawing sequence, but to specify that the information content of category $n + 1$ must not obscure the information content of category n or any higher category (i.e. $n - 1$, etc.). (S-52/2.3.2a)

5.2 Display of chart information

5.2.1 Scale and navigation purpose

(See 6.8.6.)

(S-52/3.2.3(8a)) If data from different compilation scales appears on the display, the boundary between different scales shall be clearly indicated.

(S-52/3.1.7.2) When the display cannot be completely covered with ENC data for the selected navigational purpose, the remaining part of the display shall be filled with data based on a more general navigational purpose (if available).

(S-52/3.1.7(c)) A graphical index of the navigational purpose of available data shall be shown on demand.

1516 (S-52/3.2.3(8b)) *Data shown on the display shall always be of the same display scale. If a*
 1517 *compilation scale boundary is shown on the display, the information shown in the overscale*
 1518 *area shall not be relied upon at the scale of the display. The overscale area shall be identified*
 1519 *as specified in S-52, Annex A. (Note that this overscale identification only applies to*
 1520 *automatic area scaling of parts of the display; it does not apply to overscaling of the entire*
 1521 *display commanded by the mariner.)*

1522 (S-52/3.2.3(9)) *A scale bar shall be provided as part of the display base for navigating on a*
 1523 *large compilation scale (1:80 000 and larger).*

1524 (S-52/3.2.3(9)) *For chart displays at a compilation scale smaller than 1:80 000, a latitude bar*
 1525 *shall be shown on the border of the standard display.*

1526 **5.2.2 Units and legend**

1527 (See 6.7.2.)

1528 *Units to be used on ECDIS displays are defined in IEC 62288.*

1529 (S-52/2.3.1g) *A standard legend of general information relating to the cursor pick location,*
 1530 *shall be shown on a graphic or text display. This legend shall contain as a minimum:*

- 1531 .1 *units for depth;*
- 1532 .2 *units for height;*
- 1533 .3 *scale of display;*
- 1534 .4 *data quality indicator;*
- 1535 .5 *sounding/vertical datum;*
- 1536 .6 *horizontal datum;*
- 1537 .7 *the value of the safety depth if used;*
- 1538 .8 *the value of the safety contour;*
- 1539 .9 *magnetic variation;*
- 1540 .10 *date and number of last update affecting the chart cells currently in use;*
- 1541 .11 *edition number and date of issue of the ENC;*
- 1542 .12 *chart projection.*

1543 All of the listed general information must be available for simultaneous display. It is not
 1544 necessary to accomplish this using a single "standard legend" window.

1545 **5.3 Display functions**

1546 **5.3.1 Cursor pick**

1547 (See 6.8.10.)

1548 (S-52/3.1.9) *It shall be possible to call up all the information associated with an object by*
 1549 *cursor pick on its symbol. This shall extend to areas (restricted area, depth area, etc.) and to*
 1550 *"no symbol" areas (territorial seas, etc.) and meta areas (information about the area such as*
 1551 *compilation scale, etc.). The search for area information shall extend only to the cell*
 1552 *boundaries enclosing the cursor. Also refer to 4.3 (232/A5.6).*

1553 (S-52/3.1(d)) *By identifying any object (point, line or area) with a cursor on the chart display,*
 1554 *the object description and all available attributes shall be displayed in text in common*
 1555 *language terms.*

1556 An indication based on IEC 62288 symbol 2.12 shall be presented at the area of cursor pick
 1557 as long as the information associated with the picked objects is presented. The symbol shall
 1558 surround the area for picking objects.

1559 **5.3.2 Navigational information**

1560 (See 6.8.7.)

1561 (S-52/3.1.2.1.6(d)) *If the ECDIS offers a ship-centred display mode, the manufacturer shall*
1562 *avoid overwriting between the ship symbol and a centred symbol for an area which wholly*
1563 *encloses the display (for example the traffic direction arrow (TSSLPT) in a very large traffic*
1564 *lane such as Dover Strait).*

1565 This can be accomplished by moving the "centred" symbol. When the "centred" symbol is
1566 visible beneath the ship symbol, movement is not required.

1567 **5.3.3 Date-dependant ENC objects**

1568 (See 6.8.10.)

1569 (S-52/8.4.1) *Date-dependant objects, such as seasonal buoys, are only to be displayed over a*
1570 *certain period (IHO S-57 parameters PERSTA to PEREND). Other objects, such as a traffic*
1571 *separation scheme, may have a date on which they are introduced (DATSTA) or discontinued*
1572 *(DATEND). Any ENC object with one of the above attributes shall not be displayed outside its*
1573 *effective dates.*

1574 (S-52/8.4.1) *To provide for effective route planning, for look-ahead during route monitoring, or*
1575 *for other purposes, the ECDIS shall provide means to allow the mariner to view chart data for*
1576 *any required date and time for the purpose of reviewing pre-planned changes in chart data.*
1577 *The ECDIS manufacturer shall provide this by allowing the mariner to select a date for*
1578 *displaying all chart objects active at that date and time.*

1579 When this function is in use, a persistent indication shall be provided that the information
1580 displayed may be incorrect for the present real date and time.

1581 **5.4 Supplementary display functions**

1582 **5.4.1 Additional mariner's information**

1583 (See 6.8.5.)

1584 (S-52/2.3.1(b)) *The mariner shall be provided with the capability of adding at least the*
1585 *following symbols, lines and areas to the SENC, and shall be able to revise or delete them:*

1586 .1 *the caution (!) or information (i) symbol used to call up a note on the text display by cursor*
1587 *picking; (See S-52/3.2.3(6))*

1588 .2 *simple lines and areas with or without colour fill, set up for cursor picking to give*
1589 *explanatory notes in the text display;*

1590 .3 *any of the symbols in the presentation library;*

1591 .4 *text notes.*

1592 In addition to the presentation library, other symbols may be used in accordance with the
1593 requirements of IEC 62288.

1594 **5.4.2 Additional non-HO information**

1595 **5.4.2.1 Additional display functions**

1596 (See 6.8.5.)

1597 (S-52/2.3.1a) *Additional information from non-HO sources, may be displayed provided this*
1598 *does not degrade the display of ENC data. This additional information shall be distinguished*
1599 *from the ENC data. (See S-52, Annex A.)*

1600 **5.4.2.2 No data**

1601 (See 6.5.2.)

1602 (S-52/2.3.1c.2) *If the area covered by the ECDIS display includes waters for which no HO*
1603 *ENC at a scale appropriate for navigation exists, the areas representing those waters shall*
1604 *carry an indication to the mariner to refer to the paper chart. (See S-52, Annex A.)*

1605 An area with no chart data of any kind shall be marked with the "no data" symbology defined
1606 in the presentation library. (See S-52/3.2.3(14))

1607 If an area with no ENC data is covered by non-ENC data, the area shall be marked by the
1608 “non-ENC area” symbology defined in the presentation library. (See S-52/3.2.3(13))

1609 **5.4.2.3 Unknown object**

1610 (See 6.5.1.)

1611 *Should an “unknown object” occur in the SENC which is not adequately defined or for which*
1612 *no symbol exists, its presence shall be indicated on the display by a magenta “?” with the IMO*
1613 *category “Standard Display”. (See S-52/3.1.3)*

1614 Text information about such objects or areas shall be displayed on demand in accordance
1615 with 5.3.1.

1616 **5.4.3 Tidal adjustment**

1617 (See 6.8.5.)

1618 (S-52/1.2(h)) *Depth information shall only be displayed as it has been provided in the ENC*
1619 *and not adjusted by tidal height.*

1620 **5.5 Use of the presentation library**

1621 **5.5.1 Presentation library**

1622 (See 6.5.1.)

1623 (S-52/1.4.3) *The library version number is included in the presentation library, and it shall be*
1624 *possible to display it on the ECDIS.*

1625 (S-52, 3.1.4) *The presentation library includes an ECDIS chart 1 showing both simplified and*
1626 *full chart symbols and their explanations. The ECDIS shall provide linking by cursor*
1627 *interrogation between the symbols and the explanations. This is valid for both the IHO*
1628 *presentation library and the one provided by a manufacturer.*

1629 **5.5.2 Test diagrams**

1630 (See 6.7.3.)

1631 The presentation library contains colour differentiation test diagrams to enable the mariner to
1632 detect the stage at which the display can no longer be used to discriminate important features
1633 by colour. These diagrams, one for each colour table, are coded in S-57 format. The ECDIS
1634 shall allow the selection and display of these test diagrams. The diagrams shall be used to
1635 check the discriminability of colours within all of the tables except day-bright. (See S-
1636 52/5.2.5.)

1637 **5.6 Display characteristics**

1638 **5.6.1 Display base**

1639 (See 6.8.2.)

1640 (S-52/5-1) *Information shall be displayed in the ECDIS on one or more physical screens,*
1641 *which may be divided into more than one display. Information may be displayed automatically,*
1642 *on demand or as a result of hand-entry. In addition to the IMO performance standards the*
1643 *following rules apply.*

1644 (S-52/2.3.1(g)) *The units for depth shall always be on the same screen as the chart display.*

1645 (S-52/2.3.1(e)) *The following information shall be visible on demand on the same screen as*
1646 *the chart display is visual or on an additional graphic or text display:*

- 1647 .1 *positional data and time;*
- 1648 .2 *legend;*
- 1649 .3 *object description and associated attributes (result of “cursor query”);*
- 1650 .4 *textual information from SENC;*
- 1651 .5 *list of abbreviations (from INT-1);*

- 1652 .6 *result from navigational computations;*
1653 .7 *record of ENC-updates;*
1654 .8 *list of categories which are removed from standard display;*
1655 .9 *symbol library. (See S-52, Annex A.)*

1656 **5.7 Performance requirements**

1657 **5.7.1 Redraw**

1658 (See 6.9.3.)

1659 The ECDIS shall:

1660 (S-52/5.1) *Redraw during route monitoring to follow the ship's progress, including scale*
1661 *changes due to change in the scale of the chart information, shall take less than 5 seconds.*
1662 *Demands by the mariner that cannot be predicted by the ECDIS, such as draw at a different*
1663 *scale or in a different area may take more than 5 seconds. In the latter case:*

- 1664 – *the mariner shall be informed;*
1665 – *the display shall continue route monitoring until the new information is ready to draw*
1666 *within 5 seconds.*

1667 (S-52/2.2.3) *If there is a delay in preparing (re-generating) data for display (for example due*
1668 *to a request for scale change or look ahead to another area) the ECDIS shall inform the*
1669 *mariner. The previous display shall be maintained and updated, until the new display is ready*
1670 *for re-draw.*

1671 **5.7.2 Resolution**

1672 (See 6.7.4.)

1673 (S-52/5.1) *Minimum lines per mm (L) given by $L = 864/s$, where s is the smaller dimension of*
1674 *the chart display area (for example for the minimum chart area, $s = 270$ mm and the*
1675 *resolution is $L = 3,20$ lines per mm, giving a "picture unit" size of 0,312 mm).*

1676 **5.7.3 Symbols**

1677 (See 6.7.1.)

1678 (S-52, appendix 2/3.1.5) *The minimum sizes for all symbols shall be as shown in the*
1679 *presentation library.*

1680 (S-52, appendix 2/3.1.5) *In addition, the symbols shall always be drawn with at least the same*
1681 *number of pixels as are required to draw the symbol at the size defined in the presentation*
1682 *library for the minimum resolution and minimum chart display area (270 mm × 270 mm).*

1683 (S-52, appendix 2/3.2.1(2)) *The ECDIS shall provide the mariner with the option of using*
1684 *either the traditional paper chart symbols or the new simplified symbols as best fits his*
1685 *purpose.*

1686 **5.7.4 Number of colours**

1687 (See 6.7.3.)

1688 (S-52/5.1) *Colours: 64*

1689 **5.7.5 Brightness and contrast**

1690 (See 6.7.3.)

1691 The brightness and contrast controls shall have a provision to permit returning to the
1692 calibrated setting. The ECDIS manual shall carry a warning that use of the brightness control
1693 may inhibit visibility of information at night. (See S-52/4.1.4)

1694 The colour tables are provided in the presentation library, all of which shall be available.
1695 (See S-52/4.1.5)

1696 *Colour tolerance values:*

1697 .1 (S-52/5.2.3.1) (S-52/5.2.3.2) *the discrimination difference between any two colours*
 1698 *displayed shall be not less than 10 ΔE^* units for the bright-sun colour table, restricted to*
 1699 *colour pairs of tabular ΔE^* greater than 20;*

1700 .2 (S-52/5.2.3.1) *the difference between the colour displayed and the CIE colour defined in*
 1701 *the specification shall be not greater than 16 ΔC^* units. If a monitor is independently*
 1702 *tested, then the difference shall be not greater than 8 ΔC^* units;*

1703 .3 (S-52/5.2.3.1) *the luminance of the colour displayed shall be within 20 % of its specified*
 1704 *value. Black is a special case and the luminance of it shall be not greater than 0,52 cd/m²*
 1705 *for DAY_BRIGHT.*

1706 **5.8 Ergonomic requirements**

1707 **5.8.1 Mode and orientation**

1708 (See 6.8.7.)

1709 (S-52/3.2.3(10)) *The north arrow shall always be shown at the top left corner of the chart*
 1710 *display, just clear of the scale bar or the latitude scale.*

1711 **5.8.2 Windows**

1712 (See 6.3.2.)

1713 (S-52/3.4.2) *Any windows containing text, diagrams, etc. superimposed on the route*
 1714 *monitoring display shall be temporary.*

1715 NOTE Temporary for this application means that the window can be removed or moved from the chart display area.

1716 (S-52/3.4.2) *It shall be possible to re-locate such windows in a less important part of the*
 1717 *display, such as on land, or behind the own ship symbol.*

1718 **5.9 Update of chart information**

1719 **5.9.1 General**

1720 Test requirements are addressed to individual update sets or cumulative updates (collection
 1721 of sequential individual update sets). A third alternative update method is the reissue i.e. a
 1722 “compilation update” set, which contains all current changes from the edition date of the ENC,
 1723 and does not involve or rely on any previously issued update.

1724 The detailed method of updating is described in the ENC product specification in S-57. If, in
 1725 the following clauses, there are conflicts between the requirements of S-52, appendix 1 and
 1726 the ENC product specification, the requirements of the latter shall be used.

1727 **5.9.1.1 Integration of updates**

1728 (See 6.8.15.2.)

1729 (S-52/3.4.1(c)) *Updates shall be clearly distinguishable on the display. Once accepted,*
 1730 *integrated updates shall be indistinguishable from ENC data.*

1731 *Non-integrated updates (for example those entered manually) shall be distinguishable as*
 1732 *described in S-52/2.3.4.*

1733 **5.9.1.2 Recall for display**

1734 (See 6.8.15.2, 6.8.16.)

1735 (S-52/3.4.1(e)) *It shall be possible on demand to review a previously installed update.*

1736 The review shall be possible at least for previous 3 months or until current base cell or
 1737 reissue. The review shall provide both graphical highlight and textual report of the chart
 1738 objects which has been subject of the updates including changes, insertions and deletions.
 1739 The review shall operate by date range for which all updates are highlighted.

1740 NOTE: Review by update numbers is difficult to handle for end user as the seamless chart database contains
1741 numerous individual chart cells which all have their unique update numbers. A date range is possible to
1742 understand and handle.

1743 5.9.1.3 Log file

1744 (See 6.8.15.3.)

1745 (S-52/3.4.1(h)) *ECDIS shall keep a record of updates, including time of application and*
1746 *identification parameters described in S-52, appendix 1/3.2(i), through a log file. The log file*
1747 *shall contain, for each update applied to or rejected by the SENC, the following information:*

1748 .1 *date and time of application/rejection;*

1749 .2 *complete and unique identification number of update as described in the S-57 product*
1750 *specification;*

1751 .3 *any anomalies encountered during application;*

1752 .4 *type of application: manual/automatic.*

1753 An example of “anomalies” could be error messages or load warnings.

1754 5.9.1.4 Update applied out of sequence

1755 (See 6.8.15.1.)

1756 (S-52/3.4.1(i)) *The ECDIS shall warn the user when an update is out of sequence, terminate*
1757 *the update and restore the SENC as it was before application of the ENC update file.*

1758 The permanent indication SSE 27 shall be displayed as defined in IHO S-63 covers this out of
1759 sequence case for the ENC charts delivered based on the IHO-63. For the plain S-57 ENC
1760 charts and, if provided, for the SENC delivery, the ECDIS shall create the permanent
1761 indication SSE 27 by memorizing an attempt to load an update out of sequence. In such a
1762 case the memorized attempt to load out of sequence is reset by a successful attempt to load
1763 a reissue for equal or higher update number, a new edition or complete sequence of updates
1764 until the update number of the out of sequence update or removal of the cell.

1765 NOTE: SENC delivery is required not to be inferior to ENC delivery. The SENC delivery does not deliver out of
1766 sequence updates as they are already detected in the shore based SENC conversion. However the SENC delivery
1767 detects the out of sequence case and informs the user of the SENC delivery using SSE 27 that the chart is not up-
1768 to-date. The SENC delivery removes SSE 27 after the chart supplier has fixed the situation. In other words the
1769 SENC delivery has the capability to inform ECDIS user using SSE 27 the situation that the current state of the
1770 delivered SENC in the ECDIS is not up-to-date compared to the update state of original source of the ENC.

1771 5.9.2 Manual update

1772 5.9.2.1 Keying and symbology

1773 (See 6.8.16.)

1774 (S-52, appendix 1/3.4.3(a)) *The ECDIS shall enable manual entry of updates for non-integrated*
1775 *presentation on the display. A capacity shall exist to enable the mariner to:*

1776 .1 *enter the update as described in S-52;*

1777 .2 *ensure all update text information relevant to the new condition and to the source of the*
1778 *update is entered by the mariner and recorded by the system, for display on demand.*

1779 The system shall be capable of implementing manual updates to point objects and simple line
1780 and area objects such as traffic routing schemes and restricted areas, but excluding complicated
1781 lines and areas such as contours and coastlines.

1782 5.9.2.2 Indications and alerts

1783 (See 6.8.16.)

1784 (S-52, appendix 1/3.4.3(b)) *The ECDIS shall be capable of sensing indications and alerts*
1785 *related to non-integrated (manual) updates, just as it does for integrated ENC updates.*

1786 5.9.2.3 Presentation

1787 (See 6.8.16.)