



ST. VINCENT AND THE GRENADINES

MARITIME ADMINISTRATION

CIRCULAR N° SOL 007 - Rev. 5

ELECTRONIC CHART DISPLAY AND INFORMATION AND BACK-UP ARRANGEMENTS

SOLAS 74 as amended (Consolidated Edition 2004)
Ch.V Reg. 19.2.1.4, 19.2.1.5 and 27 and
IMO Resolution A. 817(19) as amended by Res. MSC 64(67), Res. MSC
86(70) and Res. MSC 232 (82)

**TO: SHIPOWNERS, SHIPS' OPERATORS AND
MANAGERS, FLAG STATE SURVEYORS,
CLASSIFICATION SOCIETIES**

EFFECTIVE AS FROM: Date of this Circular

26th September 2017

St. Vincent and The Grenadines Maritime Administration accepts the use of Electronic Charts and Display Information Systems as per SOLAS Regulations V/19.2.1.4 and V/19.2.1.5, under the following conditions:

1. ECDIS has to be approved in accordance with the requirements of the IMO Resolution A.817 (19) as amended by MSC.64 (67), Annex 5, MSC.86 (70), Annex 4 and MSC.232 (82) has to be operated with up-to-date Electronic Nautical Charts. Ships sailing in waters not covered by Electronic Nautical Charts should be fitted with an updated folio of paper nautical charts. Masters and Deck Officers should be aware of the limitations of Raster Chart Display System (RCDS) as indicated in IMO MSC.1/Circ.1503 as amended.
2. In order to meet a proper ECDIS back-up arrangements as per SOLAS Regulations V/19.2.1.5 the ship must be fitted either with a secondary type approved ECDIS in accordance with the requirements of the MSC Resolution 64 (67) or updated nautical paper charts for the intended voyage. For ECDIS operating in the Raster Chart Display System (RCDS) mode, updated nautical paper charts for the intended voyage are requested as a back-up arrangement.
3. It is the Owner's/Company's responsibility that Masters and Navigation Watch Officers serving on board vessels fitted with ECDIS be adequately trained and certified.

Ships will be required to retrofit the equipment "at the first survey", in accordance with the application schedule below, based on the vessel's type, size and keel laying date.

Although the "first survey" may not coincide with dry docking, the owners should be aware that substantial work could be involved in retrofitting this equipment, which could take the ship out of service.

Consideration should therefore be given to carry out the necessary modifications in dry dock, before the mandatory implementation date.

Application Schedule

ECDIS should be fitted on board as follows:

- High-speed craft built on or after 1st July 2008;
- High-speed craft built before 1st July 2008, not later than 1st July 2010;
- Passenger ships > 500 GT built on or after 1st July 2012;
- Tankers > 3000 GT built on or after 1st July 2012;
- Cargo ships > 10000 GT built on or after 1st July 2013;
- Cargo ships > 3000 GT but < 10000 GT built on or after 1st July 2014;
- Passenger ships > 500 GT built before 1st July 2012, not later than the first survey on or after 1st July 2014;
- Tankers > 3000 GT built before 1st July 2012, not later than the first survey on or after 1st July 2015;
- Cargo ships > 50000 GT built before 1st July 2013, not later than the first survey on or after 1st July 2016;
- Cargo ships > 20000 GT but < 50000 GT built before 1st July 2013, not later than the first survey on or after 1st July 2017;
- Cargo ships > 10000 GT but < 20000 GT built before 1st July 2013, not later than the first survey on or after 1st July 2018.

First survey

The first survey means the first annual survey, the first periodical survey or the first renewal survey, whichever is due first after the specified date.

1. For a passenger ship, it is the first renewal survey for "Passenger ship safety survey";
2. For a cargo ship (non-passenger ship), it is either the "Cargo ship safety equipment survey" or the "Cargo ship safety survey" (combined survey – if the ship chooses to combine all SOLAS certificates into one).
3. For both passenger ships and cargo ships which are under construction, if the keel is laid before, but the ship is delivered after the date specified in the relevant regulation, the initial survey is the "first survey".

Training

In the STCW 2010 amendments and related Circulars, Master and Deck Officers on board the ship equipped ECDIS are required to complete a Generic Training (in compliance with IMO Training Course (IMO Model Course 1.27)) by 1st January 2017, as a condition to obtain or renew their certificates of competency.

It has been clarified by IMO STCW.7/Circ.24, annexed to this Circular, that the seafarers are not required to provide documentation of Generic and Type-specific Training in ECDIS. However, the seafarers are required to be familiarized with the ECDIS equipment installed on board. To provide a certificate and/or a record certifying the completion of the training is recommended as a countermeasure against Port State Control comments, Master and Deck Officers should hold training certificates for ECDIS.

Master and Deck Officers should also be familiar with the requirements of any local authorities regarding the use of ECDIS in their waters.

Companies should ensure that seafarers have done familiarization training. Therefore, a ship safety management system **should include familiarization with the fitted ECDIS equipment**, including its backup arrangements, sensors and related peripherals.

Maintenance of ECDIS Software

ECDIS in operation comprises hardware, software and data. It is important for the safety of navigation that the application software within the ECDIS works fully in accordance with the Performance Standards and is capable of displaying all the relevant digital information contained within the ENC.

Proper ECDIS software maintenance is an important issue and adequate measures need to be implemented by Masters, shipowners and operators in accordance with the International Safety Management (ISM) Code.

An ECDIS unit which has not been updated to the latest version of the IHO Standards may not meet the chart carriage requirements as set out in SOLAS regulation V/19.2.1.4. IHO has announced a revision of IHO standards effective as from 1st September 2017.

To meet the requirements of IMO Circular MSC.1/Circ.1503/Rev.1, owners and operators should liaise with ECDIS manufacturers to ensure that their ECDIS software arrangements comply by the required date with the latest versions of the IHO Standards.

It is understood that the necessary steps to update ECDIS software or hardware will vary from unit to unit and may require replacement of the whole unit. Therefore, shipowners and operators are encouraged to contact the manufacturer of their ECDIS units to arrange the update or replacement as soon as possible if they have not done so already.

If the update has not been carried out, this Administration recommends that records be maintained on board stating the reason why the update has not been carried out and details of when it has been arranged for the update to take place.

ECDIS – Guidance for Good Practice

The consolidated guidance termed "*ECDIS – Guidance for Good Practice*" is set out in the annex to circular MSC.1/Circ.1503/Rev.1.

Shipowners, Ship operators, Masters and Deck Officers on ECDIS-fitted ships should use the annexed guidance, in order to improve their understanding and facilitate safe and effective use of ECDIS.

Annexes: IMO Resolution A.817 (19), MSC.64 (67), Annex 5, MSC.86 (70), Annex 4, IMO Resolution MSC 232(82), MSC.1/Circ.1503/Rev.1 and STCW.7/Circ.24.

Revision History:

Rev 4: ECDIS – Guidance for Good Practice, Maintenance of ECDIS Software, Annexes

Rev 5: ECDIS– Guidance for Good Practice, Annex



ASSEMBLY
19th session
Agenda item 10

RESOLUTION A.817(19)
adopted on 23 November 1995

**PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY AND
INFORMATION SYSTEMS (ECDIS)**

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING ALSO regulation V/20 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, which requires all ships to carry adequate and up-to-date charts, sailing directions, lists of lights, notices to mariners, tide tables and all other nautical publications necessary for the intended voyage,

NOTING that the up-to-date charts required by SOLAS regulation V/20 can be provided and displayed electronically on board ships by electronic chart display and information systems (ECDIS), and that the other nautical publications required by regulation V/20 may also be so provided and displayed,

RECOGNIZING the need to prepare performance standards for ECDIS in order to ensure the operational reliability of such equipment, and to ensure that the information provided and displayed electronically is at least equivalent to that of up-to-date charts and, when also provided and displayed, other nautical publications, and to avoid, as far as practicable, adverse interaction between ECDIS and other shipborne navigational and communication equipment,

NOTING FURTHER that the International Hydrographic Organization (IHO) has, in co-operation with IMO, developed complementary recommendations on electronic navigational charts, thereby standardizing the database and the content, structure and format of the information provided and displayed,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its sixty-third session,

1. ADOPTS the Recommendation on Performance Standards for Electronic Chart Display and Information Systems (ECDIS) set out in the Annex to the present resolution;

2. RECOMMENDS Governments to ensure that ECDIS used on ships entitled to fly their flag conform to performance standards not inferior to those set out in the Annex to the present resolution;
3. REQUESTS the Maritime Safety Committee to keep these Performance Standards under review and to adopt amendments thereto, as necessary;
4. ALSO REQUESTS the Maritime Safety Committee to ensure that any proposed amendments to this resolution are agreed with IHO prior to adoption.

ANNEX

PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEMS (ECDIS)

1 INTRODUCTION

- 1.1 The primary function of the ECDIS is to contribute to safe navigation.
- 1.2 ECDIS, with adequate back-up arrangements, may be accepted as complying with the up-to-date charts required by regulation V/20 of the 1974 SOLAS Convention.
- 1.3 In addition to the general requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and the requirements for electronic navigational aids contained in IMO resolution A.694(17)*, ECDIS should meet the requirements of this performance standard.
- 1.4 ECDIS should be capable of displaying all chart information necessary for safe and efficient navigation originated by, and distributed on the authority of, government-authorized hydrographic offices.
- 1.5 ECDIS should facilitate simple and reliable updating of the electronic navigational chart.
- 1.6 Use of ECDIS should reduce the navigational workload as compared to use of a paper chart. It should enable the mariner to execute in a convenient and timely manner all route planning, route monitoring and positioning currently performed on paper charts. It should be capable of continuously plotting the ship's position.
- 1.7 ECDIS should have at least the same reliability and availability of presentation as the paper chart published by government-authorized hydrographic offices.
- 1.8 ECDIS should provide appropriate alarms or indications with respect to the information displayed or malfunction of the equipment (see Appendix 5).

2 DEFINITIONS

For the purpose of these performance standards:

2.1 Electronic chart display and information system (ECDIS) means a navigation information system which, with adequate back-up arrangements, can be accepted as complying with the up-to-date chart required by regulation V/20 of the 1974 SOLAS Convention, by displaying selected information from a system electronic navigational chart (SENC) with positional information from navigation sensors to assist the mariner in route planning and route monitoring, and by displaying additional navigation-related information if required.

*IEC Publication 945 (see Appendix 1).

2.2 Electronic navigational chart (ENC) means the database, standardized as to content, structure and format, issued for use with ECDIS on the authority of government-authorized hydrographic offices. The ENC contains all the chart information necessary for safe navigation, and may contain supplementary information in addition to that contained in the paper chart (e.g. sailing directions) which may be considered necessary for safe navigation.

2.3 System electronic navigational chart (SENC) means a database resulting from the transformation of the ENC by ECDIS for appropriate use, updates to the ENC by appropriate means, and other data added by the mariner. It is this database that is actually accessed by ECDIS for the display generation and other navigational functions, and is the equivalent to an up-to-date paper chart. The SENC may also contain information from other sources.

2.4 Standard display means the SENC information that should be shown when a chart is first displayed on ECDIS. The level of the information it provides for route planning or route monitoring may be modified by the mariner according to the mariner's needs.

2.5 Display base means the level of SENC information which cannot be removed from the display, consisting of information which is required at all times in all geographical areas and all circumstances. It is not intended to be sufficient for safe navigation.

2.6 Further information on ECDIS definitions may be found in IHO Special Publication S-52, Appendix 3 (see Appendix 1).

3 DISPLAY OF SENC INFORMATION

3.1 ECDIS should be capable of displaying all SENC information.

3.2 SENC information available for display during route planning and route monitoring should be subdivided into three categories, display base, standard display, and all other information (see Appendix 2).

3.3 ECDIS should present the standard display at any time by a single operator action.

3.4 When a chart is first displayed on ECDIS, it should provide the standard display at the largest scale available in the SENC for the displayed area.

3.5 It should be easy to add or remove information from the ECDIS display. It should not be possible to remove information contained in the display base.

3.6 It should be possible for the mariner to select a safety contour from the depth contours provided by the SENC. ECDIS should give the safety contour more emphasis than other contours on the display.

3.7 It should be possible for the mariner to select a safety depth. ECDIS should emphasize soundings equal to or less than the safety depth whenever spot soundings are selected for display.

3.8 The ENC and all updates to it should be displayed without any degradation of their information content.

3.9 ECDIS should provide a means of ensuring that the ENC and all updates to it have been correctly loaded into the SENC.

3.10 The ENC data and updates to it should be clearly distinguishable from other displayed information, such as, for example, that listed in Appendix 3.

4 PROVISION AND UPDATING* OF CHART INFORMATION

4.1 The chart information to be used in ECDIS should be the latest edition of information originated by a government-authorized hydrographic office, and conform to IHO standards.

4.2 The contents of the SENC should be adequate and up-to-date for the intended voyage, as required by regulation V/20 of the 1974 SOLAS Convention.

4.3 It should not be possible to alter the contents of the ENC.

4.4 Updates should be stored separately from the ENC.

4.5 ECDIS should be capable of accepting official updates to the ENC data provided in conformity with IHO standards. These updates should be automatically applied to the SENC. By whatever means updates are received, the implementation procedure should not interfere with the display in use.

4.6 ECDIS should also be capable of accepting updates to the ENC data entered manually with simple means for verification prior to the final acceptance of the data. They should be distinguishable on the display from ENC information and its official updates, and not affect display legibility.

4.7 ECDIS should keep a record of updates, including time of application to the SENC.

4.8 ECDIS should allow the mariner to display updates so that the mariner may review their contents and ascertain that they have been included in the SENC.

5 SCALE

ECDIS should provide an indication of whether:

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

6 DISPLAY OF OTHER NAVIGATIONAL INFORMATION

6.1 Radar information or other navigational information may be added to the ECDIS display. However, it should not degrade the SENC information, and should be clearly distinguishable from the SENC information.

6.2 ECDIS and added navigational information should use a common reference system. If this is not the case, an indication should be provided.

6.3 Radar

*Appendix 1 to IHO Special Publication S-52 (see Appendix 1).

- 6.3.1 Transferred radar information may contain both the radar image and ARPA information.
- 6.3.2 If the radar image is added to the ECDIS display, the chart and the radar image should match in scale and in orientation.
- 6.3.3 The radar image and the position from the position sensor should both be adjusted automatically for antenna offset from the conning position.
- 6.3.4 It should be possible to adjust the displayed position of the ship manually so that the radar image matches the SENC display.
- 6.3.5 It should be possible to remove the radar information by single operator action.

7 DISPLAY MODE AND GENERATION OF THE NEIGHBOURING AREA

- 7.1 It should always be possible to display the SENC in a "north-up" orientation. Other orientations are permitted.
- 7.2 ECDIS should provide for true motion mode. Other modes are permitted.
- 7.3 When true motion mode is in use, reset and generation of the neighbouring area should take place automatically at a distance from the border of the display determined by the mariner.
- 7.4 It should be possible manually to change the chart area and the position of own ship relative to the edge of the display.

8 COLOURS AND SYMBOLS

- 8.1 IHO recommended colours and symbols should be used to represent SENC information^{*}.
- 8.2 The colours and symbols other than those mentioned in 8.1 should be those used to describe the navigational elements and parameters listed in Appendix 3 and published by IEC^{**}.
- 8.3 SENC information, when displayed at the scale specified in the ENC, should use the specified size of symbols, figures and letters^{**}.
- 8.4 ECDIS should allow the mariner to select whether own ship is displayed in true scale or as a symbol.

9 DISPLAY REQUIREMENTS

- 9.1 ECDIS should be capable of displaying information for:

^{*}Appendix 2 to IHO Special Publication S-52 (see Appendix 1).

^{**}IEC Publication 1174.

- .1 route planning and supplementary navigation tasks;
- .2 route monitoring.

9.2 The effective size of the chart presentation for route monitoring should be at least 270 mm by 270 mm.

9.3 The display should be capable of complying with the colour and resolution recommendations of IHO*.

9.4 The method of presentation should ensure that the displayed information is clearly visible to more than one observer in the conditions of light normally experienced on the bridge of the ship by day and by night.

10 ROUTE PLANNING, MONITORING AND VOYAGE RECORDING

10.1 It should be possible to carry out route planning and route monitoring in a simple and reliable manner.

10.2 ECDIS should be designed following ergonomic principles for user-friendly operation.

10.3 The largest scale data available in the SENC for the area given should always be used by the ECDIS for all alarms or indications of crossing the ship's safety contour and of entering a prohibited area, and for alarms and indications according to Appendix 5.

10.4 Route planning

10.4.1 It should be possible to carry out route planning including both straight and curved segments.

10.4.2 It should be possible to adjust a planned route by, for example:

- .1 adding waypoints to a route;
- .2 deleting waypoints from a route;
- .3 changing the position of a waypoint;
- .4 changing the order of the waypoints in the route.

10.4.3 It should be possible to plan an alternative route in addition to the selected route. The selected route should be clearly distinguishable from the other routes.

10.4.4 An indication is required if the mariner plans a route across an own ship's safety contour.

10.4.5 An indication is required if the mariner plans a route across the boundary of a prohibited area or of a geographical area for which special conditions exist (see Appendix 4).

* Appendix 2 to IHO Special Publication S-52.

10.4.6 It should be possible for the mariner to specify a limit of deviation from the planned route at which activation of an automatic offtrack alarm should occur.

10.5 Route monitoring

10.5.1 For route monitoring the selected route and own ship's position should appear whenever the display covers that area.

10.5.2 It should be possible to display a sea area that does not have the ship on the display (e.g., for look ahead, route planning), while route monitoring. If this is done on the display used for route monitoring, the automatic route monitoring functions (e.g., updating ship's position, and providing alarms and indications) should be continuous. It should be possible to return to the route monitoring display covering own ship's position immediately by single operator action.

10.5.3 ECDIS should give an alarm if the ship, within a specified time set by the mariner, is going to cross the safety contour.

10.5.4 ECDIS should give an alarm or indication, as selected by the mariner, if the ship, within a specified time set by the mariner, is going to cross the boundary of a prohibited area or of a geographical area for which special conditions exist (see Appendix 4).

10.5.5 An alarm should be given when the specified limit for deviation from the planned route is exceeded.

10.5.6 The ship's position should be derived from a continuous positioning system of an accuracy consistent with the requirements of safe navigation. Whenever possible, a second independent positioning method of a different type should be provided; ECDIS should be capable of identifying discrepancies between the two systems.

10.5.7 ECDIS should provide an indication when the input from the position-fixing system is lost. ECDIS should also repeat, but only as an indication, any alarm or indication passed to it from a position-fixing system.

10.5.8 An alarm should be given by ECDIS if the ship, within a specified time or distance set by the mariner, is going to reach a critical point on the planned route.

10.5.9 The positioning system and the SENC should be on the same geodetic datum. ECDIS should give an alarm if this is not the case.

10.5.10 It should be possible to display an alternative route in addition to the selected route. The selected route should be clearly distinguishable from the other routes. During the voyage, it should be possible for the mariner to modify the selected sailing route or change to an alternative route.

10.5.11 It should be possible to display:

- .1 time-labels along ship's track, manually on demand and automatically at intervals selected between 1 and 120 m; and
- .2 an adequate number of: points, free movable electronic bearing lines, variable and fixed-range markers and other symbols required for navigation purposes and specified in Appendix 3.

10.5.12 It should be possible to enter the geographical co-ordinates of any position and then display that position on demand. It should also be possible to select any point (features, symbol or position) on the display and to read its geographical co-ordinates on demand.

10.5.13 It should be possible to adjust the ship's geographical position manually. This manual adjustment should be noted alpha-numerically on the screen, maintained until altered by the mariner, and automatically recorded.

10.6 Voyage recording

10.6.1 ECDIS should store and be able to reproduce certain minimum elements required to reconstruct the navigation and verify the official database used during the previous 12 hours. The following data should be recorded at one-minute intervals:

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

10.6.2 In addition, ECDIS should record the complete track for the entire voyage, with time marks at intervals not exceeding 4 hours.

10.6.3 It should not be possible to manipulate or change the recorded information.

10.6.4 ECDIS should have the capability to preserve the record of the previous 12 hours and of the voyage track.

11 ACCURACY

11.1 The accuracy of all calculations performed by ECDIS should be independent of the characteristics of the output device and should be consistent with the SENC accuracy.

11.2 Bearings and distances drawn on the display, or those measured between features already drawn on the display, should have an accuracy no less than that afforded by the resolution of the display.

12 CONNECTIONS WITH OTHER EQUIPMENT*

12.1 ECDIS should not degrade the performance of any equipment providing sensor inputs. Nor should the connection of optional equipment degrade the performance of ECDIS below this standard.

12.2 ECDIS should be connected to systems providing continuous position-fixing, heading and speed information.

13 PERFORMANCE TESTS, MALFUNCTION ALARMS AND INDICATIONS

*IEC Publication 1162.

13.1 ECDIS should be provided with means for carrying out on-board tests of major functions either automatically or manually. In case of a failure, the test should display information to indicate which module is at fault.

13.2 ECDIS should provide a suitable alarm or indication of system malfunction.

14 BACK-UP ARRANGEMENTS

Adequate back-up arrangements should be provided to ensure safe navigation in case of an ECDIS failure.

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

15 POWER SUPPLY

15.1 It should be possible to operate ECDIS and all equipment necessary for its normal functioning when supplied by an emergency source of electrical power in accordance with the appropriate requirements of chapter II-1 of the 1974 SOLAS Convention.

15.2 Changing from one source of power supply to another, or any interruption of the supply for a period of up to 45 s, should not require the equipment to be re-initialized manually.

APPENDIX 1

REFERENCE DOCUMENTS

The following international organizations have developed technical standards and specifications, as listed below, for use in conjunction with this standard. The latest edition of these documents should be obtained from the organization concerned.

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

Address: Directing Committee
International Hydrographic Bureau
BP 445
MC 98011 Monaco CEDEX Phone: + 33 9350 6587
Principality of Monaco Fax: + 33 9325 2003

Publications

Special Publication No.S-52 "Provisional Specifications for Chart Content and Display of ECDIS", 2nd Edition, September 1992

S-52 Appendix 1 "Report of the IHO (COE) Working Group on Updating the Electronic Chart", 1st Edition, June 1990

S-52 Appendix 2 "Provisional Colour and Symbol Specifications for ECDIS", 1st Edition, February 1991

S-52 Appendix 3 "Glossary of ECDIS-related Terms", 1st Edition, July 1991

Special Publication No.S-57 "IHO Transfer Standard for Digital Hydrographic Data"

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

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3 rue de Varembé
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CH-1211 Geneva 20 Phone: + 41 22 734 01 50
Switzerland Fax: + 41 22 733 38 43

Publications

IEC Publication 1174 "Electronic Chart Display and Information System (ECDIS)"

IEC Publication 945 "General Requirements for Shipborne Radio Equipment Forming Part of the Global Maritime Distress and Safety System and Marine Navigational Equipment"

IEC Publication 1162 "Digital Interfaces - Navigation and Radiocommunication Equipment On Board Ship"

APPENDIX 2

**SENC INFORMATION AVAILABLE FOR DISPLAY DURING
ROUTE PLANNING AND ROUTE MONITORING**

- 1 Display base, permanently retained on the ECDIS display, consisting of:
 - .1 coastline (high water);
 - .2 own ship's safety contour, to be selected by the mariner;
 - .3 indication of isolated underwater dangers at depths of less than the safety contour which lie within the safe waters defined by the safety contour;
 - .4 indication of isolated dangers which lie within the safe water defined by the safety contour such as bridges, overhead wires, etc., including buoys and beacons, whether or not these are being used as aids to navigation;
 - .5 traffic routeing systems;
 - .6 scale, range, orientation and display mode;
 - .7 units of depth and height.
- 2 Standard display, to be displayed when the chart is first displayed by ECDIS, consisting of:
 - .1 display base
 - .2 drying line
 - .3 indication of fixed and floating aids to navigation
 - .4 boundaries of fairways, channels, etc.
 - .5 visual and radar conspicuous features
 - .6 prohibited and restricted areas
 - .7 chart scale boundaries
 - .8 indication of cautionary notes
- 3 All other information, displayed individually on demand, for example:
 - .1 spot soundings
 - .2 submarine cables and pipelines
 - .3 ferry routes
 - .4 details of all isolated dangers
 - .5 details of aids to navigation
 - .6 contents of cautionary notes
 - .7 ENC edition date
 - .8 geodetic datum
 - .9 magnetic variation
 - .10 graticule
 - .11 place names

APPENDIX 3

NAVIGATIONAL ELEMENTS AND PARAMETERS*

- 1 Own ship
 - .1 Past track with time marks for primary track
 - .2 Past track with time marks for secondary track
- 2 Vector for course and speed made good
- 3 Variable range marker and/or electronic bearing line
- 4 Cursor
- 5 Event
 - .1 Dead reckoning position and time (DR)
 - .2 Estimated position and time (EP)
- 6 Fix and time
- 7 Position line and time
- 8 Transferred position line and time
 - .1 Predicted tidal stream or current vector with effective time and strength (in box)
 - .2 Actual tidal stream or current vector with effective time and strength (in box)
- 9 Danger highlight
- 10 Clearing line
- 11 Planned course and speed to make good. Speed is shown in box
- 12 Waypoint
- 13 Distance to run
- 14 Planned position with date and time
- 15 Visual limits of lights arc to show rising/dipping range

*See IEC Publication 1174.

16 Position and time of "wheelover"

APPENDIX 4

AREAS FOR WHICH SPECIAL CONDITIONS EXIST

The following are the areas which ECDIS should detect and for which it should provide an alarm or indication under 10.4.5 and 10.5.4:

Traffic separation zone

Traffic routeing scheme crossing or roundabout

Traffic routeing scheme precautionary area

Two-way traffic route

Deepwater route

Recommended traffic lane

Inshore traffic zone

Fairway

Restricted area

Caution area

Offshore production area

Areas to be avoided

Military practice area

Seaplane landing area

Submarine transit lane

Ice area

Channel

Fishing ground

Fishing prohibited

Pipeline area

Cable area

Anchorage area

Anchorage prohibited

Dumping ground

Spoil ground

Dredged area

Cargo transshipment area

Incineration area

Specially protected areas

APPENDIX 5

ALARMS AND INDICATORS

Section	Requirements	Information
10.3	Alarm or Indication	Largest scale for alarm
10.4.6	Alarm	Exceeding off-track limits
10.5.3	Alarm	Crossing safety contour
10.5.4	Alarm or Indication	Area with special conditions
10.5.5	Alarm	Deviation from route
10.5.8	Alarm	Approach to critical point
10.5.9	Alarm	Different geodetic datum
13.2	Alarm or Indication	Malfunction of ECDIS
5.1	Indication	Information overscale
5.2	Indication	Larger scale ENC available
6.2	Indication	Different reference system
10.4.4	Indication	Route planning across safety contour
10.4.5	Indication	Route planning across specified area
10.5.7	Indication	Positioning system failure
13.1	Indication	System test failure

In this performance standard the definitions of indicators and alarms provided in the IMO publication "Code on Alarms and Indicators" (IMO-867E) apply.

Alarm: An alarm or alarm system which announces by audible means, or audible and visual means, a condition requiring attention.

Indicator: Visual indication giving information about the condition of a system or equipment.

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MSC.1/Circ.1503/Rev.1
16 June 2017

ECDIS – GUIDANCE FOR GOOD PRACTICE

- 1 The Maritime Safety Committee, at its ninety-fifth session (3 to 12 June 2015), approved the *ECDIS – Guidance for Good Practice*, drawing together relevant guidance from seven previous ECDIS circulars into a single, consolidated document.
- 2 The undeniable safety benefits of navigating with Electronic Chart Display and Information Systems (ECDIS) were recognized through Formal Safety Assessments submitted to the Organization and experience gained by the voluntary use of ECDIS for many years. ECDIS was mandated for carriage by High-Speed Craft (HSC) as early as 1 July 2008. Subsequently, the mandatory carriage of ECDIS for ships other than HSC (depending on the ship type, size and construction date, as required by SOLAS regulation V/19.2.10) commenced in a phased manner from 1 July 2012 onwards.
- 3 ECDIS is a complex, safety-relevant, software-based system with multiple options for display and integration. The ongoing safe and effective use of ECDIS involves many stakeholders including seafarers, equipment manufacturers, chart producers, hardware and software maintenance providers, shipowners and operators, and training providers. It is important that all these stakeholders have a clear and common understanding of their roles and responsibilities in relation to ECDIS.
- 4 ECDIS was accepted as meeting the chart carriage requirements of SOLAS regulation V/19 in 2002. Over the years, IMO Member States, hydrographic offices, equipment manufacturers and other organizations have contributed to the development of guidance on a variety of ECDIS-related matters. Over the years, IMO has issued a series of complementary circulars on ECDIS.
- 5 While most useful IMO guidance on ECDIS was developed in this incremental manner, the information needed to be consolidated, where possible, to have ECDIS-related guidance within a single circular, which could be easily kept up to date without duplication or need for continual cross-referencing. Such consolidation of information offers clear and unambiguous understanding of the carriage requirements and use of ECDIS.
- 6 The consolidated guidance termed "*ECDIS – Guidance for Good Practice*" is set out in the annex to this circular (referred to as "Guidance" hereafter). Ship operators, masters and deck officers on ECDIS-fitted ships are encouraged to use this guidance to improve their understanding and facilitate safe and effective use of ECDIS.

7 The Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), based on a recommendation from the fourth session of the Sub-Committee on Human Element, Training and Watchkeeping (30 January to 3 February 2017), and noting the need to clarify the requirement of ECDIS familiarization as specified in the STCW Convention, 1978, as amended, and the ISM Code, approved the revision of the *ECDIS – Guidance for Good Practice*, as set out in the annex.

8 Members of the Organization and all Contracting Governments to the SOLAS Convention are invited to bring this circular to the attention of all entities concerned. In particular, port States are invited to make the guidance available to their port State control inspectors, and flag States to shipowners, masters, recognized organizations, flag State control inspectors and surveyors. An electronic copy of this circular can be downloaded from the Organization's website at: (<http://www.imo.org/OurWork/Circulars/Pages/Home.aspx>).

9 This circular revokes MSC.1/Circ.1391, MSC.1/Circ.1503 and Corrigenda 1, SN.1/Circ.207/Rev.1, SN.1/Circ.266/Rev.1, SN.1/Circ.276, SN.1/Circ.312, STCW.7/Circ.10 and STCW.7/Circ.18.

ANNEX

ECDIS – GUIDANCE FOR GOOD PRACTICE

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INTRODUCTION

1 The undeniable safety benefits of navigating with Electronic Chart Display and Information Systems (ECDIS) were recognized through Formal Safety Assessments submitted to the Organization and experience gained by the voluntary use of ECDIS for many years. ECDIS was mandated for carriage by High-Speed Craft (HSC) as early as 1 July 2008. Subsequently, the mandatory carriage of ECDIS for ships other than HSC (depending on the ship type, size and construction date, as required by SOLAS regulation V/19.2.10) commenced in a phased manner from 1 July 2012 onwards.

2 ECDIS is a complex, safety-relevant, software-based system with multiple options for display and integration. The ongoing safe and effective use of ECDIS involves many stakeholders including seafarers, equipment manufacturers, chart producers, hardware and software maintenance providers, shipowners and operators, and training providers. It is important that all these stakeholders have a clear and common understanding of their roles and responsibilities in relation to ECDIS.

3 This *ECDIS – Guidance for Good Practice*, referred to as "Guidance" hereafter, draws together relevant guidance from seven previous ECDIS circulars into a single, consolidated document. The guidance is laid out in seven sections, namely:

- A. Chart carriage requirement of SOLAS
- B. Maintenance of ECDIS software
- C. Operating anomalies identified within ECDIS
- D. Differences between raster chart display system (RCDS) and ECDIS
- E. ECDIS training
- F. Transitioning from paper chart to ECDIS navigation
- G. Guidance on training and assessment in the operational use of ECDIS simulators

4 This guidance is intended to assist smooth implementation of ECDIS and its ongoing safe and effective use on board ships. Ship operators, masters and deck officers on ECDIS-fitted ships are encouraged to use this guidance to improve their understanding and facilitate safe and effective use of ECDIS.

5 Although this guidance replaces seven IMO ECDIS-related circulars, there remain several other IMO circulars that also address ECDIS matters to varying degree and reference should also be made to these circulars where necessary. A list containing the IMO ECDIS performance standards and the other IMO circulars that relate to ECDIS is provided in the reference section.

A CHART CARRIAGE REQUIREMENT OF SOLAS

6 The mandatory carriage of ECDIS, as required by SOLAS regulation V/19.2.10, is subject to a staged entry into force between 1 July 2012 and 1 July 2018. As per SOLAS regulations V/18 and V/19, for a ship to use ECDIS to meet the chart carriage requirements of SOLAS, the ECDIS equipment must conform to the relevant IMO performance standards. ECDIS units on board are required to comply with one of two performance standards (either IMO resolution A.817(19), as amended or resolution MSC.232(82)), depending on the date of

their installation. Essentially, where an ECDIS is being used to meet the chart carriage requirements of SOLAS, it must:

- .1 be type-approved;
- .2 use up-to-date electronic nautical charts (ENC);
- .3 be maintained so as to be compatible with the latest applicable International Hydrographic Organization (IHO) standards; and
- .4 have adequate, independent back-up arrangements in place.

7 According to SOLAS regulation V/18, ECDIS units on board ships must be type-approved. Type approval is the certification process that ECDIS equipment must undergo before it can be considered as complying with IMO performance standards. The process is carried out by flag Administration-accredited type-approval organizations or marine classification societies in accordance with the relevant test standards developed by, inter alia, the International Electrotechnical Commission (IEC) (e.g. IEC 61174).

8 In accordance with SOLAS regulation V/19.2.1.4, ships must carry all nautical charts necessary for the intended voyage. As defined by SOLAS regulation V/2.2, nautical charts are issued officially by or on the authority of a Government, authorized Hydrographic Office or other relevant government institutions. Ships required to fit ECDIS and ships choosing to use ECDIS to meet the chart carriage requirements of SOLAS should carry Electronic Navigational Charts (ENCs) or, where ENCs are not available at all or are not of an appropriate scale for the planning and display of the ship's voyage plan, Raster Navigational Charts (RNC) and/or any needed paper charts should be carried.

9 IHO provides an online chart catalogue that details the coverage of ENCs together with references to coastal State guidance on any requirements for paper charts (where this has been provided). The catalogue also provides links to IHO Member States' websites where additional information may be found. The IHO online chart catalogue can be accessed from the IHO website at: www.iho.int

10 As per SOLAS regulation V/27, all nautical charts necessary for the intended voyage shall be adequate and up to date. For ships using ECDIS to meet the chart carriage requirement of SOLAS, all ENCs and RNCs must be of the latest available edition and be kept up to date using both the electronic chart updates (e.g. ENC updates) and the latest available notices to mariners. Additionally, ECDIS software should be kept up to date such that it is capable of displaying up-to-date electronic charts correctly according to the latest version of IHO's chart content and display standards.

11 Relevant appendices of IMO performance standards for ECDIS specify the requirements for adequate independent back-up arrangements to ensure safe navigation in case of ECDIS failure. Such arrangements include: 1) facilities enabling a safe take-over of the ECDIS functions in order to ensure that an ECDIS failure does not result in a critical situation; 2) a means to provide for safe navigation for the remaining part of the voyage in case of ECDIS failure.

B MAINTENANCE OF ECDIS SOFTWARE

12 ECDIS in operation comprises hardware, software and data. It is important for the safety of navigation that the application software within the ECDIS works fully in accordance

with the Performance Standards and is capable of displaying all the relevant digital information contained within the ENC.

13 ECDIS that is not updated to the latest version of the IHO Standards may not meet the chart carriage requirements as set out in SOLAS regulation V/19.2.1.4.

14 For example, in January 2007, Supplement No.1 to the IHO ENC Product Specification was introduced in order to include, within the ENC, the then recently introduced IMO requirements for Particularly Sensitive Sea Areas (PSSA), Archipelagic Sea Lanes (ASL) and to cater for any future safety of navigation requirements.

15 Any ECDIS which is not upgraded to be compatible with the latest version of the IHO ENC Product Specification or the Presentation Library may be unable to correctly display the latest charted features. Additionally, the appropriate alarms and indications may not be activated even though the features have been included in the ENC. Similarly, any ECDIS which is not updated to be fully compliant with the latest version of the IHO Data Protection Standard may fail to decrypt or to properly authenticate some ENCs, leading to failure to load or install. An up-to-date list of all the relevant IHO standards relating to ECDIS equipment can be accessed from the IHO website (www.iho.int).

16 The need for safe navigation requires that manufacturers should provide a mechanism to ensure software maintenance arrangements are adequate. This may be achieved through the provision of software version information using a website. Such information should include the IHO Standards which have been implemented.

17 Administrations should inform shipowners and operators that proper ECDIS software maintenance is an important issue and that adequate measures need to be implemented by masters, shipowners and operators in accordance with the International Safety Management (ISM) Code.

C OPERATING ANOMALIES IDENTIFIED WITHIN ECDIS

18 A number of ECDIS operating anomalies have been identified. Due to the complex nature of ECDIS, and in particular because it involves a mix of hardware, software and data, it is possible that further anomalies may exist.

19 These anomalies are particularly apparent in ECDIS units that have been built and type-approved to ECDIS Performance Standards (resolution A.817(19), as amended), (i.e. before 2009). However, ECDIS units type-approved to the revised ECDIS Performance Standards (resolution MSC.232(82)) are still vulnerable to the limitations in as set out in appendix 1, item 5(a).

20 An ECDIS anomaly is an unexpected or unintended behaviour of an ECDIS unit which may affect the use of the equipment or navigational decisions made by the user. Examples include, but are not limited to:

- .1 failure to display a navigational feature correctly, such as:
 - .1 navigation areas recently recognized by IMO such as PSSA and ASL
 - .2 navigational lights with complex characteristics; and
 - .3 underwater features and isolated dangers;
- .2 failure to detect objects by "route checking" in voyage planning mode;

- .3 failure to alarm correctly; and
- .4 failure to manage a number of alarms correctly.

21 The existence of such anomalies highlights the importance of maintaining ECDIS software to ensure that it is capable of displaying up-to-date electronic charts correctly according to the latest version of the IHO's chart content and display standards. It is recommended that appropriate checks are made with the equipment manufacturer. This is of particular importance where ECDIS is the only source of chart information available.

22 IHO has produced an ECDIS Data Presentation and Performance Check (DPPC) dataset that allows mariners to check some important aspects of the operation of their ECDIS. This dataset contains two fictitious ENC cells which deck officers can load into their ECDIS units to assess operating performance and to determine whether there may be any display anomalies that either need to be remedied or otherwise managed in the way that the ECDIS is operated. If the check highlights a problem, the accompanying guidance notes with the check dataset offer suggested courses of action. The check dataset and accompanying instructions can be obtained from ENC service providers, or can be downloaded from the IHO website at: www.iho.int

23 A list of the known anomalies with advice and information on whether or not the DPPC dataset checks for each anomaly is set out in appendix 1.

24 Given the widespread use and the implementation of the ECDIS carriage requirement, the Committee considered it important that any anomalies identified by mariners are reported to and investigated by the appropriate authorities to ensure their resolution.

25 In order to better understand the extent of the issue, Administrations are invited to collect, investigate and disseminate information about ECDIS anomalies. Administrations or designated bodies are invited to:

- .1 encourage vessels under their flag to report such anomalies, with sufficient detail on the ECDIS equipment and ENCs, to allow analysis;
- .2 treat the identity of the reporter as confidential;
- .3 agree to share information with other IMO Member States and international organizations on request; and
- .4 issue alerts to mariners where such anomalies might affect safety of navigation.

D DIFFERENCES BETWEEN RASTER CHART DISPLAY SYSTEM (RCDS) AND ECDIS

26 ECDIS may be operated in one of the two modes:

- .1 the ECDIS mode when ENCs are used; and
- .2 the RCDS mode when ENCs are not available and RNCs are used instead.

Although in recent years ENC coverage has increased rapidly there could be some areas for which suitably detailed ENCs may not have been issued.

27 The RCDS mode does not have the full functionality of ECDIS and can only be used together with an appropriate portfolio of up-to-date paper charts. Limitations of the RCDS mode is set out in appendix 2.

E ECDIS TRAINING

28 The information provided below aims to assist Member States, Parties to the 1978 STCW Convention, as amended, companies and seafarers in ensuring that training programmes on the use of ECDIS provided to masters and deck officers¹ serving on ships fitted with ECDIS meet the mandatory training requirements of the 1978 STCW Convention, as amended:

- .1 under the provisions of the STCW Convention and Code, all officers in charge of a navigational watch on ships of 500 gross tonnage or more must have a thorough knowledge and ability to use nautical charts and nautical publications (refer STCW Code, Table A-II/1);
- .2 masters and officers in charge of a navigational watch (both at management and operational level) serving on ships fitted with ECDIS should as a minimum, undertake appropriate generic ECDIS training, meeting the competence requirements of the 2010 Manila Amendments to the STCW Convention and Code;
- .3 the 2010 Manila Amendments to the STCW Convention and Code have reinforced ECDIS training requirements and introduced several additional specific competencies in the use of ECDIS for officers both at management and operational level serving on ECDIS-fitted ships (refer to STCW Code, Tables A-II/1 and A-II/2). Training in accordance with the 2010 Manila Amendments became effective from 1 July 2013;
- .4 masters and officers certificated under chapter II of the STCW Convention serving on board ships fitted with ECDIS are to be familiarized (in accordance with STCW Convention, regulation I/14) with the ship's equipment including ECDIS;
- .5 STCW Convention, regulation I/14, paragraph 1.5, as well as section 6.3 of the International Safety Management (ISM) Code, require companies to ensure seafarers are provided with familiarization. A ship safety management system should include familiarization with the ECDIS equipment fitted, including its backup arrangements, sensors and related peripherals. ECDIS manufacturers are encouraged to provide training resources including type-specific materials. These resources may form part of the ECDIS familiarization;
- .6 STCW Convention, regulation I/14, paragraph 1.4, requires companies to maintain evidence of the training and ensures that it is readily accessible. For certificates of competency that have expiry dates beyond 1 January 2017, port State control authorities should accept the certificate issued as *prima facie* evidence that the seafarer has met the standard of

¹ Training and assessment in the use of ECDIS is not required for those who serve exclusively on ships not fitted with ECDIS. This limitation shall be reflected in the endorsements issued to the seafarer concerned (refer to tables A-II/1 and A-II/2 of the STCW Code).

- competence required by the 2010 Amendments in accordance with the control provisions of article X and regulation I/4 of the STCW Convention;
- .7 companies should also maintain evidence of the familiarization in compliance with STCW Convention, regulation I/14, paragraph 1.5;
- .8 Administrations should inform their port State control officers of the requirements for ECDIS training as detailed in sub-paragraph 6 above; and
- .9 attention is also drawn to:
- STCW.7/Circ.16 – Clarification of transitional provisions relating to the 2010 Manila Amendments to the STCW Convention and Code;
 - STCW.7/Circ.17 – Advice for port State control officers on transitional arrangements leading up to the full implementation of the requirements of the 2010 Manila Amendments to the STCW Convention and Code on 1 January 2017; and
 - STCW.7/Circ. 24/Rev.1 – *Guidance for Parties, Administrations, port State control authorities, recognized organizations and other relevant parties on the requirements of the STCW Convention, 1978, as amended*

F TRANSITIONING FROM PAPER CHART TO ECDIS NAVIGATION

29 As an initial step, shipowners and operators should undertake an assessment of the issues involved in changing from paper chart to ECDIS navigation. Ships' masters and deck officers should participate in any such assessment so as to capture any practical concerns or needs of those that would be required to use ECDIS. Such a process will help facilitate an early understanding of any issues to be addressed and will aid masters and deck officers prepare for change.

30 Documenting the assessment of issues, combined with the development of ECDIS standard operating procedures, will help lead to the adoption of robust ECDIS navigation practices, simplification of masters and deck officers' training and facilitate smooth handovers.

31 In addition, shipowners and operators should ensure that their ships' masters and deck officers are provided with a generic ECDIS training and an ECDIS familiarization programme so that the ships' masters and deck officers fully understand the use of ECDIS for passage planning and navigation.

32 In addition to national and international rules and regulations, IMO model course 1.27 on Operational Use of Electronic Chart Display and Information Systems (ECDIS) and IMO performance standards, IHO has published an online publication "Facts about electronic charts and carriage requirements". It is a recommended source of information on ECDIS hardware, training and the technical aspects of electronic chart data. Copies are available free of charge from various sources including: www.iho.int

33 Shipowners and operators should always refer to their national Administrations for the latest information on ECDIS carriage and use.

G GUIDANCE ON TRAINING AND ASSESSMENT IN THE OPERATIONAL USE OF ECDIS SIMULATORS

34 When simulators are being used for training or assessment in the operational use of Electronic Chart Display and Information Systems (ECDIS), the following interim guidance should be taken into consideration in any such training or assessment.

35 Training and assessment in the operational use of the ECDIS should:

- .1 incorporate the use of ECDIS simulation equipment; and
- .2 conform to standards not inferior to those given in paragraphs 35 to 37 below.

36 ECDIS simulation equipment should, in addition to meeting all applicable performance standards set out in section A-I/12 of the STCW Code, as amended, be capable of simulating navigational equipment and bridge operational controls which meet all applicable performance standards adopted by the Organization, incorporate facilities to generate soundings and:

- .1 create a real-time operating environment, including navigation control and communications instruments and equipment appropriate to the navigation and watchkeeping tasks to be carried out and the manoeuvring skills to be assessed; and
- .2 realistically simulate "own ship" characteristics in open-water conditions, as well as the effects of weather, tidal stream and currents.

37 Demonstrations of, and practice in, ECDIS use should be undertaken, where appropriate, through the use of simulators. Training exercises should preferably be undertaken in real time, in order to increase trainees' awareness of the hazards of the improper use of ECDIS. Accelerated timescale may be used only for demonstrations.

38 Detailed guidance is provided in appendix 3.

Appendix 1

LIST OF ECDIS APPARENT OPERATING AND DISPLAY ANOMALIES (NOT IN PRIORITY ORDER)

In the following list, items 1, 2, 3, 4, 5(b), 6, 7, and 11 are checked against the IHO DPPC dataset dated November 2011:

1 Inability to correctly display symbols for IMO-approved features such as ASLs or PSSAs – ECDIS equipment that does not have the latest version of the IHO Presentation Library installed will, instead of displaying the correct symbol, either show question marks (?) or nothing at all. In some cases the ECDIS may fail to load an ENC that includes such data. An ECDIS retains its type approval certificate regardless of the version of the Presentation Library installed.

Workaround – interrogate any "?" symbol displayed using the "pick report" or refer to paper charts and/or publications.

2 Incorrect display of foul areas and obstructions in some ECDIS equipment – some ECDIS models do not show some underwater features in Standard display mode as expected (however they do activate appropriate alarms). These features are only displayed when the "All" or "Other" display mode is used. Also in some cases different symbols are used to depict these features.

Workaround – use Mode "All" or "Other".

3 On some occasions some stranded/dangerous wrecks and obstructions may not display in any mode; it is believed that this is limited to some ECDIS versions from a single manufacturer who has now produced a software amendment to resolve the problem.

Workaround – use paper charts.

4 An object that falls on a contour line may fail to display in "Standard" mode in some ECDIS equipment.

Workaround – use Mode "All" or "Other".

5 Small (point) land areas, especially those depicted only on small scale (usage band 1 and 2) ENCs may not always be clearly displayed and do not always activate alarms in route planning or route monitoring modes in some ECDIS equipment:

- (a) it is possible for small land features to be obscured by other chart detail such as names or contour labels; and
- (b) some ECDIS equipment may not conduct route checks on small scale ENCs and may therefore not provide an appropriate warning. Where this is the case the land area may not be detected by the "look-ahead" function during route monitoring.

Workaround – careful manual inspection of the largest scale ENC available.

Due to the limitations of ECDIS referred to in 5(a) above, mariners (even those using the most modern systems) should always undertake careful visual inspection of the entire planned route using the "Other/All" display mode to confirm that it, and any deviations from it, are clear of dangers.

6 Incorrect display of the coloured arcs of light sectors – some ECDIS may not display the coloured arcs of complex lights as intended. This is especially prevalent where the sectors straddle 0/360deg (North).

Workaround – use "pick report" function to check light sectors.

7 Some early models of ECDIS are unable to display correctly time-variable data encoded in ENCs. For example features with Date Start and Date End attributes used for the implementation of new traffic routeing measures in ENCs may not be depicted correctly; the result being that both old and new instances are displayed simultaneously. Tests for this were not included in IEC61174 Edition1.

Workaround – use "pick report" function to determine Start/End date/time.

8 Tidal stream data not available in usable form – some early models of ECDIS only provide a comma-separated list of values which is difficult to interpret and use.

Workaround – use Tidal Stream Atlases external to ECDIS.

9 Display of anchorage, berth and channel names may not be easily visible to the mariner and the radius of a maximum swinging circle may not be shown.

Workaround – use "All" or "Other" display mode and "pick report" function to obtain swinging circle information; VTS/Port Authority communications will be able to clarify any necessary names.

10 Three hundred and sixty degree landfall lights not always prominent in comparison to shorter range sector lights.

Workaround – mariners to be aware – use "pick report" to verify light characteristic.

11 ENCs may include certain shoal soundings, especially reported depths, which have been encoded in such a way that they do not display in "Standard" Mode and might not activate an alarm even where the depth is less than the safety contour setting. Most Hydrographic Offices have reported to IHO that they have updated the relevant ENCs to ensure that significant depths are displayed in Standard Mode.

Workaround – operate in a display Mode where all soundings are shown.

12 Areas of foul ground that have no known depth value may be depicted in some ECDIS as isolated dangers and shown in "Standard" mode; this can result in unnecessary screen clutter.

Workaround – no workaround for clutter problem, mariners to be aware and use "pick report" function to determine if the feature is a danger.

13 Where ECDIS includes an option to show isolated dangers in waters shoaler than the safety contour value the symbology used may vary between manufacturers.

Workaround – mariners to be aware and to use "All" or "Other" Mode when operating in such areas.

14 Screen clutter can be a problem when displaying smaller scale ENC's for areas where larger scale coverage is also loaded in ECDIS. This can be more apparent when the user zooms out. This is due to a combination of each manufacturer's ENC loading strategy and the individual ENC producer's encoding policy. Where Hydrographic Offices use SCAMIN (scale minimum) attributes on chart features then this problem is minimized. The intention of the IHO standard is that ECDIS should not display ENC data which has a compilation scale significantly different from the display scale in use. Improvements could be made, in future, by adopting a standardized ENC loading strategy based on a scale range defined within the ENC.

Workaround – the situation can be improved through use of the standard display mode during voyage monitoring and appropriate (but not over) use of the zoom function. This technique has been included in the syllabus of IMO model course 1.27 on Operational Use of Electronic Chart Display and Information Systems (ECDIS).

15 In some ECDIS equipment the text for some notes in the ENC may be truncated or not displayed at all, and therefore is not available to the mariner.

Workaround – no workaround available; mariners should advise ENC service providers where they observe this problem.

16 Unnecessary alarms and indications – feedback from mariners shows that ECDIS can produce excessive and distracting alarms. This is due to a combination of the interpretation of the requirements of the ECDIS Performance Standards and the ENC encoding. Some control over the number of alarms and indications is available to the mariner in ECDIS built to the revised Performance Standards (resolution MSC.232(82)), but this is not always recognized.

Workaround – the methods available to minimize alarms are included in the syllabus of IMO model course 1.27 on Operational Use of Electronic Chart Display and Information Systems (ECDIS).

Appendix 2

DIFFERENCES BETWEEN RASTER CHART DISPLAY SYSTEM (RCDS) AND ECDIS

The mariners' attention is drawn to the following limitations of the RCDS mode:

- 1 Unlike ENC, where there are no displayed boundaries, RNCs are based on paper charts and as such have boundaries which are evident in ECDIS;
- 2 RNCs will not trigger automatic alarms (e.g. anti-grounding). However, alarms and indications can be generated with the manual addition, during passage planning, e.g. of clearing lines, ship safety contour lines, isolated danger markers and danger areas to mitigate these limitations;
- 3 Horizontal datums and chart projections may differ between RNCs. Mariners should understand how a chart's horizontal datum relates to the datum of the position fixing system in use. In some instances, this may appear as a shift in position. This difference may be most noticeable at grid intersections;
- 4 A number of RNCs cannot be referenced to either WGS-84 or PE 90 geodetic datums. Where this is the case, ECDIS should give a continuous indication;
- 5 The display of RNCs features cannot be simplified by the removal of features to suit a particular navigational circumstance or task at hand. This could affect the superimposition of radar/ARPA;
- 6 Without selecting different scale charts the look-ahead capability may be limited. This may lead to inconvenience when determining range and bearing or the identity of distant objects;
- 7 Orientation of the RCDS display to other than chart-up, may affect the readability of chart text and symbols (e.g. course-up, route-up);
- 8 It is not possible to interrogate RNC features to gain additional information about charted objects. Whether using ENC or RNC, in the planning process a mariner should consult all relevant publications (such as sailing directions, etc.);
- 9 With RNC, it is not possible to display a ship's safety contour or safety depth and highlight it on the display unless these features are manually entered during route planning;
- 10 Depending on the source of the RNC, different colours may be used to show similar chart information. There may also be differences in colours used during day and night time;
- 11 An RNC is intended to be used at the scale of the equivalent paper chart. Excessive zooming in or zooming out can seriously degrade the displayed image. If the RNC is displayed at a larger scale than the equivalent paper chart, the ECDIS will provide an indication; and
- 12 ECDIS provides an indication in the ENC which allows a determination of the quality of hydrographic the data. When using RNCs, mariners are invited to consult the source diagram or the zone of confidence diagram, if available.

Appendix 3

GUIDANCE ON TRAINING AND ASSESSMENT IN THE OPERATIONAL USE OF ECDIS SIMULATORS

GENERAL

Goals of an ECDIS training programme

- 1 The ECDIS trainee should be able to:
 - .1 operate the ECDIS equipment, use the navigational functions of ECDIS, select and assess all relevant information and take proper action in the case of a malfunction;
 - .2 state the potential errors of displayed data and the usual errors of interpretation; and
 - .3 explain why ECDIS should not be relied upon as the sole reliable aid to navigation.

Theory and demonstration

2 As the safe use of ECDIS requires knowledge and understanding of the basic principles governing ECDIS data and their presentation rules as well as potential errors in displayed data and ECDIS-related limitations and potential dangers, a number of lectures covering the theoretical explanation should be provided. As far as possible, such lessons should be presented within a familiar context and make use of practical examples. They should be reinforced during simulator exercises.

3 For safe operation of ECDIS equipment and ECDIS-related information (use of the navigational functions of ECDIS, selection and assessment of all relevant information, becoming familiar with ECDIS man-machine interfacing), practical exercises and training on the ECDIS simulators should constitute the main content of the course.

4 For the definition of training objectives, a structure of activities should be defined. A detailed specification of learning objectives should be developed for each topic of this structure.

Simulator exercises

5 Exercises should be carried out on individual ECDIS simulators, or full-mission navigation simulators including ECDIS, to enable trainees to acquire the necessary practical skills. For real-time navigation exercises, navigation simulators are recommended to cover the complex navigation situation. The exercises should provide training in the use of the various scales, navigational modes, and display modes which are available, so that the trainees will be able to adapt the use of the equipment to the particular situation concerned.

6 The choice of exercises and scenarios is governed by the simulator facilities available. If one or more ECDIS workstations and a full-mission simulator are available, the workstations may primarily be used for basic exercises in the use of ECDIS facilities and for passage-planning exercises, whereas full-mission simulators may primarily be used for exercises related to passage-monitoring functions in real time, as realistic as possible in connection with the total

workload of a navigational watch. The degree of complexity of exercises should increase throughout the training programme until the trainee has mastered all aspects of the learning subject.

7 Exercises should produce the greatest impression of realism. To achieve this, the scenarios could be located in a fictitious sea area. Situations, functions and actions for different learning objectives which occur in different sea areas can be integrated into one exercise and experienced in real time.

8 The main objective of simulator exercises is to ensure that trainees understand their responsibilities in the operational use of ECDIS in all safety-relevant aspects and are thoroughly familiar with the system and equipment used.

Principal types of ECDIS and their display characteristics

9 The trainee should gain knowledge of the principal types of ECDIS in use; their various display characteristics, data structure and an understanding of:

- .1 differences between vector and raster charts;
- .2 differences between ECDIS and ECS;
- .3 differences between ECDIS and RCDS;
- .4 characteristics of different types of ECDIS; and
- .5 characteristics of systems for special purposes (unusual situations/emergencies).

Risks of over-reliance on ECDIS

10 The training in ECDIS operational use should address:

- .1 the limitations of ECDIS as a navigational tool;
- .2 potential risk of improper functioning of the system;
- .3 system limitations, including those of its sensors;
- .4 hydrographic data inaccuracy; limitations of vector and raster electronic charts (ECDIS vs RCDS and ENC vs RNC); and
- .5 potential risk of human errors.

Emphasis should be placed on the need to keep a proper look-out and to perform periodical checking, especially of the ship's position, by ECDIS-independent methods.

Detection of misrepresentation of information

11 Knowledge of the limitations of the equipment and detection of misrepresentation of information is essential for the safe use of ECDIS. The following factors should be emphasized during training:

- .1 performance standards of the equipment;

- .2 radar data representation on an electronic chart, elimination of discrepancy between the radar image and the electronic chart;
- .3 possible projection discrepancies between an electronic and paper charts;
- .4 possible scale discrepancies (overscaling and underscaling) in displaying an electronic chart and its original scale;
- .5 effects of using different reference systems for positioning;
- .6 effects of using different horizontal and vertical datums;
- .7 effects of the motion of the ship in a seaway;
- .8 ECDIS limitations in raster chart display mode;
- .9 potential errors in the display of:
 - .1 the own ship's position;
 - .2 radar data and ARPA and AIS information;
 - .3 different geodetic coordinate systems; and
- .10 verification of the results of manual or automatic data correction:
 - .1 comparison of chart data and radar picture; and
 - .2 checking the own ship's position by using other independent position-fixing systems.

12 False interpretation of the data and proper action to be taken to avoid errors of interpretation, should be explained. The implications of the following should be emphasized:

- .1 ignoring overscaling of the display;
- .2 uncritical acceptance of the own ship's position;
- .3 confusion of display mode;
- .4 confusion of chart scale;
- .5 confusion of reference systems;
- .6 different modes of presentation;
- .7 different modes of vector stabilization;
- .8 differences between true north and gyro north (radar);
- .9 using the same data reference system;
- .10 using the appropriate chart scale;
- .11 using the best-suited sensor to the given situation and circumstances;

- .12 entering the correct values of safety data:
 - .1 the own ship's safety contour;
 - .2 safety depth (safe water); and
 - .3 events; and
- .13 proper use of all available data.

13 Appreciation that RCDS is only a navigational aid and that, when operating in the RCDS mode, the ECDIS equipment should be used together with an appropriate portfolio of up-to-date paper charts:

- .1 appreciation of the differences in operation of RCDS mode as described in appendix 2; and
- .2 ECDIS, in any mode, should be used in training with an appropriate portfolio of up-to-date charts.

Factors affecting system performance and accuracy

14 An elementary understanding should be attained of the principles of ECDIS, together with a full practical knowledge of:

- .1 starting and setting up ECDIS; connecting data sensors: satellite and radio navigation system receivers, radar, gyro-compass, log, echo-sounder; accuracy and limitations of these sensors, including effects of measurement errors and ship's position accuracy, manoeuvring on the accuracy of course indicator's performance, compass error on the accuracy of course indication, shallow water on the accuracy of log performance, log correction on the accuracy of speed calculation, disturbance (sea state) on the accuracy of an echo-sounder performance; and
- .2 the current performance standards for electronic chart display and information systems adopted by the Organization².

Practice

Setting up and maintaining display

- 15 Knowledge and skills should be attained in:
- .1 the correct starting procedure to obtain the optimum display of ECDIS information;
 - .2 the selection of display presentation (standard display, display base, all other information displayed individually on demand);
 - .3 the correct adjustment of all variable radar/ARPA display controls for optimum display of data;
 - .4 the selection of convenient configuration;

² See relevant/appropriate performance standards adopted by the Organization.

- .5 the selection, as appropriate, of required speed input to ECDIS;
- .6 the selection of the timescale of vectors; and
- .7 performance checks of position, radar/ARPA, compass, speed input sensors and ECDIS.

Operational use of electronic charts

16 Knowledge and skills should be attained in:

- .1 the main characteristics of the display of ECDIS data and selecting proper information for navigational tasks;
- .2 the automatic functions required for monitoring ship's safety, such as display of position, heading/gyro course, speed, safety values and time;
- .3 the manual functions (by the cursor, electronic bearing line, range rings);
- .4 selecting and modification of electronic chart content;
- .5 scaling (including underscaling and overscaling);
- .6 zooming;
- .7 setting of the own ship's safety data;
- .8 using a daytime or night-time display mode;
- .9 reading all chart symbols and abbreviations;
- .10 using different kinds of cursors and electronic bars for obtaining navigational data;
- .11 viewing an area in different directions and returning to the ship's position;
- .12 finding the necessary area, using geographical coordinates;
- .13 displaying indispensable data layers appropriate to a navigational situation;
- .14 selecting appropriate and unambiguous data (position, course, speed, etc.);
- .15 entering the mariner's notes;
- .16 using north-up orientation presentation and other kinds of orientation; and
- .17 using true- and relative-motion modes.

Route planning

- 17 Knowledge and skills should be attained in:
- .1 loading the ship's characteristics into ECDIS;
 - .2 selection of a sea area for route planning:
 - .1 reviewing required waters for the sea passage; and
 - .2 changing over of chart scale;
 - .3 verifying that proper and updated charts are available;
 - .4 route planning on a display by means of ECDIS, using the graphic editor, taking into consideration rhumb line and great-circle sailing:
 - .1 using the ECDIS database for obtaining navigational, hydro-meteorological and other data;
 - .2 taking into consideration turning radius and wheel-over points/lines when they are displayed on chart scale;
 - .3 marking dangerous depths and areas and exhibiting guarding depth contours;
 - .4 marking waypoints with the crossing depth contours and critical cross-track deviations, as well as by adding, replacing and erasing of waypoints;
 - .5 taking into consideration safe speed;
 - .6 checking pre-planned route for navigational safety; and
 - .7 generating alarms and warnings;
 - .5 route planning with calculation in the table format, including:
 - .1 waypoints selection;
 - .2 recalling the waypoints list;
 - .3 planning notes;
 - .4 adjustment of a planned route;
 - .5 checking a pre-planned route for navigational safety;
 - .6 alternative route planning;
 - .7 saving planned routes, loading and unloading or deleting routes;
 - .8 making a graphic copy of the monitor screen and printing a route;
 - .9 editing and modification of the planned route;

- .10 setting of safety values according to the size and manoeuvring parameters of the vessel;
- .11 back-route planning; and
- .12 connecting several routes.

Route monitoring

18 Knowledge and skills should be attained in:

- .1 using independent data to control ship's position or using alternative systems within ECDIS;
- .2 using the look-ahead function:
 - .1 changing charts and their scales;
 - .2 reviewing navigational charts;
 - .3 vector time selecting;
 - .4 predicting the ship's position for some time interval;
 - .5 changing the pre-planned route (route modification);
 - .6 entering independent data for the calculation of wind drift and current allowance;
 - .7 reacting properly to the alarm;
 - .8 entering corrections for discrepancies of the geodetic datum;
 - .9 displaying time markers on a ship's route;
 - .10 entering ship's position manually; and
 - .11 measuring coordinates, course, bearings and distances on a chart.

Alarm handling

19 Knowledge and ability to interpret and react properly to all kinds of alarm systems, such as navigational sensors, indicators, data and charts alarms and indicator warnings, including, switching the sound and visual alarm signalling system on/off, should be attained in case of:

- .1 absence of the next chart in the ECDIS database;
- .2 crossing a safety contour;
- .3 exceeding cross-track limits;
- .4 deviation from planned route;
- .5 approaching a waypoint;

- .6 approaching a critical point;
- .7 discrepancy between calculated and actual time of arrival to a waypoint;
- .8 information on under-scaling or over-scaling;
- .9 approaching an isolated navigational danger or danger area;
- .10 crossing a specified area;
- .11 selecting a different geodetic datum;
- .12 approaching other ships;
- .13 watch termination;
- .14 switching timer;
- .15 system test failure;
- .16 malfunctioning of the positioning system used in ECDIS;
- .17 failure of dead-reckoning; and
- .18 inability to fix vessel's position using the navigational system.

Manual correction of a ship's position and motion parameters

- 20 Knowledge and skills should be attained in manually correcting:
- .1 the ship's position in dead-reckoning mode, when the satellite and radio navigation system receiver is switched off;
 - .2 the ship's position, when automatically obtained coordinates are inaccurate; and
 - .3 course and speed values.

Records in the ship's log

- 21 Knowledge and skills should be attained in:
- .1 automatic voyage recording;
 - .2 reconstruction of past track, taking into account:
 - .1 recording media;
 - .2 recording intervals;
 - .3 verification of database in use;
 - .3 viewing records in the electronic ship's log;

- .4 instant recording in the electronic ship's log;
- .5 changing ship's time;
- .6 entering the additional data;
- .7 printing the content of the electronic ship's log;
- .8 setting up the automatic record time intervals;
- .9 composition of voyage data and reporting; and
- .10 interface with a voyage data recorder (VDR).

Chart updating

22 Knowledge and skills should be attained in:

- .1 performing manual updating of electronic charts. Special attention should be paid to reference ellipsoid conformity and to conformity of the measurement units used on a chart and in the correction text;
- .2 performing semi-automatic updating of electronic charts, using the data obtained on electronic media in the electronic chart format; and
- .3 performing automatic updating of electronic charts, using update files obtained via electronic data communication lines.

In the scenarios where non-updated data are employed to create a critical situation, trainees should be required to perform ad hoc updating of the chart.

Operational use of ECDIS where radar/ARPA is connected

23 Knowledge and skills should be attained in:

- .1 connecting ARPA to ECDIS;
- .2 indicating target's speed vectors;
- .3 indicating target's tracks;
- .4 archiving target's tracks;
- .5 viewing the table of the targets;
- .6 checking alignment of radar overlay with charted geographic features;
- .7 simulating one or more manoeuvres;
- .8 corrections to own ship's position, using a reference point captured by ARPA; and
- .9 corrections using the ARPA's cursor and electronic bar.

See also STCW Code section B-I/12, Guidance regarding the use of simulators (pertaining to radar and ARPA), especially paragraphs 17 to 19 and 36 to 38.

Operational use of ECDIS where AIS is connected

24 Knowledge and skills should be attained in:

- .1 interface with AIS;
- .2 interpretation of AIS data;
- .3 indicating target's speed vectors;
- .4 indicating target's tracks; and
- .5 archiving target's tracks.

Operational warnings, their benefits and limitations

25 Trainees should gain an appreciation of the uses, benefits and limitations of ECDIS operational warnings and their correct setting, where applicable, to avoid spurious interference.

System operational tests

26 Knowledge and skills should be attained in:

- .1 methods of testing for malfunctions of ECDIS, including functional self-testing;
- .2 precautions to be taken after a malfunction occurs; and
- .3 adequate back-up arrangements (take over and navigate using the back-up system).

Debriefing exercise

27 The instructor should analyse the results of all exercises completed by all trainees and print them out. The time spent on the debriefing should take between 10% and 15% of the total time used for simulator exercises.

REFERENCES

IMO PERFORMANCE STANDARDS FOR ECDIS

- 1 RESOLUTION A.817(19): PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEMS (ECDIS)
- 2 RESOLUTION MSC.64(67): RECOMMENDATIONS ON NEW AND AMENDED PERFORMANCE STANDARDS
- 3 RESOLUTION MSC.86(70): ADOPTION OF NEW AND AMENDED PERFORMANCE STANDARDS FOR NAVIGATIONAL EQUIPMENT
- 4 RESOLUTION MSC.232(82): ADOPTION OF THE REVISED PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEMS (ECDIS)

OTHER IMO CIRCULARS RELATED TO ECDIS

- 1 MSC.1/Circ.982: GUIDELINES ON ERGONOMIC CRITERIA FOR BRIDGE EQUIPMENT AND LAYOUT
 - 2 MSC.1/Circ.1091: ISSUES TO BE CONSIDERED WHEN INTRODUCING NEW TECHNOLOGY ON BOARD SHIP
 - 3 MSC.1/Circ.1221: VALIDITY OF TYPE APPROVAL CERTIFICATION FOR MARINE PRODUCTS
 - 4 MSC.1/Circ.1389: GUIDANCE ON PROCEDURES FOR UPDATING SHIPBORNE NAVIGATION AND COMMUNICATION EQUIPMENT
 - 5 SN.1/Circ.213: GUIDANCE ON CHART DATUMS AND THE ACCURACY OF POSITIONS ON CHARTS
 - 6 SN.1/Circ.243/Rev.1 AMENDED GUIDELINES FOR THE PRESENTATION OF NAVIGATIONAL-RELATED SYMBOLS, TERMS AND ABBREVIATIONS
 - 7 SN.1/Circ.255: ADDITIONAL GUIDANCE ON CHART DATUMS AND THE ACCURACY OF POSITIONS ON CHARTS
 - 8 SN.1/Circ.265: GUIDELINES ON THE APPLICATION OF SOLAS REGULATION V/15 TO INS, IBS AND BRIDGE DESIGN
 - 9 SN.1/Circ.288: GUIDELINES FOR BRIDGE EQUIPMENT AND SYSTEMS, THEIR ARRANGEMENT AND INTEGRATION (BES)
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ANNEX 5

**AMENDMENT TO RESOLUTION A.817(19) - PERFORMANCE
STANDARDS FOR ELECTRONIC CHART DISPLAY AND
INFORMATION SYSTEMS (ECDIS)**

Add a new Appendix 6 to the Annex to the resolution:

"APPENDIX 6

BACK-UP REQUIREMENTS

1 INTRODUCTION

As prescribed in section 14 of this performance standard, adequate independent back-up arrangements should be provided to ensure safe navigation in case of ECDIS failure. Such arrangements include:

- .1 facilities enabling a safe take-over of the ECDIS functions in order to ensure that an ECDIS failure does not result in a critical situation;
- .2 a means to provide for safe navigation for the remaining part of the voyage in case of ECDIS failure.

2 PURPOSE

The purpose of an ECDIS back-up system is to ensure that safe navigation is not compromised in the event of ECDIS failure. This should include a timely transfer to the back-up system during critical navigation situations. The back-up system shall allow the vessel to be navigated safely until the termination of the voyage.

3 FUNCTIONAL REQUIREMENTS

3.1 Required functions and their availability

3.1.1 Presentation of chart information

The back-up system should display in graphical (chart) form the relevant information of the hydrographic and geographic environment which are necessary for safe navigation.

3.1.2 Route planning

The back-up system should be capable of performing the route planning functions, including:

- .1 taking over of the route plan originally performed on the ECDIS;
- .2 adjusting a planned route manually or by transfer from a route planning device.

3.1.3 Route monitoring

The back-up system should enable a take-over of the route monitoring originally performed by the ECDIS, and provide at least the following functions:

- .1 plotting own ship's position automatically, or manually on a chart;
- .2 taking courses, distances and bearings from the chart;
- .3 displaying the planned route;
- .4 displaying time labels along ship's track;
- .5 plotting an adequate number of points, bearing lines, range markers, etc., on the chart.

3.1.4 Display information

If the back-up is an electronic device, it should be capable of displaying at least the information equivalent to the standard display as defined in this performance standard.

3.1.5 Provision of chart information

- .1 The chart information to be used should be the latest editions of that originated by a government hydrographic office, and based on IHO standards.
- .2 It should not be possible to alter the contents of the electronic chart information.
- .3 The chart or chart data edition and issuing date should be indicated.

3.1.6 Updating

The information displayed by the ECDIS back-up arrangements should be up-to-date for the entire voyage.

3.1.7 Scale

If an electronic device is used, it should provide an indication:

- .1 if the information is displayed at a larger scale than that contained in the database;
and
- .2 if own ship's position is covered by a chart at a larger scale than that provided by the system.

3.1.8 If radar and other navigational information are added to an electronic back-up display, all the corresponding requirements of this performance standard should be met.

3.1.9 If an electronic device is used, the display mode and generation of the neighbouring area should be in accordance with section 7 of this performance standard.

3.1.10 Voyage recording

The back-up arrangements should be able to keep a record of the ship's actual track, including positions and corresponding times.

3.2 Reliability and accuracy

3.2.1 Reliability

The back-up arrangements should provide reliable operation under prevailing environmental and normal operating conditions.

3.2.2 Accuracy

Accuracy shall be in accordance with section 11 of this performance standard.

3.3 Malfunctions, warnings, alarms and indications

If an electronic device is used, it should provide a suitable indication of system malfunction.

4 OPERATIONAL REQUIREMENTS

4.1 Ergonomics

If an electronic device is used, it should be designed in accordance with the ergonomic principles of ECDIS.

4.2 Presentation of information

4.2.1 Colours and symbols used in the back-up arrangements should be based on IHO recommendations.

4.2.2 If an electronic device is used, the effective size of the chart presentation shall be in accordance with section 9.2 of this performance standard.

5 POWER SUPPLY

If an electronic device is used:

- .1 the back-up power supply should be separate from the ECDIS; and
- .2 conform to the requirements in this ECDIS performance standard.

6 CONNECTIONS WITH OTHER EQUIPMENT

6.1 If an electronic device is used, it should:

- .1 be connected to systems providing continuous position-fixing capability; and
- .2 not degrade the performance of any equipment providing sensor input.

6.2 If radar with selected parts of the ENC chart information overlay is used as an element of the back-up, the radar should comply with resolution A.477(XII), as amended.

ANNEX 17

RESOLUTION MSC.86(70)
(adopted on 8 December 1998)**ADOPTION OF NEW AND AMENDED PERFORMANCE STANDARDS
FOR NAVIGATIONAL EQUIPMENT**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.825(19), by which the Assembly resolved that the functions of adopting performance standards for radio and navigational equipment, as well as amendments thereto, shall be performed by the Maritime Safety Committee on behalf of the Organization,

HAVING CONSIDERED new performance standards and amendments to existing performance standards adopted by the Assembly and prepared by the forty-fourth session of the Sub-Committee on Safety of Navigation,

1. ADOPTS the following new recommended performance standards, set out in Annexes 1 to 3 to the present resolution:

- .1 Recommendation on Performance Standards for Sound Reception Systems (Annex 1);
- .2 Recommendation on Performance Standards for Marine Transmitting Magnetic Heading Devices (TMHDs) (Annex 2); and
- .3 Recommendation on Performance Standards for an Integrated Navigation System (Annex 3);

2. ADOPTS ALSO the amendments to the Recommendation on Performance Standards for Electronic Chart Display and Information Systems (ECDISs) (resolution A.817(19)) set out in Annex 4 to the present resolution;

3. RECOMMENDS Member Governments to ensure that:

- .1 sound reception systems, marine transmitting heading devices and integrated navigation systems installed on or after 1 January 2000 conform to performance standards not inferior to those set out in Annexes 1 to 3 to the present resolution;
- .2 ECDIS installed on or after 1 January 2000 conform, respectively, to performance standards not inferior to those set out in resolution A.817(19), as amended, and Annex 4 to the present resolution;
- .3 ECDIS installed on 1 January 1999 and before 1 January 2000 conform at least to the performance standards set out in resolution A.817(19), as amended by resolution MSC.64(67), Annex 5; and
- .4 ECDIS installed before 1 January 1999 conform at least to performance standards set out in resolution A.817(19).

ANNEX 4

**AMENDMENTS TO THE RECOMMENDATION ON PERFORMANCE STANDARDS
FOR ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEMS (ECDISs)
(RESOLUTION A.817(19))**

Add a new paragraph 1.9

- 1.9 When the relevant chart information is not available in the appropriate form (see section 4), some ECDIS equipment may operate in the Raster Chart Display System (RCDS) mode as defined in Appendix 7. Unless otherwise specified in Appendix 7, the RCDS mode of operation should conform to performance standards not inferior to those set out in this Annex.

Modify paragraph 10.5.7 as follows:

- 10.5.7 ECDIS should provide an alarm when the input from the position-fixing system is lost. ECDIS should also repeat, but only as an indication, any alarm or indication passed to it from a position-fixing system.

In Appendix 5, paragraph 10.5.7 change the word "indication" to "alarm".

Add a new Appendix 7 to the Annex to the resolution:

APPENDIX 7

RCDS MODE OF OPERATION

Whenever in this appendix a reference is made to provisions of the Annex related to ECDIS, ECDIS should be substituted by RCDS, SENC by SRNC and ENC by RNC, as appropriate.

All paragraphs of the Annex related to ECDIS are indicated as to whether they apply to RCDS, do not apply to RCDS, or are modified in order to apply to RCDS. These paragraphs are followed by additional requirements for ECDIS equipment in the RCDS mode.

1 INTRODUCTION

1.1 Paragraph applies to RCDS.

1.2 When operating in the RCDS mode, ECDIS equipment should be used together with an appropriate portfolio of up-to-date paper charts.

1.3-1.7 Paragraphs apply to RCDS.

1.8 RCDS should provide appropriate alarms or indications with respect to the information displayed or malfunction of the equipment (see Table 1 of this Appendix).

2 DEFINITIONS

2.1 Raster Chart Display System (RCDS) means a navigation information system displaying RNCs with positional information from navigation sensors to assist the mariner in route planning and route monitoring and, if required, display additional navigation-related information.

2.2 Raster Navigational Chart (RNC) means a facsimile of a paper chart originated by, or distributed on the authority of, a government-authorized hydrographic office. RNC is used in these standards to mean either a single chart or a collection of charts.

2.3 System Raster Navigational Chart Database (SRNC) means a database resulting from the transformation of the RNC by the RCDS to include updates to the RNC by appropriate means.

2.4-2.5 Paragraphs do not apply to RCDS.

2.6 Paragraph applies to RCDS.

3 DISPLAY OF SRNC INFORMATION

3.1 Paragraph applies to RCDS.

3.2 SRNC information available for display during route planning and route monitoring should be subdivided into two categories:

.1 the RCDS standard display consisting of RNC and its updates, including its scale, the scale at which it is displayed, its horizontal datum, and its units of depths and heights; and

.2 any other information such as mariner's notes.

3.3 Paragraph applies to RCDS.

3.4 When a RNC is displayed on the RCDS, it should provide an indication advising the mariner if a more detailed (larger scale) RNC is available for the displayed area.

3.5 It should be easy to add to, or remove from, the RCDS display any information additional to the RNC data, such as mariner's notes. It should not be possible to remove any information from the RNC.

3.6-3.7 Paragraphs do not apply to RCDS.

3.8-3.10 Paragraphs apply to RCDS.

3.11 There should always be an indication if the ECDIS equipment is operating in the RCDS mode.

4 PROVISION AND UPDATING OF CHART INFORMATION

4.1 The RNC used in RCDS should be the latest edition of that originated by, or distributed on the authority of, a government authorized hydrographic office and conform to IHO standards. RNCs not on WGS-84 or PE-90 should carry meta-data (i.e., additional data) to allow geo-referenced positional data to be displayed in the correct relationship to SRNC data.

4.2 The contents of the SRNC should be adequate and up-to-date for that part of the intended voyage not covered by ENC.

4.3-4.8 All paragraphs apply to RCDS.

5 SCALE

This section applies to RCDS.

6 DISPLAY OF OTHER NAVIGATIONAL INFORMATION

6.1-6.3 All paragraphs apply to RCDS.

7 DISPLAY MODE AND GENERATION OF THE NEIGHBOURING AREA

7.1 It should always be possible to display the RNC in "chart-up" orientation. Other orientations are permitted.

7.2-7.4 All paragraphs apply to RCDS.

8 COLOURS AND SYMBOLS

8.1 IHO recommended colours and symbols should be used to represent SRNC information.

8.2 Paragraph applies to RCDS.

8.3 Paragraph does not apply to RCDS.

8.4 Paragraph applies to RCDS.

9 DISPLAY REQUIREMENTS

9.1-9.2 Paragraphs apply to RCDS.

9.3 Paragraph does not apply to RCDS.

9.4 Paragraph applies to RCDS.

9.5 RCDS should be capable of displaying, simply and quickly, chart notes which are not located on the portion of the chart currently being displayed.

- 10 ROUTE PLANNING, MONITORING AND VOYAGE RECORDING**
- 10.1-10.2 Paragraphs apply to RCDS.
- 10.3 Paragraph does not apply to RCDS.
- 10.4 Route Planning
- 10.4.1-10.4.3 Paragraphs apply to RCDS.
- 10.4.4-10.4.5 Paragraphs do not apply to RCDS.
- 10.4.6 Paragraph applies to RCDS.
- 10.4.7 It should be possible for the mariner to enter points, lines and areas which activate an automatic alarm. The display of these features should not degrade the SRNC information and it should be clearly distinguishable from the SRNC information.
- 10.5 Route monitoring
- 10.5.1 Paragraph applies to RCDS.
- 10.5.2 It should be possible to display a sea area that does not have the ship on the display (e.g. for look ahead, route planning), while route monitoring. If this is done on the display used for route monitoring, the automatic route monitoring functions in 10.4.6 and 10.4.7 should be continuous. It should be possible to return to the route monitoring display covering own ship's position immediately by single operator action.
- 10.5.3-10.5.4 Paragraphs do not apply to RCDS.
- 10.5.5-10.5.8 Paragraphs apply to RCDS.
- 10.5.9 The RCDS should only accept data referenced to the WGS-84 or PE-90 geodetic datums. RCDS should give an alarm if the positional data is not referenced to one of these datums.
- 10.5.10-10.5.13 Paragraphs apply to RCDS.
- 10.5.14 RCDS should allow the user to manually align the SRNC with positional data. This can be necessary, for example, to compensate for local charting errors.
- 10.5.15 It should be possible to activate an automatic alarm when the ship crosses a point, line, or is within the boundary of a mariner-entered feature within a specified time or distance.
- 10.6 Voyage recording
- 10.6.1-10.6.4 All paragraphs apply to RCDS.

- 11** **ACCURACY**
- 11.1-11.2 All paragraphs apply to RCDS.
- 12** **CONNECTIONS WITH OTHER EQUIPMENT**
- 12.1-12.2 All paragraphs apply to RCDS.
- 13** **PERFORMANCE TESTS, MALFUNCTION ALARMS AND INDICATIONS**
- 13.1-13.2 All paragraphs apply to RCDS.
- 14** **BACK-UP ARRANGEMENTS**
- All paragraphs apply to RCDS.
- 15** **POWER SUPPLY**
- 15.1-15.2 All paragraphs apply to RCDS.

Table 1

ALARMS AND INDICATORS IN THE RCDS MODE OF OPERATION

Paragraph	Requirement	Information
10.4.6, 10.5.5	Alarm	Deviation from route
10.4.7, 10.5.15	Alarm	Approach to critical point, line, area or mariner-entered feature
10.5.7	Alarm	Positioning system failure
10.5.8	Alarm	Approach to critical point
10.5.9	Alarm	Different geodetic datum
13.2	Alarm	Malfunction of RCDS mode
3.11	Indication	ECDIS operating in the raster mode
3.4, 5.1	Indication	Information under-scale or overscale
5.2	Indication	Larger scale RNC available for the area of the vessel

The definitions of alarms and indicators are given in Appendix 5.

ANNEX 24**RESOLUTION MSC.232(82)****(adopted on 5 December 2006)****ADOPTION OF THE REVISED PERFORMANCE STANDARDS FOR
ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEMS (ECDIS)**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.886(21), by which the Assembly resolved that the function of adopting performance standards and technical specifications, as well as amendments thereto shall be performed by the Maritime Safety Committee and/or the Marine Environment Protection Committee, as appropriate, on behalf of the Organization,

RECALLING ALSO regulations V/19 and V/27 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, which requires all ships to carry adequate and up-to-date charts, sailing directions, lists of lights, notices to mariners, tide tables and all other nautical publications necessary for the intended voyage,

NOTING that the up-to-date charts required by SOLAS regulations V/19 and V/27 can be provided and displayed electronically on board ships by electronic chart display and information systems (ECDIS), and that the other nautical publications required by regulation V/27 may also be so provided and displayed,

RECOGNIZING the need to improve the previously adopted, by resolution A.817(19), as amended, performance standards for ECDIS in order to ensure the operational reliability of such equipment and taking into account the technological progress and experience gained,

HAVING CONSIDERED the recommendation made by the Sub-Committee on Safety of Navigation, at its fifty-second session,

1. ADOPTS the Revised performance standards for electronic chart display and information systems (ECDIS), set out in the Annex to the present resolution;
2. RECOMMENDS Governments ensure that ECDIS equipment:
 - (a) if installed on or after 1 January 2009, conform to performance standards not inferior to those specified in the Annex to the present resolution; and
 - (b) if installed on or after 1 January 1996 but before 1 January 2009, conform to performance standards not inferior to those specified in the Annex to resolution A.817(19), as amended by resolutions MSC.64(67) and MSC.86(70).

ANNEX

REVISED PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEMS (ECDIS)

1 SCOPE OF ECDIS

- 1.1 The primary function of the ECDIS is to contribute to safe navigation.
- 1.2 ECDIS with adequate back-up arrangements may be accepted as complying with the up-to-date charts required by regulations V/19 and V/27 of the 1974 SOLAS Convention, as amended.
- 1.3 ECDIS should be capable of displaying all chart information necessary for safe and efficient navigation originated by, and distributed on the authority of, government authorized hydrographic offices.
- 1.4 ECDIS should facilitate simple and reliable updating of the electronic navigational chart.
- 1.5 ECDIS should reduce the navigational workload compared to using the paper chart. It should enable the mariner to execute in a convenient and timely manner all route planning, route monitoring and positioning currently performed on paper charts. It should be capable of continuously plotting the ship's position.
- 1.6 The ECDIS display may also be used for the display of radar, radar tracked target information, AIS and other appropriate data layers to assist in route monitoring.
- 1.7 ECDIS should have at least the same reliability and availability of presentation as the paper chart published by government authorized hydrographic offices.
- 1.8 ECDIS should provide appropriate alarms or indications with respect to the information displayed or malfunction of the equipment (see appendix 5).
- 1.9 When the relevant chart information is not available in the appropriate form (see section 4), some ECDIS equipment may operate in the Raster Chart Display System (RCDS) mode as defined in appendix 7. RCDS mode of operation should conform to performance standards not inferior to those set out in appendix 7.

2 APPLICATION OF THESE STANDARDS

- 2.1 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.
- 2.2 These performance standards apply to ECDIS mode of operation, ECDIS in RCDS mode of operation as specified in appendix 7 and ECDIS backup arrangements as specified in appendix 6.

- 2.3 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 appendix 1.
- 2.4 In addition to the general requirements set out in resolution A.694(17)*, the presentation requirements set out in resolution MSC.191(79), ECDIS equipment should meet the requirements of these standards and follow the relevant guidelines on ergonomic principles adopted by the Organization¹.

3 DEFINITIONS

For the purpose of these performance standards:

- 3.1 *Electronic Chart Display and Information System (ECDIS)* means a navigation information system which with adequate back-up arrangements can be accepted as complying with the up-to-date chart required by regulations V/19 and V/27 of the 1974 SOLAS Convention, as amended, by displaying selected information from a system electronic navigational chart (SENC) with positional information from navigation sensors to assist the mariner in route planning and route monitoring, and if required display additional navigation-related information.
- 3.2 *Electronic Navigational Chart (ENC)* means the database, standardized as to content, structure and format, issued for use with ECDIS by or on the authority of a Government, authorized Hydrographic Office or other relevant government institution, and conform to IHO standards. The ENC contains all the chart information necessary for safe navigation and may contain supplementary information in addition to that contained in the paper chart (e.g. sailing directions) which may be considered necessary for safe navigation.
- 3.3 *System Electronic Navigational Chart (SENC)* means a database, in the manufacturer's internal ECDIS format, resulting from the lossless transformation of the entire ENC contents and its updates. It is this database that is accessed by ECDIS for the display generation and other navigational functions, and is equivalent to an up-to-date paper chart. The SENC may also contain information added by the mariner and information from other sources.
- 3.4 *Standard Display* is the display mode intended to be used as a minimum during route planning and route monitoring. The chart content is listed in appendix 2.
- 3.5 *Display Base* means the chart content as listed in appendix 2 and which cannot be removed from the display. It is not intended to be sufficient for safe navigation.
- 3.6 Further information on ECDIS definitions may be found in IHO Hydrographic Dictionary Special Publication S-32 (see appendix 1).

* Refer to Publication IEC 60945.

¹ MSC/Circ.982.

MODULE A - DATABASE

4 PROVISION AND UPDATING OF CHART INFORMATION

- 4.1** The chart information to be used in ECDIS should be the latest edition, as corrected by official updates, of that issued by or on the authority of a Government, government-authorized Hydrographic Office or other relevant government institution, and conform to IHO standards².
- 4.2** The contents of the SENC should be adequate and up-to-date for the intended voyage to comply with regulation V/27 of the 1974 SOLAS Convention as amended.
- 4.3** It should not be possible to alter the contents of the ENC or SENC information transformed from the ENC.
- 4.4** Updates should be stored separately from the ENC.
- 4.5** ECDIS should be capable of accepting official updates to the ENC data provided in conformity with IHO standards. These updates should be automatically applied to the SENC. By whatever means updates are received, the implementation procedure should not interfere with the display in use.
- 4.6** ECDIS should also be capable of accepting updates to the ENC data entered manually with simple means for verification prior to the final acceptance of the data. They should be distinguishable on the display from ENC information and its official updates and not affect display legibility.
- 4.7** ECDIS should keep and display on demand a record of updates including time of application to the SENC. This record should include updates for each ENC until it is superseded by a new edition.
- 4.8** ECDIS should allow the mariner to display updates in order to review their contents and to ascertain that they have been included in the SENC.
- 4.9** ECDIS should be capable of accepting both non-encrypted ENCs and ENCs encrypted in accordance with the IHO Data Protection Scheme³.

² IHO Special Publication S-52 and S-57 (see appendix 1).

³ IHO Special Publication S-63 (see appendix 1).

MODULE B – OPERATIONAL AND FUNCTIONAL REQUIREMENTS

5 DISPLAY OF SENC INFORMATION

- 5.1** ECDIS should be capable of displaying all SENC information. An ECDIS should be capable of accepting and converting an ENC and its updates into a SENC. The ECDIS may also be capable of accepting a SENC resulting from conversion of ENC to SENC ashore, in accordance with IHO TR 3.11⁴. This method of ENC supply is known as SENC delivery.
- 5.2** SENC information available for display during route planning and route monitoring should be subdivided into the following three categories, Display Base, Standard Display and All Other Information (see appendix 2).
- 5.3** ECDIS should present the Standard Display at any time by a single operator action.
- 5.4** When an ECDIS is switched on following a switch off or power failure, it should return to the most recent manually selected settings for display.
- 5.5** It should be easy to add or remove information from the ECDIS display. It should not be possible to remove information contained in the Display Base.
- 5.6** For any operator identified geographical position (e.g. by cursor picking) ECDIS should display on demand the information about the chart objects associated with such a position.
- 5.7** It should be possible to change the display scale by appropriate steps e.g. by means of either chart scale values or ranges in nautical miles.
- 5.8** It should be possible for the mariner to select a safety contour from the depth contours provided by the SENC. ECDIS should emphasize the safety contour over other contours on the display, however:
- .1 if the mariner does not specify a safety contour, this should default to 30m. If the safety contour specified by the mariner or the default 30 m contour is not in the displayed SENC, the safety contour shown should 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 should default to the next deeper contour; and
 - .3 in each of the above cases, an indication should be provided.
- 5.9** It should be possible for the mariner to select a safety depth. ECDIS should emphasize soundings equal to or less than the safety depth whenever spot soundings are selected for display.
- 5.10** The ENC and all updates to it should be displayed without any degradation of their information content.

⁴ IHO Miscellaneous Publication M-3.
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5.11 ECDIS should provide a means to ensure that the ENC and all updates to it have been correctly loaded into the SENC.

5.12 The ENC data and updates to it should be clearly distinguishable from other displayed information, including those listed in appendix 3.

6 SCALE

6.1 ECDIS should provide an indication if:

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

7 DISPLAY OF OTHER NAVIGATIONAL INFORMATION

7.1 Radar information and/or AIS information may be transferred from systems compliant with the relevant standards of the Organization. Other navigational information may be added to the ECDIS display. However, it should not degrade the displayed SENC information and it should be clearly distinguishable from the SENC information.

7.2 It should be possible to remove the radar information, AIS information and other navigational information by single operator action.

7.3 ECDIS and added navigational information should use a common reference system. If this is not the case, an indication should be provided.

7.4 Radar

7.4.1 Transferred radar information may contain a radar image and/or tracked target information.

7.4.2 If the radar image is added to the ECDIS display, the chart and the radar image should match in scale, projection and in orientation.

7.4.3 The radar image and the position from the position sensor should both be adjusted automatically for antenna offset from the conning position.

8 DISPLAY MODE AND GENERATION OF THE NEIGHBOURING AREA

8.1 It should always be possible to display the SENC information in a "north-up" orientation. Other orientations are permitted. When such orientations are displayed, the orientation should be altered in steps large enough to avoid unstable display of the chart information.

8.2 ECDIS should provide for true motion mode. Other modes are permitted.

8.3 When true motion mode is in use, reset and generation of the chart display of the neighbouring area should take place automatically at own ship's distance from the edge of the display as determined by the mariner.

- 8.4** It should be possible to manually change the displayed chart area and the position of own ship relative to the edge of the display.
- 8.5** If the area covered by the ECDIS display includes waters for which no ENC at a scale appropriate for navigation is available, the areas representing those waters should carry an indication (see appendix 5) to the mariner to refer to the paper chart or to the RCDS mode of operation (see appendix 7).

9 COLOURS AND SYMBOLS

- 9.1** IHO recommended colours and symbols should be used to represent SENC information⁵.
- 9.2** The colours and symbols other than those mentioned in 9.1 should comply with the applicable requirements contained in the IMO standards for navigational symbols⁶.
- 9.3** SENC information displayed at the scale specified in the ENC should use the specified size of symbols, figures and letters⁵.
- 9.4** ECDIS should allow the mariner to select whether own ship is displayed in true scale or as a symbol.

10 DISPLAY REQUIREMENTS

- 10.1** ECDIS should be capable of displaying information for:
- .1 route planning and supplementary navigation tasks; and
 - .2 route monitoring.
- 10.2** The effective size of the chart presentation for route monitoring should be at least 270 mm x 270 mm.
- 10.3** The display should be capable of meeting colour and resolution recommendations of IHO⁵.
- 10.4** The method of presentation should ensure that the displayed information is clearly visible to more than one observer in the conditions of light normally experienced on the bridge of the ship by day and by night.
- 10.5** If information categories included in the Standard Display (See appendix 2) are removed to customize the display, this should be permanently indicated. Identification of categories which are removed from the Standard Display should be shown on demand.

⁵ Special Publication S-52, Appendix 2 (see appendix 1)
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11 ROUTE PLANNING, MONITORING AND VOYAGE RECORDING

11.1 It should be possible to carry out route planning and route monitoring in a simple and reliable manner.

11.2 The largest scale data available in the SENC for the area given should always be used by the ECDIS for all alarms or indications of crossing the ship's safety contour and of entering a prohibited area, and for alarms and indications according to appendix 5.

11.3 Route Planning

11.3.1 It should be possible to carry out route planning including both straight and curved segments.

11.3.2 It should be possible to adjust a planned route alphanumerically and graphically including:

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

11.3.3 It should be possible to plan one or more alternative routes in addition to the selected route. The selected route should be clearly distinguishable from the other routes.

11.3.4 An indication is required if the mariner plans a route across an own ship's safety contour.

11.3.5 An indication should be given if the mariner plans a route closer than a user-specified distance from the boundary of a prohibited area or a geographic area for which special conditions exist (see appendix 4). An indication should also be given if the mariner plans a route closer than a user-specified distance from a point object, such as a fixed or floating aid to navigation or isolated danger.

11.3.6 It should be possible for the mariner to specify a cross track limit of deviation from the planned route at which an automatic off-track alarm should be activated.

11.4 Route monitoring

11.4.1 For route monitoring the selected route and own ship's position should appear whenever the display covers that area.

11.4.2 It should be possible to display a sea area that does not have the ship on the display (e.g. for look ahead, route planning), while route monitoring. If this is done on the display used for route monitoring, the automatic route monitoring functions (e.g. updating ship's position, and providing alarms and indications) should be continuous. It should be possible to return to the route monitoring display covering own ship's position immediately by single operator action.

11.4.3 ECDIS should give an alarm if, within a specified time set by the mariner, own ship will cross the safety contour.

- 11.4.4** ECDIS should give an alarm or indication, as selected by the mariner, if, within a specified time set by the mariner, own ship will cross the boundary of a prohibited area or of a geographical area for which special conditions exist (see appendix 4).
- 11.4.5** An alarm should be given when the specified cross track limit for deviation from the planned route is exceeded.
- 11.4.6** An indication should be given to the mariner if, continuing on its present course and speed, over a specified time or distance set by the mariner, own ship will pass closer than a user-specified distance from a danger (e.g. obstruction, wreck, rock) that is shallower than the mariner's safety contour or an aid to navigation.
- 11.4.7** The ship's position should be derived from a continuous positioning system of an accuracy consistent with the requirements of safe navigation. Whenever possible, a second independent positioning source, preferably of a different type, should be provided. In such cases ECDIS should be capable of identifying discrepancies between the two sources.
- 11.4.8** ECDIS should provide an alarm when the input from position, heading or speed sources is lost. ECDIS should also repeat, but only as an indication, any alarm or indication passed to it from position, heading or speed sources.
- 11.4.9** An alarm should be given by ECDIS when the ship reaches a specified time or distance, set by the mariner, in advance of a critical point on the planned route.
- 11.4.10** The positioning system and the SENC should be on the same geodetic datum. ECDIS should give an alarm if this is not the case.
- 11.4.11** It should be possible to display alternative routes in addition to the selected route. The selected route should be clearly distinguishable from the other routes. During the voyage, it should be possible for the mariner to modify the selected sailing route or change to an alternative route.
- 11.4.12** It should be possible to display:
- .1 time-labels along a ship's track manually on demand and automatically at intervals selected between 1 and 120 minutes; and
 - .2 an adequate number of: points, free movable electronic bearing lines, variable and fixed range markers and other symbols required for navigation purposes and specified in appendix 3.
- 11.4.13** It should be possible to enter the geographical co-ordinates of any position and then display that position on demand. Also, it should be possible to select any point (features, symbol or position) on the display and read its geographical co-ordinates on demand.
- 11.4.14** It should be possible to adjust the displayed geographic position of the ship manually. This manual adjustment should be noted alpha-numerically on the screen, maintained until altered by the mariner and automatically recorded.

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

11.4.15.2 ECDIS should indicate discrepancies between the positions obtained by continuous positioning systems and positions obtained by manual observations.

11.5 Voyage recording

11.5.1 ECDIS should store and be able to reproduce certain minimum elements required to reconstruct the navigation and verify the official database used during the previous 12 hours. The following data should be recorded at one minute intervals:

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

11.5.2 In addition, ECDIS should record the complete track for the entire voyage, with time marks at intervals not exceeding 4 hours.

11.5.3 It should not be possible to manipulate or change the recorded information.

11.5.4 ECDIS should have a capability to preserve the record of the previous 12 hours and of the voyage track.

12 CALCULATIONS AND ACCURACY

12.1 The accuracy of all calculations performed by ECDIS should be independent of the characteristics of the output device and should be consistent with the SENC accuracy.

12.2 Bearings and distances drawn on the display or those measured between features already drawn on the display should have accuracy no less than that afforded by the resolution of the display.

12.3 The system should be capable of performing and presenting the results of at least the following calculations:

- .1 true distance and azimuth between two geographical positions;
- .2 geographic position from known position and distance/azimuth; and
- .3 geodetic calculations such as spheroidal distance, rhumb line, and great circle.

13 PERFORMANCE TESTS, MALFUNCTIONS ALARMS AND INDICATIONS

- 13.1** ECDIS should be provided with means for either automatically or manually carrying out on-board tests of major functions. In case of a failure, the test should display information to indicate which module is at fault.
- 13.2** ECDIS should provide a suitable alarm or indication of system malfunction.

14 BACK-UP ARRANGEMENTS

Adequate back-up arrangements should be provided to ensure safe navigation in case of an ECDIS failure; see appendix 6.

- .1** Facilities enabling a safe take-over of the ECDIS functions should be provided in order to ensure that an ECDIS failure does not develop into a critical situation.
- .2** A back-up arrangement should provide means of safe navigation for the remaining part of a voyage in the case of an ECDIS failure.

MODULE C – INTERFACING AND INTEGRATION

15 CONNECTIONS WITH OTHER EQUIPMENT ⁷

- 15.1** ECDIS should not degrade the performance of any equipment providing sensor inputs. Nor should the connection of optional equipment degrade the performance of ECDIS below this standard.
- 15.2** ECDIS should be connected to the ship's position fixing system, to the gyro compass and to the speed and distance measuring device. For ships not fitted with a gyro compass, ECDIS should be connected to a marine transmitting heading device.
- 15.3** ECDIS may provide a means to supply SENC information to external equipment.

16 POWER SUPPLY

- 16.1** It should be possible to operate ECDIS and all equipment necessary for its normal functioning when supplied by an emergency source of electrical power in accordance with the appropriate requirements of chapter II-1 of the 1974 SOLAS Convention, as amended.
- 16.2** Changing from one source of power supply to another or any interruption of the supply for a period of up to 45 seconds should not require the equipment to be manually re-initialized.

⁷ Publication IEC 61162.

Appendix 1

REFERENCE DOCUMENTS

The following international organizations have developed technical standards and specifications, as listed below, for use in conjunction with this standard. The latest edition of these documents should be obtained from the organization concerned:

INTERNATIONAL MARITIME ORGANIZATION (IMO)

Address: International Maritime Organization	Phone: +44 207 735 76 11
4 Albert Embankment	Fax: +44 207 587 32 10
London SE1 7SR	E-mail: info@imo.org
United Kingdom	Web: http://www.imo.org

Publications

IMO resolution MSC.191(79) on Performance Standards for the presentation of navigation related information on shipborne navigational displays

IMO resolution A.694(17) on Recommendations on general requirements for shipborne radio equipment forming part of the Global Maritime Distress and Safety System (GMDSS) and for electronic navigational aids

SN.Circ/207 (1999) on Differences between RCDS and ECDIS

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

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

INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO)

Address: Directing Committee	Phone: +377 93 10 81 00
International Hydrographic Bureau	Fax: +377 93 10 81 40
BP 445	E-mail: info@ihb.mc
MC 98011 Monaco Cedex	Web: http://www.iho.shom.fr
Principality of Monaco	

Publications

Special Publication No. S-52, Specifications for Chart Content and Display Aspects of ECDIS

Special Publication No. S-52 appendix 1, Guidance on Updating the Electronic Navigational Chart

Special Publication No. S-52 appendix 2, Colour and Symbol Specifications for ECDIS

Special Publication No. S-32, Hydrographic Dictionary

Special Publication No. S-57, IHO Transfer Standard for Digital Hydrographic Data

Special Publication No. S-61, IHO Product specification for Raster Navigational Charts (RNC)

Special Publication No. S-63, IHO Data Protection Scheme

Miscellaneous Publication No. M-3, *Resolutions of the IHO*

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

Address: IEC Central Office
3 rue de Varembé
PO Box 131
CH-1211 Geneva 20
Switzerland

Phone: +41 22 734 01 50
Fax: +41 22 733 38 43

Publications

IEC Publication 61174, Electronic Chart Display and Information Systems (ECDIS) - Operational and Performance Requirements, Method of Testing and Required Test Results.

IEC Publication 60945, General Requirements for Shipborne Radio Equipment Forming Part of the Global Maritime Distress and Safety System and Marine Navigational Equipment.

IEC Publication 61162, *Digital Interfaces - Navigation and Radiocommunication Equipment On board Ship.*

[IEC Publication 62288, Maritime Navigation and Radiocommunication Equipment and Systems – Presentation of navigation related information – General requirements, methods of test and required test results.]

Appendix 2

SENC INFORMATION AVAILABLE FOR DISPLAY DURING ROUTE PLANNING AND ROUTE MONITORING

- 1 Display base to be permanently shown on the ECDIS display, consisting of:
 - .1 coastline (high water);
 - .2 own ship's safety contour;
 - .3 isolated underwater dangers of depths less than the safety contour which lie within the safe waters defined by the safety contour;
 - .4 isolated dangers which lie within the safe water defined by the safety contour, such as fixed structures, overhead wires, etc.;
 - .5 scale, range and north arrow;
 - .6 units of depth and height; and
 - .7 display mode.

- 2 Standard display consisting of:
 - .1 display base
 - .2 drying line
 - .3 buoys, beacons, other aids to navigation and fixed structures
 - .4 boundaries of fairways, channels, etc.
 - .5 visual and radar conspicuous features
 - .6 prohibited and restricted areas
 - .7 chart scale boundaries
 - .8 indication of cautionary notes
 - .9 ships' routing systems and ferry routes
 - .10 archipelagic sea lanes.

- 3 All other information, to be displayed individually on demand, for example:
 - .1 spot soundings
 - .2 submarine cables and pipelines
 - .3 details of all isolated dangers
 - .4 details of aids to navigation
 - .5 contents of cautionary notes
 - .6 ENC edition date
 - .7 most recent chart update number
 - .8 magnetic variation
 - .9 graticule
 - .10 place names.

Appendix 3

NAVIGATIONAL ELEMENTS AND PARAMETERS

- 1 Own ship.
 - .1 Past track with time marks for primary track.
 - .2 Past track with time marks for secondary track.
- 2 Vector for course and speed made good.
- 3 Variable range marker and/or electronic bearing line.
- 4 Cursor.
- 5 Event.
 - .1 Dead reckoning position and time (DR).
 - .2 Estimated position and time (EP).
- 6 Fix and time.
- 7 Position line and time.
- 8 Transferred position line and time.
 - .1 Predicted tidal stream or current vector with effective time and strength.
 - .2 Measured tidal stream or current vector with effective time and strength.
- 9 Danger highlight.
- 10 Clearing line.
- 11 Planned course and speed to make good.
- 12 Waypoint.
- 13 Distance to run.
- 14 Planned position with date and time.
- 15 Visual limits of lights arc to show rising/dipping range.
- 16 Position and time of “wheel over”.

Appendix 4

AREAS FOR WHICH SPECIAL CONDITIONS EXIST

The following are the areas which ECDIS should detect and provide an alarm or indication under sections 11.3.5 and 11.4.4:

- Traffic separation zone
- Inshore traffic zone
- Restricted area
- Caution area
- Offshore production area
- Areas to be avoided
- User defined areas to be avoided
- Military practise area
- Seaplane landing area
- Submarine transit lane
- Anchorage area
- Marine farm/aquaculture
- PSSA (Particularly Sensitive Sea Area)

Appendix 5

ALARMS AND INDICATORS

Section	Requirements	Information
11.4.3	Alarm	Crossing safety contour
11.4.4	Alarm or Indication	Area with special conditions
11.4.5	Alarm	Deviation from route
11.4.8	Alarm	Positioning system failure
11.4.9	Alarm	Approach to critical point
11.4.10	Alarm	Different geodetic datum
13.2	Alarm or Indication	Malfunction of ECDIS
5.8.3	Indication	Default safety contour
6.1.1	Indication	Information overscale
6.1.2	Indication	Larger scale ENC available
7.3	Indication	Different reference system
8.5	Indication	No ENC available
10.5	Indication	Customized display
11.3.4	Indication	Route planning across safety contour
11.3.5	Indication	Route planning across specified area
11.4.6	Indication	Crossing a danger in route monitoring mode
13.1	Indication	System test failure

In this Performance Standard the definitions of Indicators and Alarms provided in the IMO resolution A.830(19) "Code on Alarms and Indicators, 1995" apply.

Alarm: An alarm or alarm system which announces by audible means, or audible and visual means, a condition requiring attention.

Indicator: Visual indication giving information about the condition of a system or equipment.

Appendix 6

BACK-UP REQUIREMENTS

1 INTRODUCTION

As prescribed in section 14 of this performance standard, adequate independent back-up arrangements should be provided to ensure safe navigation in case of ECDIS failure. Such arrangements include:

- .1 facilities enabling a safe take-over of the ECDIS functions in order to ensure that an ECDIS failure does not result in a critical situation;
- .2 a means to provide for safe navigation for the remaining part of the voyage in case of ECDIS failure.

2 PURPOSE

The purpose of an ECDIS back-up system is to ensure that safe navigation is not compromised in the event of ECDIS failure. This should include a timely transfer to the back-up system during critical navigation situations. The back-up system shall allow the vessel to be navigated safely until the termination of the voyage.

3 FUNCTIONAL REQUIREMENTS

3.1 Required functions and their availability

3.1.1 Presentation of chart information

The back-up system should display in graphical (chart) form the relevant information of the hydrographic and geographic environment which are necessary for safe navigation.

3.1.2 Route planning

The back-up system should be capable of performing the route planning functions, including:

- .1 taking over of the route plan originally performed on the ECDIS;
- .2 adjusting a planned route manually or by transfer from a route planning device.

3.1.3 Route monitoring

The back-up system should enable a take-over of the route monitoring originally performed by the ECDIS, and provide at least the following functions:

- .1 plotting own ship's position automatically, or manually on a chart;
- .2 taking courses, distances and bearings from the chart;
- .3 displaying the planned route;

- .4 displaying time labels along ship's track;
- .5 plotting an adequate number of points, bearing lines, range markers, etc., on the chart.

3.1.4 Display information

If the back-up is an electronic device, it should be capable of displaying at least the information equivalent to the standard display as defined in this performance standard.

3.1.5 Provision of chart information

- .1 The chart information to be used in the backup arrangement should be the latest edition, as corrected by official updates, of that issued by or on the authority of a Government, authorized Hydrographic Office or other relevant government institution, and conform to IHO standards.
- .2 It should not be possible to alter the contents of the electronic chart information.
- .3 The chart or chart data edition and issuing date should be indicated.

3.1.6 Updating

The information displayed by the ECDIS back-up arrangements should be up-to-date for the entire voyage.

3.1.7 Scale

If an electronic device is used, it should provide an indication:

- .1 if the information is displayed at a larger scale than that contained in the database;
and
- .2 if own ship's position is covered by a chart at a larger scale than that provided by the system.

3.1.8 If radar and other navigational information are added to an electronic back-up display, all the corresponding requirements for radar information and other navigation information of this performance standard should be met.

3.1.9 If an electronic device is used, the display mode and generation of the neighbouring area should be in accordance with section 8 of this performance standard.

3.1.10 Voyage recording

The back-up arrangements should be able to keep a record of the ship's actual track, including positions and corresponding times.

3.2 Reliability and accuracy

3.2.1 Reliability

The back-up arrangements should provide reliable operation under prevailing environmental and normal operating conditions.

3.2.2 Accuracy

Accuracy should be in accordance with section 12 of this performance standard.

3.3 Malfunctions, warnings, alarms and indications

If an electronic device is used, it should provide a suitable alarm or indication of system malfunction.

4 OPERATIONAL REQUIREMENTS

4.1 Ergonomics

If an electronic device is used, it should be designed in accordance with the ergonomic principles of ECDIS.

4.2 Presentation of information

If an electronic device is used:

- .1 Colours and symbols should be in accordance with the colours and symbols requirements of ECDIS.
- .2 The effective size of the chart presentation should be not less than 250 mm x 250 mm or 250 mm diameter.

5 POWER SUPPLY

If an electronic device is used:

- .1 the back-up power supply should be separate from the ECDIS; and
- .2 conform to the requirements in this ECDIS performance standard.

6 CONNECTIONS WITH OTHER EQUIPMENT

6.1 If an electronic device is used, it should:

- .1 be connected to systems providing continuous position-fixing capability; and
- .2 not degrade the performance of any equipment providing sensor input.

6.2 If radar with selected parts of the ENC chart information overlay is used as an element of the back-up, the radar should comply with resolution MSC.192(79).

Appendix 7

RCDS MODE OF OPERATION

Whenever in this appendix reference is made to any provisions of the annex related to ECDIS, the term ECDIS should be substituted by the term RCDS, SENC by SRNC and ENC by RNC, as appropriate.

This appendix refers to each paragraph of the performance standards for ECDIS (i.e. the Annex to which this part is appendix 7) and specifies which paragraphs of the Annex either:

- .1 apply to RCDS; or
- .2 do not apply to RCDS; or
- .3 are modified or replaced as shown in order to apply to RCDS.

Any additional requirements applicable to RCDS are also described.

1 SCOPE

1.1 Paragraph applies to RCDS.

1.2 When operating in RCDS-mode, an appropriate portfolio of up-to-date paper charts (APC) should be carried on board and be readily available to the mariner.

1.3 - 1.7 Paragraphs apply to RCDS.

1.8 RCDS should provide appropriate alarms or indications with respect to the information displayed or malfunction of the equipment (see Table 1 of this appendix).

1.9 Refers to Appendix 7 and applies to RCDS.

2 APPLICATION OF THESE STANDARDS

2.1 – 2.4 Paragraphs apply to RCDS.

3 DEFINITIONS

3.1 *Raster Chart Display System (RCDS)* means a navigation information system displaying RNCs with positional information from navigation sensors to assist the mariner in route planning and route monitoring, and if required, display additional navigation-related information.

3.2 *Raster Navigational Chart (RNC)* means a facsimile of a paper chart originated by, or distributed on the authority of, a government-authorized hydrographic office. RNC is used in these standards to mean either a single chart or a collection of charts.

- 3.3** *System Raster Navigational Chart Database (SRNC)* means a database resulting from the transformation of the RNC by the RCDS to include updates to the RNC by appropriate means.
- 3.4-3.5** Paragraphs do not apply to RCDS.
- 3.6** Paragraph applies to RCDS.
- 3.7** Appropriate Portfolio of up to date paper Charts (APC) means a suite of paper charts of a scale to show sufficient detail of topography, depths, navigational hazards, aids to navigation, charted routes, and routing measures to provide the mariner with information on the overall navigational environment. The APC should provide adequate look-ahead capability. Coastal States will provide details of the charts which meet the requirement of this portfolio, and these details are included in a worldwide database maintained by the IHO. Consideration should be given to the details contained in this database when determining the content of the APC.

MODULE A - DATABASE

4 PROVISION AND UPDATING OF CHART INFORMATION

- 4.1** The RNC used in RCDS should be the latest edition of that originated by, or distributed on the authority of, a government authorized hydrographic office and conform to IHO standards. RNCs not on WGS 84 or PE-90 should carry meta-data (i.e., additional data) to allow geo-referenced positional data to be displayed in the correct relationship to SRNC data.
- 4.2** The contents of the SRNC should be adequate and up-to-date for that part of the intended voyage not covered by ENC.
- 4.3** It should not be possible to alter the contents of the RNC.
- 4.4 – 4.8** All paragraphs apply to RCDS.
- 4.9** Paragraph does not apply to RCDS

MODULE B – OPERATIONAL AND FUNCTIONAL REQUIREMENTS

5 DISPLAY OF SRNC INFORMATION

- 5.1** RCDS should be capable of displaying all SRNC information.
- 5.2** SRNC information available for display during route planning and route monitoring should be subdivided into two categories:
- .1 the RCDS standard display consisting of RNC and its updates, including its scale, the scale at which it is displayed, its horizontal datum, and its units of depths and heights; and
 - .2 any other information such as mariner's notes.

- 5.3- 5.4** Paragraphs apply to RCDS.
- 5.5** It should be easy to add to, or remove from; the RCDS display any information additional to the RNC data, such as mariner's notes. It should not be possible to remove any information from the RNC.
- 5.6 – 5.9** Paragraphs do not apply to RCDS.
- 5.10 – 5.12** Paragraphs apply to RCDS.
- 5.13** There should always be an indication if the ECDIS equipment is operating in RCDS mode.
- 6** **SCALE**
- This section applies to RCDS.
- 7** **DISPLAY OF OTHER NAVIGATIONAL INFORMATION**
- 7.1 - 7.4** All paragraphs apply to RCDS.
- 8** **DISPLAY MODE AND GENERATION OF THE NEIGHBOURING AREA**
- 8.1** It should always be possible to display the SRNC in “chart-up” orientation. Other orientations are permitted.
- 8.2 - 8.4** All paragraphs apply to RCDS.
- 8.5** Paragraph refers to RCDS mode of operation.
- 9** **COLOURS AND SYMBOLS**
- 9.1** IHO recommended colours and symbols should be used to represent SRNC information.
- 9.2** Paragraph applies to RCDS.
- 9.3** Paragraph does not apply to RCDS.
- 9.4** Paragraph applies to RCDS.
- 10** **DISPLAY REQUIREMENTS**
- 10.1-10.2** Paragraphs apply to RCDS.
- 10.3** Paragraph does not apply to RCDS.

- 10.4** Paragraph applies to RCDS.
- 10.5** Paragraph does not apply to RCDS.
- 10.6** RCDS should be capable of displaying, simply and quickly, chart notes which are not located on the portion of the chart currently being displayed.
- 11** **ROUTE PLANNING, MONITORING AND VOYAGE RECORDING**
- 11.1** Paragraphs apply to RCDS.
- 11.2** Paragraph does not apply to RCDS.
- 11.3** **Route Planning**
- 11.3.1-11.3.3** Paragraphs apply to RCDS.
- 11.3.4-11.3.5** Paragraphs do not apply to RCDS.
- 11.3.6** Paragraph applies to RCDS.
- 11.3.7** It should be possible for the mariner to enter points, lines and areas which activate an automatic alarm. The display of these features should not degrade the SRNC information and it should be clearly distinguishable from the SRNC information.
- 11.4** **Route monitoring**
- 11.4.1** Paragraph applies to RCDS.
- 11.4.2** It should be possible to display a sea area that does not have the ship on the display (e.g. for look ahead, route planning), while route monitoring. If this is done on the display used for route monitoring, the automatic route monitoring functions in 10.4.6 and 10.4.7 should be continuous. It should be possible to return to the route monitoring display covering own ship's position immediately by single operator action.
- 11.4.3-11.4.4** Paragraphs do not apply to RCDS.
- 11.4.5** Paragraph apply to RCDS.
- 11.4.6** Paragraphs do not apply to RCDS.
- 11.4.7-11.4.9** Paragraphs apply to RCDS.
- 11.4.10** The RCDS should only accept positional data referenced to the WGS 84 or PE-90 geodetic datum. RCDS should give an alarm if the positional data is not referenced to one of these datum. If the displayed RNC cannot be referenced to the WGS 84 or PE-90 datum then a continuous indication should be provided.

11.4.11-11.4.15 Paragraphs apply to RCDS.

11.4.16 RCDS should allow the user to manually align the SRNC with positional data. This can be necessary, for example, to compensate for local charting errors.

11.4.17 It should be possible to activate an automatic alarm when the ship crosses a point, line, or is within the boundary of a mariner entered feature within a specified time or distance.

11.5 Voyage recording

11.5.1-11.5.4 All paragraphs apply to RCDS.

12 CALCULATIONS AND ACCURACY

12.1-12.3 All paragraphs apply to RCDS.

12.4 RCDS should be capable of performing transformations between a local datum and WGS 84 Datum.

13 PERFORMANCE TESTS, MALFUNCTION ALARMS AND INDICATIONS

13.1-13.2 All paragraphs apply to RCDS.

14 BACK-UP ARRANGEMENTS

All paragraphs apply to RCDS.

MODULE C – INTERFACING AND INTEGRATION

15 CONNECTIONS WITH OTHER EQUIPMENT

15.1-15.3 All paragraphs apply to RCDS.

16 POWER SUPPLY

16.1-16.2 All paragraphs apply to RCDS.

Table 1

ALARMS AND INDICATORS IN THE RCDS MODE OF OPERATION

Paragraph	Requirement	Information
11.4.5	Alarm	Deviation from route
11.4.17	Alarm	Approach to mariner entered feature, e.g. area, line
11.4.8	Alarm	Position system failure
11.4.9	Alarm	Approach to critical point
11.4.10	Alarm or indication	Different geodetic datum
13.2	Alarm or indication	Malfunction of RCDS mode
5.13	Indication	ECDIS operating in the raster mode
6.1	Indication	Larger scale information available, or overscale
6.1.2	Indication	Larger scale RNC available for the area of the vessel

Note: The definitions of alarms and indicators are given in appendix 5.

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STCW.7/Circ.24
6 February 2017

**INTERNATIONAL CONVENTION ON STANDARDS OF TRAINING, CERTIFICATION AND
WATCHKEEPING FOR SEAFARERS (STCW), 1978, AS AMENDED**

**Interim Guidance for Parties, Administrations, port State control authorities,
recognized organizations and other relevant parties on the requirements of the STCW
Convention, 1978, as amended**

1 The Sub-Committee on Human Element, Training and Watchkeeping, at its fourth session (30 January to 3 February 2017), noted the urgent need for some clarification on the implementation of the 2010 Manila Amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, as amended.

2 The Sub-Committee also noted that:

- .1 problems associated with requests for documentation during inspections or surveys that is not required by the STCW Convention, 1978, as amended, were resulting in significant and unnecessary administrative burdens on Administrations, companies and seafarers. It was further noted that some problems were linked to inconsistencies in interpretations regarding the status of IMO model courses;
- .2 references to the STCW Convention, 1978, as amended, were made in varied ways within certificates and documentary evidence;
- .3 there were reported misinterpretations of the training and familiarization provisions for Electronic Chart Display and Information Systems (ECDIS) as required by the STCW Convention, 1978, as amended; and
- .4 the 2010 Manila Amendments to the STCW Convention and STCW Code introduced four new certificates as set out in regulation II/5 (able seafarer deck), III/5 (able seafarer engine), III/6 (electro-technical officers) and III/7 (electro-technical ratings), and that misinterpretation of the applicable provisions had been reported.

3 To assist all concerned, the Sub-Committee prepared clarifications on a number of issues in the interim Guidance, as set out in the annex.

4 Member States are invited to be guided accordingly and to bring this Guidance to the attention of all concerned, in particular, port State control officers, recognized organizations, companies and other relevant parties.

5 The content of this circular takes account of the guidance in MSC/Circ.1030 and MSC/Circ.1032.

ANNEX

**INTERIM GUIDANCE FOR PARTIES, ADMINISTRATIONS, PORT STATE CONTROL
AUTHORITIES, RECOGNIZED ORGANIZATIONS AND OTHER RELEVANT PARTIES ON
THE REQUIREMENTS OF THE STCW CONVENTION, 1978, AS AMENDED**

Provision of documentation for verification

1 Under regulation I/2 of the STCW Convention, 1978, as amended, the documentation authorizing the holder to serve in certain functions on board ship are certificates of competency and certificates of proficiency and, only with regard to regulation V/2, documentary evidence. The list of certificates or documentary evidence required under the STCW Convention, 1978, as amended, is set out in Table B-I/2 of the STCW Code.

2 Certificates of competency, certificates of proficiency and documentary evidence issued in accordance with chapters II, III, IV, V, VI and VII of the STCW Convention, 1978, as amended, are evidence of having successfully completed all required training and that the required standard of competence has been achieved.

3 While IMO model courses may assist with the development of training programmes they are not mandatory and Administrations are not required to use them when preparing and approving training courses to meet the objectives of the STCW Code, as amended.

4 The validation of an IMO model course means that no reason was found to object to its contents. It does not mean that it is an official interpretation of the Convention, or that approval was granted by the IMO bodies.

5 It is agreed that:

- .1 in accordance with regulation I/4 of the STCW Convention, 1978, as amended, seafarers should not be required to provide documentation for verification that is not required by the Convention; and
- .2 certificates or documentary evidence issued under the STCW Convention, 1978, as amended, should not be required to contain reference to IMO model courses.

References to the STCW Convention, 1978, as amended

6 The normal practice within IMO is to refer to international conventions by an acronym of the title of the convention and the date on which it was made (e.g. SOLAS 1974). Where amendments are made to the original convention, the title is then amended to reflect the amendments (e.g. SOLAS 1974, as amended) but it is not normal practice to append the year/dates of the amendments to the title of the amended convention.

7 It has been reported that different references to the STCW Convention, 1978, as amended, can be found in certificates and endorsements, which has led to some confusion. In particular, if the references had different meanings, or if the differences were unintentional.

8 The format of certificates and endorsements provided in section A-I/2 of the STCW Code refers to "the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended."

9 In order to avoid confusion, it is recommended that certificates and endorsements referring to the STCW Convention use the reference "the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended", without appending the year/dates of the amendments.

10 It is important to note that seafarers may hold certificates and documentary evidence that contain a different reference to the STCW Convention that remain valid and should be accepted.

Training requirements for Electronic Chart Display and Information Systems (ECDIS) and provision of the documentation for verification

11 The STCW Code contains requirements for approved training on ECDIS. In cases where the approved training has not been completed, a limitation shall be included on the certificate and endorsements issued to the seafarer. Where such a limitation is not specified, the certificate and endorsements are evidence of having successfully completed the required approved training and that the standard of competence has been achieved.

12 No requirement exists for the approved training on ECDIS equipment to be type-specific. The knowledge, understanding and proficiency required to be demonstrated is generalized to ensure seafarers have the necessary skills for basic operation of all types of equipment.

13 In accordance with regulation I/14, companies are responsible for ensuring that seafarers employed on their ships are familiarized with the installed equipment, including ECDIS.

14 It is agreed that seafarers required to have training in the use of ECDIS:

- .1 should not be required to provide documentation of training in ECDIS that is specific to the installed equipment; and
- .2 are required to be familiarized with the ECDIS equipment installed on board.

Regulations II/5 (able seafarer deck), III/5 (able seafarer engine), III/6 (electro-technical officers) and III/7 (electro-technical ratings)

15 Misinterpretation of the applicable provision of regulations II/5, III/5, III/6 and III/7 has been reported. In particular, port State control officers have required personnel on board to possess an applicable Certificate of Competency or Certificate of Proficiency, when such personnel are not included in the Minimum Safe Manning Document (MSMD) of the ship.

16 Port State control officers, recognized organizations and other relevant parties are reminded that under paragraph 2.1 of appendix 11 of the *Procedures for Port State Control, 2011* (resolution A.1052(27)), "If a ship is manned in accordance with a MSMD or equivalent document issued by the flag State, the port State control officers should accept that the ship is safely manned."