

# Annex 1

*NOTE: Changes to the original text are marked with grey. Sections removed are not indicated.*

## **DRAFT 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. 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 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.
- 2.2. 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.
- 2.3. 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.

- 2.4 **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.
- 2.5 **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.
- 2.6 Further information on ECDIS definitions may be found in IHO **Hydrographic Dictionary Special Publication S-32** (see appendix 1).

### 3. DISPLAY OF SENC INFORMATION

- 3.1 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<sup>1</sup> 3.11. This method of ENC supply is known as SENC delivery.
- 3.2 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) and be presented as such.
- 3.3 ECDIS should present the Standard Display at any time by a single operator action.
- 3.4 When an ECDIS is switched on following a switch off or power failure it should return to the display used prior to switch off or power failure.
- 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 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.
- 3.7 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.
- 3.8 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.
- .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.
- .3 In each of the above cases, an indication should be provided.
- 3.9 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.
- 3.10 The ENC and all updates to it should be displayed without any degradation of their information content.
- 3.11 ECDIS should provide a means to ensure that the ENC and all updates to it have been correctly loaded into the SENC.
- 3.12 The ENC data and updates to it should be clearly distinguishable from other displayed information, including those listed in appendix 3.



<sup>1</sup> IHO Miscellaneous Publication M-3

#### 4. PROVISION AND UPDATING <sup>2</sup> 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, authorized Hydrographic Office or other relevant government institution, and conform to IHO standards.
- 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 Scheme<sup>3</sup>.

#### 5. SCALE

- 5.1 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.

#### 6. DISPLAY OF OTHER NAVIGATIONAL INFORMATION<sup>4</sup>

- 6.1 Radar information, AIS information or 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.
- 6.2 It should be possible to remove the radar information, AIS information and other navigational information by single operator action.
- 6.3 ECDIS and added navigational information should use a common reference system. If this is not the case, an indication should be provided.
- 6.4 Radar
- .1 Transferred radar information may contain a radar image and/or tracked target information.
  - .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.
  - .3 The radar image and the position from the position sensor should both be adjusted automatically for antenna offset from the conning position.

<sup>2</sup> Appendix 1 to IHO Special Publication S-52 (see appendix 1).

<sup>3</sup> IHO Special Publication S-63 (see appendix 1).

<sup>4</sup> IMO Resolution MSC.191(79)

- .4 It should be possible to adjust the displayed position of the ship manually so that the radar image matches the SENC information displayed.

## 7. DISPLAY MODE AND GENERATION OF THE NEIGHBOURING AREA

- 7.1 It should always be possible to display the SENC information in a "north-up" orientation. Other orientations are permitted. When other orientations are displayed, the orientation should be altered in steps large enough to avoid unstable display of the chart information.
- 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 chart display of the neighbouring area should take place automatically at own ship's distance from the border of the display as determined by the mariner.
- 7.4 It should be possible to change manually the chart area displayed and the position of own ship relative to the edge of the display.
- 7.5 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).

## 8. COLOURS AND SYMBOLS

- 8.1 IHO recommend colours and symbols should be used to represent SENC information<sup>5</sup>.
- 8.2 The colours and symbols other than those mentioned in 8.1 should comply with the applicable requirements contained in the IMO standards for navigational symbols<sup>6</sup>.
- 8.3 SENC information displayed at the scale specified in the ENC should use the specified size of symbols, figures and letters<sup>5</sup>.
- 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:
- .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 x 270 mm.
- 9.3 The display should be capable of meeting colour and resolution recommendations of IHO<sup>7</sup>.
- 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.
- 9.5 If information categories included in the Standard Display (See Appendix 2) are removed to customise the display, this should be permanently indicated. Identification of categories which are removed from the Standard Display should be shown on demand.


<sup>5</sup> Appendix 2 to IHO Special Publication S-52 (see appendix 1).

<sup>6</sup> IMO resolution MSC 191(79)

<sup>7</sup> Appendix 2 to IHO Special Publication S-52.

## 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<sup>8</sup> 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 **alphanumerically and graphically including:**
- .1 adding waypoints to a route;
  - .2 deleting waypoints from a route;
  - .3 changing the position of a waypoint;
- 10.4.3 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.
- 10.4.4 An indication is required if the mariner plans a route across an own ship's safety  our.
- 10.4.5 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.
- 10.4.6 It should be possible for the mariner to specify a **cross  limit** of deviation from the planned route at which an automatic off-track alarm should **be activated**.
- 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, within a specified time set by the mariner, own ship will cross the safety contour.
- 10.5.4 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).
- 10.5.5 An alarm should be given when the specified **cross track limit for** deviation from the planned route is exceeded.
- 10.5.6 **An indication should be given to the mariner if, within a specified time or distance set by the mariner, own ship will cross a danger (e.g. obstruction, wreck, rock) that is shoaler than the mariner's safety contour, or if own ship will cross an aid to navigation.**

<sup>8</sup> MSC/Circ. 982: Guidelines on ergonomic criteria for  ge equipment and layout.

- 10.5.7 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.
- 10.5.8 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.
- 10.5.9 An alarm should be given by ECDIS if the ship, within a specified time or distance set by the mariner, will reach a critical point on the planned route.
- 10.5.10 The positioning system and the SENC should be on the same geodetic datum. ECDIS should give an alarm if this is not the case.
- 10.5.11 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.
- 10.5.12 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.
- 10.5.13 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.
- 10.5.14 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.
- [10.5.15.1 ECDIS should provide the capability to enter and plot manually obtained bearing and distance line of position (LOP), and calculate the resulting position of own ship. It should be possible to enter and display up to six LOPs simultaneously, and use the resulting position to update dead reckoning.
- 10.5.15.2 ECDIS should identify discrepancies between the positions obtained by continuous positioning systems and positions obtained by manual observations.]

## 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 as a 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 a capability to preserve the record of the previous 12 hours and of the voyage track.

## 11. CALCULATIONS AND 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 accuracy no less than that afforded by the resolution of the display.
- 11.3 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.

## 12. CONNECTIONS WITH OTHER EQUIPMENT<sup>9</sup>

- 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 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.
- 12.3 ECDIS may provide a means to supply SENC information to external equipment.

## 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.

## 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, as amended.
- 15.2 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.

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<sup>9</sup> IEC Publication 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 4 Albert Embankment London SE1 7SR United Kingdom	Phone: +44 207 735 76 11 Fax: +44 207 587 32 10 E-mail: <a href="mailto:info@imo.org">info@imo.org</a> Web: <a href="http://www.imo.org">http://www.imo.org</a>
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Publications

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

IMO Resolution A.694(17) 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

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

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

**INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO)**

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



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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.*

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## 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 buoys and beacons;
    - .6 ships routing;
    - .7 scale, range and north arrow;
    - .8 uncharted depth and height.
    - .9 display mode.
  
  2. Standard display consisting of:
    - .1 display base
    - .2 drying line
    - .3 aids to navigation in addition to buoys, beacons and fixed structures (see 1.4 and 1.5 above)
    - .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 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 update number]
    - .8 magnetic variation
    - .9 graticule
    - .10 place names.
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## APPENDIX 3

NAVIGATIONAL ELEMENTS AND PARAMETERS <sup>10</sup>

- 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".




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<sup>10</sup> See IEC Publication 61174.

## 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 10.4.5 and 10.5.4:

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

ESSA/PSSA (Environmental Sensitive Sea Area / Particular Sensitive Sea Area)

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## APPENDIX 5

## ALARMS AND INDICATORS

Section	Requirements	Information
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	Positioning system failure
10.5.9	Alarm	Approach to critical point
10.5.10	Alarm	Different geodetic datum
13.2	Alarm or Indication	Malfunction of ECDIS
3.8.3	Indication	Default safety contour
5.1.1	Indication	Information overscale
5.1.2	Indication	Larger scale ENC available
6.3	Indication	Different reference system
7.5	Indication	No ENC available
9.5	Indication	Customized display
10.4.4	Indication	Route planning across safety contour
10.4.5	Indication	Route planning across specified area
10.5.6	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 ECDIS 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 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 should 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 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

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 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), as amended.

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## 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 should be carried on board and be readily available to the mariner. IHO maintains an up-to-date world-wide catalogue that indicates which charts meet the requirements of such an appropriate portfolio. This catalogue is compiled from inputs provided by coastal States. Consideration should be given to this catalogue when determining the 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).
- 1.9 Refers to Appendix 7 and applies to RCDS..

## 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.
- 2.7 An appropriate portfolio of up-to-date paper charts (APC) should cover those sections of the intended voyage where ECDIS will be operated in the RCDS mode. These paper charts are to be of a scale that will 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. In conjunction with ECDIS in RCDS mode, such charts should provide adequate look-ahead capability.

## 3. DISPLAY OF SRNC INFORMATION

- 3.1 RCDS should be capable of displaying all SRNC information.

- 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.
- 3.3-3.4 Paragraphs apply to RCDS.
- 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 – 3.9 Paragraphs do not apply to RCDS.
- 3.10 – 3.12 Paragraphs apply to RCDS.
- 3.13 There should always be an indication if the ECDIS equipment is operating in 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 **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
- 5. SCALE**
- This section applies to RCDS.
- 6. DISPLAY OF OTHER NAVIGATIONAL INFORMATION**
- 6.1-6.4 All paragraphs apply to RCDS.
- 7. DISPLAY MODE AND GENERATION OF THE NEIGHBOURING AREA**
- 7.1 It should always be possible to display the SRNC in "chart-up" orientation. Other orientations are permitted.
- 7.2-7.4 All paragraphs apply to RCDS.
- 7.5 Paragraph refers to RCDS mode of operation.
- 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 Paragraph does not apply to RCDS.

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

## 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 Paragraph apply to RCDS.

10.5.6 Paragraphs do not apply to RCDS.

10.5.7-10.5.9 Paragraphs apply to RCDS.

10.5.10 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.

10.5.11 -10.5.14 Paragraphs apply to RCDS.

[10.5.15.1- 10.5.15.2 Paragraphs apply to RCDS]

10.5.16 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.



10.5.17 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.

10.6 Voyage recording

10.6.1-10.6.4 All paragraphs apply to RCDS.

## 11. **CALCULATIONS AND ACCURACY**

11.1-11.3 All paragraphs apply to RCDS.

11.4 RCDS should be capable of performing transformations between a local datum and WGS-84



## 12. **CONNECTIONS WITH OTHER EQUIPMENT**

12.1-12.3 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

Para	Requirement	Information
10.5.5	Alarm	Deviation from route
10.5.17	Alarm	Approach to mariner entered feature, e.g. area, line
10.5.8	Alarm	Position system failure
10.5.9	Alarm	Approach to critical point
10.5.10	Alarm / indication	Different geodetic datum
13.2	Alarm or indication	Malfunction of RCDS mode
3.13	Indication	ECDIS operating in the raster mode
5.1	Indication	Larger scale information available, or overscale
5.1.2	Indication	Larger scale RNC available for the area of the vessel

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

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## Annex 2

Overview of proposed new structure for ECDIS PS, suggested by Germany

<b>Structure revised PS</b>	<b>Modular structure with existing numbering</b>	<b>Modular structure with new numbering</b>
1 Scope	1 Scope	1 Scope
2 Definitions	2 Definitions	2 Definitions
	Module A Database	Module A Database
3 Display of SENC Information	4 Provision and updating of chart information	3 Provision and updating of chart information
	Module B Operational and functional requirements	Module B Operational and functional requirements
4 Provision and updating of chart information	3 Display of SENC Information	4 Display of SENC Information
5 Scale	5 Scale	5 Scale
6 Display of other navigational information	6 Display of other navigational information	6 Display of other navigational information
7 Display mode and generation of the neighbouring area	7 Display mode and generation of the neighbouring area	7 Display mode and generation of the neighbouring area
8 Colours and symbols	8 Colours and symbols	8 Colours and symbols
9 Display requirements	9 Display requirements	9 Display requirements
10 Route planning, monitoring and voyage recording	10 Route planning, monitoring and voyage recording	10 Route planning, monitoring and voyage recording
11 Calculations and accuracy	11 Calculations and accuracy	11 Calculations and accuracy
12 Connection with other equipment	13 Performance tests, malfunctions alarms and indications	12 Performance tests, malfunctions alarms and indications
13 Performance tests, malfunctions alarms and indications	14 Back-up arrangements	13 Back-up arrangements
	Module C Interfacing and integration	Module C Interfacing and integration
14 Back-up arrangements	12 Connection with other equipment	14 Connection with other equipment
15 Power supply	15 Power supply	15 Power supply

## Annex 3

### TERMS OF REFERENCE OF THE CORRESPONDENCE GROUP ON EVALUATION OF THE USE OF ECDIS AND ENC DEVELOPMENT

Taking into account resolution A.817(19) as amended by resolutions MSC.64(70) and MSC.86(70), the decisions of NAV 51 and the decisions of the MSC to include amendments to the ECDIS performance standards in the work programme of the Sub-Committee and provisional agenda for NAV 52 (NAV 51/2/2, annex 2), provide comments and give preliminary consideration to:

.1 the proposed amendments to the ECDIS performance standards as contained in documents MSC 80/21/2 (Greece and IHO), NAV 51/6/2 (Russian Federation), NAV 51/6/3 (Japan) and NAV 51/6 (Report of Correspondence Group);

.2 prepare a draft consolidated text of revised performance standards for ECDIS;

.3 consider possible implications of the proposed amendments for IMO performance standards, guidance and guidelines on ECDIS;

.4 the preliminary draft specifications of the proposed chart catalogue given at NAV 51/WP.4, annex 3; and

prepare a report for submission to NAV 52.