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;

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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.

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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.

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.

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[*]IEC Publication 945 (see Appendix 1).

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

6.3.1   Transferred radar information may contain both the radar image and ARPA information.

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

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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:

    .1   route planning and supplementary navigation tasks;

    .2   route monitoring.

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[*]Appendix 2 to IHO Special Publication S-52 (see Appendix 1).

[**]IEC Publication 1174.

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).

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.

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*Appendix 2 to IHO Special Publication S-52.

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

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.

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*IEC Publication 1162.

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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

16   Position and time of "wheelover"

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*See IEC Publication 1174.

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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

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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.