

Paper for Consideration by ENCWG 8

Proposed New Editions of S-52 & S-64 to support Dual Fuel S-100 ECDIS

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Executive Summary:	The new IMO S-100 ECDIS performance standard has introduced new requirements for the presentation of ENC to take into account the accuracy of the hydrographic information. The requirement extends to both the S-100 and S-57 modes of the ECDIS (Dual Fuel mode).
Related Documents:	Resolution MSC.530(106) & Resolution MSC.232(82). performance standards for ECDIS S-57 Supplement No. 3 (Edition 3.1.3) June 2014 S-52 PresLib 4.0.3

Introduction / Background

The new S-100 ECDIS performance standard has introduced a requirement for the Mariner to be able to select the ECDIS indication highlight has taken into account the underlying accuracy of the hydrographic information. This requirement equally applies to both S-57 and S-100 datasets. (See Annex A)

Analysis / Discussion

There is currently no guidance in S-52 or S-100 on how this should be implemented by the OEMs. The current edition of S-52 PresLib 4.0.3 - 10.5.9 Detection and Notification of Navigational Hazards & 10.5.10 Detection of Areas, for which Special Conditions Exist & 10.5.12 Detection of Safety Contour specifies the S-57 object classes and their geometric primitives that should raise an alarm or indication based on requirements in the IMO Performance Standard for ECDIS MSC.232(82).

Within the IHO standard S-57 there are various object classes and attributes that deal with accuracy. Quality of data (M_QUAL) is an area on an ENC where a uniform assessment of the quality of the data exists. This meta object must form continuous coverage across all areas of bathymetry. The attribute Category Zone Of Confidence (CATZOC) assigns a single value to an area based on a number of parameters. Supplement No. 3 (Edition 3.1.3) June 2014 details the Zone Of Confidence (ZOC) table, which contains all the necessary parameters to assign ZOC values. Depth and position accuracies specified for each ZOC category refer to the errors of the final depicted soundings and include not only survey errors but also other errors introduced in the chart production process.

A CATZOC category indicates that the depths encoded within a M_QUAL area meet the minimum criteria described in the CATZOC definition table. A CATZOC category may be further sub-divided by specifying depth and positional accuracy, and sounding technique, using the attributes POSACC, SOUACC and TECSOU, within separate M_QUAL areas.

The meta object Accuracy of data (M_ACCY) can be used to provide an overall accuracy of position for all non-bathymetric features. It must not be used to provide the accuracy of bathymetric information.

Unsurveyed areas do not have to have an M_QUAL coverage.

Considerations

Based on the new IMO requirement IHO should detail in their standards how the accuracy/uncertainty objects and attributes from the ENC data should be taken into consideration.

Based on the IMO requirements it is not considered necessary for the IHO to bring into scope accuracy of non-bathymetric data.

Recommendations

In order for OEMs to meet this new IMO requirement it is recommended that a New Edition of S-52 Presentation Library be created exclusively for the creation and type approval of an S-100 ECDIS against IMO MSC.530(106)

The current sections in S-52 related to indications and alarms must be updated to include references or extracts from the S-57 ZOC table. POSACC on the M_QUAL objects must be also considered when available.

It has been noted that CATZOC D and U have no numerical way of determining the accuracy, therefore its recommended S-52 prescribe a permanent indication on the ECDIS screen informing the user that no determination of accuracy can be made due to the unavailability of the underlying accuracy data.

All clauses in S-52 which reference the old IMO performance standard MSC.232(82) need updating.

A new set of tests in S-164 must be added to ensure ECDIS can take into account the accuracy of the hydrographic data in passage planning and monitoring modes of use, the tests must cover both S-57 and S-101 ENCs.

Action Required of ENCWG

The ENCWG is invited to:

- a. Discuss the details within the paper
- b. Agree to the recommendations and task the S-52 subgroup to draft the required changes
- c. Draft impact study for HSSC recommending a NE of S-52

Annex A

PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEMS (ECDIS) RESOLUTION MSC.530(106)

Route Planning

11.3.4 A graphical indication is required if the mariner plans a route closer than a user-specified distance from own ship's safety contour.

11.3.5 A graphical indication should be given if the mariner plans a route closer than a user-specified distance from the boundary of a user-selectable category of prohibited area or geographic area for which special conditions exist (see appendix 4). A graphical indication should also be given if the mariner plans a route closer than a user-specified distance from a user-selectable category of point objects, such as a fixed or floating aid to navigation or isolated danger. The user-selectable categories should be the same as the user selections for the display of objects and be based on IHO standards. There should be a permanent indication when any user-selectable categories are deselected. Details of the deselection should be available on demand.

11.3.6 It should be possible for the mariner to select that the indications of 11.3.4 and 11.3.5 take into account accuracy information of relevant hydrographic information, as defined by IHO standards.

Route Monitoring

11.4.3 It should be possible to select that ECDIS gives an alarm and related graphical indication if, within a specified time or distance set by the mariner, own ship will pass closer than a user-selected distance from the safety contour. There should be a permanent indication when the safety contour alarm is deselected.

11.4.4 ECDIS should give a warning or caution, or indication, as selected by the mariner, and related graphical indication if, within a specified time or distance set by the mariner, own ship will pass closer than a user-selected distance from the boundary of a user-selectable category of prohibited area or of a geographical area for which special conditions exist (see appendix 4). The user-selectable categories should be the same as user selections for the display of objects and be based on IHO standards. There should be a permanent indication when any user-selectable categories are deselected. Details of the deselection should be available on demand.

11.4.6 ECDIS should give a warning or caution or indication as selected by the mariner and related graphical indication 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 user-selectable category of danger (e.g. obstruction, wreck, rock) that is shallower than the mariner's safety contour or a user-selectable category of aid to navigation. The user-selectable categories should be the same as user selections for the display of objects and be based on IHO standards. There should be a permanent indication when any of the user-selectable categories are deselected. Details of the deselection should be available on demand.

11.4.7 A graphical indication should be given if the current or the next leg of the selected route passes closer than a user-specified distance from the safety contour.

11.4.8 A graphical indication should be given if the current or the next leg of the selected route goes closer than a user-specified distance from the boundary of a user-selectable category of prohibited area or a geographic area for which special conditions exist (see appendix 4). A graphical indication should also be given if the selected route goes closer than a user-specified distance from a user-selectable category of point objects, such as a fixed or floating aid to navigation or isolated danger. The user-selectable categories should be the same as user selections for the display of objects and be based on IHO standards

11.4.9 It should be possible for the mariner to select that the indications of 11.4.3, 11.4.4, 11.4.6, 11.4.7 and 11.4.8 take into account accuracy information of relevant hydrographic information, as defined by IHO standards.

ANNEX B ZOC table

ZOC Table:

1	2	3		4	5
ZOC ¹	Position Accuracy ²	Depth Accuracy ³		Seafloor Coverage	Typical Survey Characteristics ⁵
A1	± 5 m + 5% depth	= 0.50 + 1%d		Full area search undertaken. Significant seafloor features detected ⁴ and depths measured.	Controlled, systematic survey ⁶ high position and depth accuracy achieved using DGPS or a minimum three high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 0.6 ± 0.8 ± 1.5 ± 10.5		
A2	± 20 m	= 1.00 + 2%d		Full area search undertaken. Significant seafloor features detected ⁴ and depths measured.	Controlled, systematic survey ⁶ achieving position and depth accuracy less than ZOC A1 and using a modern survey echosounder ⁷ and a sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 1.2 ± 1.6 ± 3.0 ± 21.0		
B	± 50 m	= 1.00 + 2%d		Full area search not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey achieving similar depth but lesser position accuracies than ZOCA2, using a modern survey echosounder ⁵ , but no sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 1.2 ± 1.6 ± 3.0 ± 21.0		
C	± 500 m	= 2.00 + 5%d		Full area search not achieved, depth anomalies may be expected.	Low accuracy survey or data collected on an opportunity basis such as soundings on passage.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 2.5 ± 3.5 ± 7.0 ± 52.0		
D	worse than ZOC C	Worse Than ZOC C		Full area search not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality assessed due to lack of information.
U	Unassessed - The quality of the bathymetric data has yet to be assessed				