

Transition to S-100 based ECDIS

January 2024

Position summary

CIRM members foresee many benefits to the mariner through the incorporation of data products from the S-100 series into navigational equipment, and CIRM is actively supporting the transition to S-100 based ECDIS.

In accordance with the phased installation timeline specified in MSC.530(106), ECDIS manufacturers are ready and willing to bring S-100 capable ECDIS to market, however their ability to do so is dependent on the finalisation of the related IHO and IEC standards and the availability of robust test data. Furthermore, the availability of production data with adequate coverage and at a price the market is willing to pay will be essential to ensuring that the full benefits of S-100 based ECDIS are realised.

The length of the dual-fuel mode period, during which ECDIS will have to support both S-57 and S-101 format ENC's, should be limited. IHO should set an end date for the provision of ENC's in S-57 format and subsequently inform IMO of this decision, because such an end date will limit the ongoing maintenance cost of legacy systems whilst incentivising the global transition to S-100 based ECDIS.

Background

Development of S-100

The International Hydrographic Organization (IHO) maintains, amongst others, IHO standard S-57, the current transfer standard for digital hydrographic content. S-57 has been used for official Electronic Navigational Charts (ENCs) since November 1995.

IHO's S-100 Universal Hydrographic Data Model was adopted by the IMO in 2011 as the basis for technical harmonization of data services providing navigation-related information exchange. The next generation of ECDIS will be built upon S-100, which comprises a number of critical framework standards:

- S-98 Data Product Interoperability in S-100 Navigational Systems
- S-100 Universal Hydrographic Data Model
- S-128 Catalogue of Nautical Products
- S-164 Test Data Set for S-100 and ECDIS Type Approval

The IHO has released its new transfer standard, S-101 (*Electronic navigational chart product specification*), now at version 1.1.0, with the stated intent that S-101 ENC's will eventually replace S-57 ENC's.

Numerous other S-100 navigation-related product specifications are under development, with the intention that the associated data products will be made available for incorporation into S-100 capable ECDIS supplementary to the base S-101 ENC. The IHO has grouped these other product specifications into two categories:

Step 1 - Navigational Route Monitoring Mode includes:

- S-101 ENC;
- S-102 Bathymetric Surface Product Specification;
- S-104 Water Level Information for Surface Navigation Product Specification;
- S-111 Surface Currents Product Specification;
- S-124 Navigational Warnings; and
- S-129 Under Keel Clearance Management.

Step 2 - Navigational Route Planning Mode includes:

- S-122 Marine Protected Areas;
- S-123 Marine Radio Services;
- S-125 Marine Aids to Navigational (AtoN);
- S-126 Marine Physical Environment;
- S-127 Marine Traffic Management;
- S-131 Marine Harbour Infrastructure;
- S-411 Ice Information (WMO); and
- S-412 Weather and Wave Hazards (WMO).

IHO's implementation roadmap for S-100 product specifications

Document 80/1088/INF, submitted by the IHO to the 2023 plenary meeting of IEC Technical Committee 80, contains an updated roadmap (dated 09 July 2023), which indicates that:

- the critical framework standards S-98, S-128 and S-164 will all have entered the implementation phase by the beginning of 2025 (with S-100 itself being operational already);
- S-101 will have entered the implementation phase by the beginning of 2025;
- all six S-100 product specifications grouped under "Step 1 - Navigational Route Monitoring Mode" will also have entered the implementation phase by the beginning of 2025; and
- three of the S-100 product specifications grouped under "Step 2 - Navigational Route Planning Mode" will enter the implementation phase at the beginning of 2026, with the others still in approval, development or preliminary implementation.

Revision of ECDIS Performance Standards to introduce support for S-100

In November 2022 the IMO's Maritime Safety Committee adopted Resolution MSC.530(106) *Performance standards for Electronic Chart Display and Information Systems (ECDIS)*, which introduces a requirement for ECDIS to support S-100.

MSC.530(106) includes a phased timeline for new installations of ECDIS, whereby from 1 January 2026 a new ECDIS may conform with MSC.530(106) and from 1 January 2029 a new ECDIS must conform with MSC.530(106). IMO did not specify a timeline for updating in-service ECDIS.

Revision of ECDIS testing standard IEC 61174

IEC 61174, the testing standard for ECDIS, is currently undergoing revision in order to enable manufacturers to develop, test and type approve S-100 capable ECDIS. Completion of the new edition (5.0) is dependent on the completion of related IHO S-100 framework standards including but not limited to S-164.

Dual-Fuel Concept for S-100 capable ECDIS

As defined by the IHO, the “dual-fuel mode” of operation for S-100 capable ECDIS will require the ECDIS to use ENC’s in both S-57 and S-101 formats. It is viewed by IHO as an essential step in the transition from S-57 to S-100 based ECDIS, and is provided for in MSC.530(106).

The IHO has developed and approved a dual-fuel governance document, entitled “Dual-Fuel Concept for ECDIS”, which sets out the rationale for dual-fuel mode during the transition phase, the essential elements it requires from all partners within the data chain, and any gaps still existing within the standards and supporting framework.

The governance document notes that “No formal description, timescale or sequence of events has yet been put forward for how S-57 is actually phased out at the end of the transition period.”

Discussion on the transition to S-100 based ECDIS

Completion of S-100 standards

As ready and willing as they are to bring S-100 capable ECDIS to the market, ECDIS manufacturers are unable to do so until the related standards and product specifications are available, along with their associated test data.

This includes operational editions of the IHO’s critical framework standards and the associated test data (S-98, S-128, S-164), and the published version of IEC 61174 edition 5.0. It also includes all IHO product specifications grouped under Step 1.

Document 80/1088/INF references the test bed programmes listed on IHO’s S-100 Resources webpage. These test bed programs provide an important opportunity to validate the S-100 framework and product specifications, successful completion of which is a prerequisite for the avoidance of anomalies when S-100 data products start to be used for navigation on an ECDIS.

Availability of S-100 data

CIRM’s view is the main drivers behind moving to an S-100 based ECDIS are the possibilities associated with the integration of the datasets/overlays provided through those S-100 product specifications over and above the ENC Product Specification S-101. Therefore, availability of these additional data products at a price the market is willing to pay is essential to ensuring that the full benefits of an S-100 based ECDIS are realised - meaning both availability across the globe and across different product specifications.

Length of dual-fuel period

For the duration of the dual-fuel period manufacturers will be required to support both S-57 and S-101 ENC’s in their ECDIS systems. Such dual support will incur additional cost through increased type approval burden and ongoing maintenance of legacy systems, and so the length of the dual-fuel period must be limited.

CIRM's view is that IHO should decide upon a realistic end date for the provision of S-57 ENC's, following which only S-101 ENC's would be provided, and subsequently inform IMO of this decision. This would provide an end date for the dual-fuel mode period, limiting the cost of maintaining legacy systems and expediting the global transition to S-100 based ECDIS.

CIRM position on the transition to S-101 ENC's in ECDIS

CIRM holds the following positions:

- The ability for manufacturers to bring S-100 capable ECDIS to market in accordance with the phased installation timeline specified in MSC.530(106) is wholly dependent on the **availability of the related standards and product specifications, along with their associated test data**. This includes the IHO critical framework standards, the IHO product specifications included under Step 1 and IEC 61174 edition 5.0.
- **Availability of live S-100 data** at a price the market is willing to pay will be essential to ensuring that the full benefits of an S-100 based ECDIS are realised - meaning both availability across the globe and across different product specifications.
- **IHO should decide upon an end date for the provision of S-57 ENC's**, following which only S-101 ENC's would be provided by Hydrographic Offices, and subsequently inform IMO of this decision. Such an end date will limit the cost burden on manufacturers and shipowners incurred by support for "dual-fuel mode" and incentivise the wider global implementation of S-100. CIRM's view is that the precise end date needs to be discussed thoroughly between all stakeholders before being agreed upon.
- **Successful completion of the S-100 test bed programs** is a prerequisite for the avoidance of anomalies when S-100 data products start to be used for navigation on an ECDIS.

