ECDIS Regulations

2

2 ECDIS Regulations

2.1 The IHO

The International Hydrographic Organization (IHO) is an intergovernmental consultative and technical organisation. Established in 1921, the IHO aims to ensure that the world's seas, oceans and navigable waters are surveyed and charted with adequate hydrographic data, products and services.

The IHO sets the technical standards related to the digital data format, specifications for ECDIS content and display and data protection.

The IHO standards have been revised several times since ECDIS was introduced to meet the revised ECDIS Performance Standards adopted by the International Maritime Organization (IMO) and also to improve how the chart data is displayed in ECDIS.

IHO Special Publication 52 (S-52) provides specifications and guidance regarding the issuing and updating of electronic navigational charts (ENC) and their display in ECDIS in terms of symbols and colours.

IHO Special Publication 57 (S-57) includes a description of the data format, product specification for the production of ENC data and an updating profile.

IHO Special Publication 63 (S-63) describes the IHO recommended standard for the protection of ENC data.

IHO Special Publication 64 (S-64) contains test data sets for ECDIS.

IHO S-52, S-57 and S-63 are specified in the IMO Performance Standards for ECDIS.

2.2 International Electrotechnical Commission (IEC)

The International Electrotechnical Commission (IEC) is a worldwide organisation for standardisation comprising all national electro-technical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardisation in the electrical and electronic fields. In addition to its other activities, the IEC publishes international standards, technical specifications, technical reports, publicly available specifications (PAS) and guides.

IEC 61174 is used as the basis for type-approval/recognition by maritime safety administrations for an IMO compliant ECDIS.

This international standard specifies the performance requirements, methods of testing and required test results of ECDIS equipment conforming to performance standards adopted by IMO Resolution MSC.232(82).

This standard is also based upon the performance standards of IHO special publications S-52, S-57, S-61, S-63 and S-64.

S-52, S-57 and S-63 are discussed in depth later in Section 4.6 as they are critical to the ECDIS operator's understanding.

These performance standards apply to ECDIS when navigating in ECDIS mode of operation, ECDIS in RCDS mode of operation and ECDIS back-up arrangements. The standards also apply the requirements for structure and format of the chart data, encryption of chart data, as well as the presentation of chart data.

The IEC specifies the performance requirements, methods of testing and required test results of equipment conforming to performance standards adopted by IMO Resolution MSC.232(82).

2.3 International Maritime Organization (IMO)

The IMO is responsible for the international improvement of navigational safety at sea. Since 1959, a whole series of measures has been introduced in the form of conventions, recommendations and other instruments. The best known and most important of these measures are the conventions, three of which are particularly relevant to navigation. These are the International Convention for the Safety of Life at Sea, 1974 (SOLAS), the Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS), and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW).

A specialised agency of the United Nations, the IMO is based in the United Kingdom with around 300 international staff. The IMO's specialised committees and sub-committees are the focus for the technical work to update existing legislation or develop and adopt new regulations, with meetings attended by maritime experts from represented Member Governments, together with those from interested intergovernmental and non-governmental organisations.

The IMO conventions that are significant for ECDIS are SOLAS, STCW and ISM, all of which are applicable under Port State Control (PSC) inspection measures. Any changes to these take time to come about and enter force. The interpretation of any change must also be addressed by flag States, so it is common for there to be varying stages of understanding and guidance.

Performance standards for electronic charts were adopted in 1995 by Resolution A.817(19), which was amended by Resolution MSC.232(82).

An ECDIS complies with the IMO regulations and can be used as an alternative to paper nautical charts. To legally comply with IMO regulations, an ECDIS must receive type approval, which is typically conducted by recognised organisations or marine Classification Societies nominated by flag States.

The mandatory carriage of ECDIS depends on ship type, size and construction date. IMO Resolution MSC.282(86) amends SOLAS Reg V/19 to include a new paragraph 2.10 detailing an ECDIS carriage requirement on certain kinds of ships engaged on international voyages.

2.3.1 IMO Resolution MSC.232(82)

In accordance with MSC.232(82), an ECDIS must:

- Display SENC and all other chart information, as deemed necessary by HOs for safe navigation
- manage and record for review all new editions and chart corrections issued post installation of the base discs
- indicate the scale of the ENC and whether RCDS mode/a paper chart is required
- be capable of north up and true motion
- use IHO symbology
- carry out route planning and warn of dangers, as discussed in Section 5.23
- carry out route monitoring and warn as discussed in Section 5.24
- carry out and preserve the voyage recording of the previous 12 hours

- be connected to a continuous position-fixing system (often GNSS)
- be connected to a gyro or marine transmitting heading device
- be connected to a speed and measuring device.

The ECDIS operator must ensure that the ECDIS equipment meets, as a minimum, the above capabilities.

2.4 CIRM

CIRM is the principal international association for marine electronics companies. They provide services and publications related to marine electronics. The CIRM performance test procedure is provided in Annex B of this manual, along with further guidance to ensure onboard equipment remains both effective and approved. In 2018 the joint Paris and Tokyo MOU Concentrated Navigation Inspection Campaign showed 53 observations where ECDIS equipment was not functioning in accordance with the IMO and SOLAS regulations. There were also further observations due to failing equipment.

2.5 Date Changes in Performance Standards

IMO Resolution MSC.232(82) concerns Adoption of the Revised Performance Standards for ECDIS. It supersedes Resolution A.817(19), recognising the need for improvement in performance standards to ensure the operational reliability of ECDIS equipment and to take into account the technological progress and experience gained.

Resolution MSC.232(82) recommends that Governments ensure that ECDIS equipment:

1. If installed on or after 1 January 2009, conforms to performance standards not inferior to those specified in the Annex to the present resolution, MSC.232(82).
2. If installed on or after 1 January 1996 but before 1 January 2009, conforms 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).

2.6 IMO Circulars

IMO Circulars are documents that provide guidance and best practice on a particular subject. Safety of Navigation (ECDIS related) IMO Circulars include:

- IMO Circular 10 – Interim guidance on training and assessment in the operational use of ECDIS simulators
- IMO Circular 18 – ECDIS training
- IMO Circular 207 – Differences between RCDS and ECDIS
- IMO Circular 213 – Guidance on chart datums and the accuracy of positions on charts
- IMO Circular 266 – Maintenance of ECDIS software
- IMO Circular 276 – Transitioning from paper chart to ECDIS navigation
- IMO Circular 1179 – Deficiencies in hydrographic surveying and nautical charting worldwide and their impact on safety of navigation and protection of the marine environment
- IMO Circular 1391 – Operating anomalies identified within ECDIS
- IMO Circular 312 – Operating anomalies identified within ECDIS (supplement to IMO Circular 1391).

2.7 Safety of Life at Sea (SOLAS) Convention

The International Convention for the Safety of Life at Sea (SOLAS 1974), specifies the requirements for the navigational equipment to be used on board ships entitled to fly the flag of a party to the Convention. The Convention is frequently amended following Resolutions agreed and issued at the Maritime Safety Committee of the IMO.

Some commonly asked ECDIS questions are all answered within SOLAS. These include:

What must a ship use to 'navigate'?

> *"All ships irrespective of size shall have: nautical charts and nautical publications to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage. An electronic chart display and information system (ECDIS) is also accepted as meeting the chart carriage requirements of this subparagraph ..."*
>
> SOLAS V, Reg 19.2.1.4

What and who produces a 'nautical chart or publication'?

> *"Nautical chart or nautical publication is a special-purpose map or book, or a specially compiled database from which such a map or book is derived, that is issued officially by or on the authority of a Government, authorized Hydrographic Office or other relevant government institution and is designed to meet the requirements of marine navigation."*
>
> SOLAS V, Reg 2.2

What exactly is an 'ECDIS'?

> *"... for an electronic chart display and information system (ECDIS) to be accepted as satisfying the chart carriage requirement of regulation 19.2.1.4, that system shall conform to the relevant performance standards..."*
>
> SOLAS V, Reg 18.4

What are the IMO 'performance standards'?

> *"Recommendation on performance standards for electronic chart display and information systems (ECDIS) (resolution A.817(19) as amended). Systems and equipment required to meet the requirements of regulations 19 and 20 shall be of a type approved by the Administration."*
>
> SOLAS V, Reg 18

Although all ships over 500 GT must comply with ECDIS carriage requirements, this does not mean that they must go 'paperless' and navigate using the ECDIS as a replacement for paper charts.

A ship may remain a 'paper ship' and use the ECDIS as another navigational aid. The decision to replace the paper chart with the ECDIS is still down to the shipowner. However, flag State legislation will ultimately govern how ECDIS fitted ships employ the system.

Should a shipowner want to adopt 'paperless' navigation and use ECDIS as the primary means of navigation (PMN), the transition must be approved by the flag State, who will issue new certification.

An ECDIS running with ENCs only ('ECDIS mode') must have a back-up that meets or exceeds performance standards. Generally, this means a duplicate ECDIS system, although many ships run two different systems, which still complies with the SOLAS requirement.

Back-up in RCDS mode requires adequate paper charts.

IMO performance standards therefore require that the *'overall system' includes both a primary ECDIS and an adequate independent back-up arrangement that provides:*

- *Independent facilities enabling a safe take over of the ECDIS functions in order to ensure that a system failure does not result in a critical situation; and*
- *A means to provide for safe navigation for the remaining part of the voyage in case of ECDIS failure."*

However, there are various interpretations as to what are the minimum functional requirements or what constitute 'adequate' back-up arrangements.

There are two commonly accepted options:

- A second ECDIS, connected to an independent power supply and a separate GNSS position input
- an appropriate up to date folio of official paper charts for the intended voyage.

Back-up arrangements are covered in more detail Section 5.24.10.

In accordance with SOLAS, the IMO routinely reviews ECDIS standards and publishes updates. They recommend that governments ensure that all ECDIS equipment conforms to performance standards set in amendments made to Resolution A.817(19), the latest being MSC.232(82). An ECDIS must also meet IHO hydrographic data transfer standards (currently S-57), IHO chart content and display parameters S-52, the latest being PL 4.0, and IEC performance and testing standards.

Once a new ECDIS is type approved and fitted, it is important to ensure that the manufacturer continues to provide support by updating either the hardware or software. This is to remain legal according to the ship's requirements and the latest performance standards.

All ECDIS operators should understand and ensure compliance with the following four SOLAS Regulations. Breach of these regulations will result in the ECDIS not working as it was originally intended. Furthermore, it may result in an observation or detention for the ship.

2.7.1 SOLAS Ch V, Regulation 2, Part 2

"Nautical chart or nautical publication is a special purpose map, or book, or a specially compiled database from which such a map or book is derived, that is issued officially by or on the authority of a Government, authorised Hydrographic Office or other relevant government institution and is designed to meet the requirements of marine navigation."

2.7.2 SOLAS Ch V, Regulation 19, Part 2.1.4

"All ships, irrespective of size, shall have nautical charts and nautical publications to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage. An electronic chart display and information system (ECDIS) may be accepted as meeting the chart carriage requirements of this subparagraph."

2.7.3 SOLAS Ch V, Regulation 19, Part 2.1.5

"All ships, irrespective of size, shall have back-up arrangements to meet the functional requirements of Regulation 19 Part 2.1.4, if this function is partly or fully fulfilled by electronic means."

An appropriate folio of paper nautical charts may be used as a back-up arrangement for ECDIS. Other back-up arrangements for ECDIS are available (see IMO Resolutions A.817(19) and MSC.232(82)).

2.7.4 SOLAS Ch V, Regulation 27

"Nautical charts and nautical publications, such as sailing directions, list of lights, notices to mariners, tide table and all other nautical publications necessary for the intended voyage, shall be adequate and up to date."

Most ships still satisfy carriage requirements for charts and publications by the use of paper products, but amendments to SOLAS regulations that came into force in July 2002 allow these carriage requirements to be satisfied solely by electronic means where a suitable back-up is provided.