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Working Party on Inland Water Transport
(Forty-fifth session, 23-25 October 2001,
agenda item 7(d))

**ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM
FOR INLAND NAVIGATION (INLAND ECDIS)**

Note by the secretariat

The Working Party, at its twenty-second session, was informed of the work which had been carried out within the European Union on the elaboration of the Inland ECDIS Standard compatible with relevant existing standards of the International Hydrographic Organization (IHO) and of the International Maritime Organization (IMO), and took note of the Inland ECDIS Standard as adopted by CCNR for use on the river Rhine. The Working Party felt that the standard could be recommended for use in all UNECE countries concerned with inland navigation and requested the secretariat to transmit the text of a relevant draft resolution, as proposed by the delegation of Austria, to the Working Party on Inland Water Transport for consideration and adoption. The secretariat was requested also to issue the Inland ECDIS Standard as a formal UNECE document for consideration by the Working Party SC.3 (TRANS/SC.3/WP.3/44, paras. 28 and 29).

Reproduced below is the text of the draft resolution of the Working Party on Inland Water Transport concerning the Electronic Chart Display and Information System for Inland Navigation with the Inland ECDIS Standard annexed to it for consideration and adoption by the Working Party SC.3.

**RECOMMENDATION ON ELECTRONIC CHART DISPLAY AND
INFORMATION SYSTEM FOR INLAND NAVIGATION (INLAND ECDIS)**

Resolution No. ...

(adopted by the Working Party on Inland Water Transport
on .. October 2001)

The Working Party on Inland Water Transport,

Noting the development of electronic charts for inland navigation and the necessity to have a harmonized standard for these charts in Europe to enable international transport to use charts of different countries with the same equipment of hardware and software,

Bearing in mind the existing standard of IHO and IMO for Electronic Chart Display and Information Systems (S-52 and S-57) for maritime navigation and the desirability of compatibility in areas of mixed traffic, where inland navigation as well as seagoing vessels are navigating,

Noting also the development of an ECDIS-compatible Inland ECDIS standard by the European Union and the decision of the Central Commission for the Navigation of the Rhine on the implementation of the Inland ECDIS standard,

Recommends Governments, intergovernmental organizations, regional economic integration organizations, river commissions and private entities to apply the Inland ECDIS Standard reproduced in the annex to this resolution for the production of electronic charts for inland navigation,

Recommends Governments to bring their national legislation concerning navigation by inland waterway in accordance with the Inland ECDIS Standard,

Invites Governments to keep the secretariat informed of the measures taken with a view to the introduction of the Inland ECDIS Standard, specifying the inland waterways concerned,

Requests the Executive Secretary of the Economic Commission for Europe to periodically include the question of application of this resolution in the agenda of the Working Party on Inland Water Transport.

Annex

Electronic Chart Display and Information System for Inland Navigation (Inland ECDIS)

Preface

1. Reflections and experiments have been made in several countries of the European Union (EU) to use telematics for the support of inland navigation. This aim was in particular pursued within the scope of the EU research and development project INDRIS. A pilot project on the river Rhine was launched in Germany in 1998 named ARGO. In ARGO and INDRIS systems, the radar image on the display in the boatmaster wheelhouse is overlaid by an electronic chart. This is an approach aimed at a higher safety and efficiency in inland navigation.

2. In the course of discussions it turned out that only an internationally-agreed approach would be successful, since a boatmaster cannot be expected to employ different equipment in each country. This was the reason why the internationally-introduced *Electronic Chart Display and Information System (ECDIS)* - originally developed for maritime navigation - came into view also for inland navigation. The IMO-, IHO- and IEC¹-Standards for ECDIS were introduced in their latest versions in 1996. ECDIS is a well-matured system now. The idea was to adopt ECDIS for inland navigation and to supplement some distinct inland features but not to change the original ECDIS standard. In this way, it will be possible to have compatibility between the original - Maritime - ECDIS and Inland ECDIS. This is important for the estuaries of the rivers, where sea vessels as well as inland vessels navigate.

3. The *Concerted Action on Inland Navigation*, an institution of the Fourth Framework Programme for Transport Research and Development of the European Union, set up a Working Group and an Inland ECDIS Expert Group in 1998 for the development of the Inland ECDIS Standard. The experience gained within ARGO and INDRIS projects had to be taken as a basis for the new standard.

4. The Expert Group submitted its first proposal on 1 January 1999.

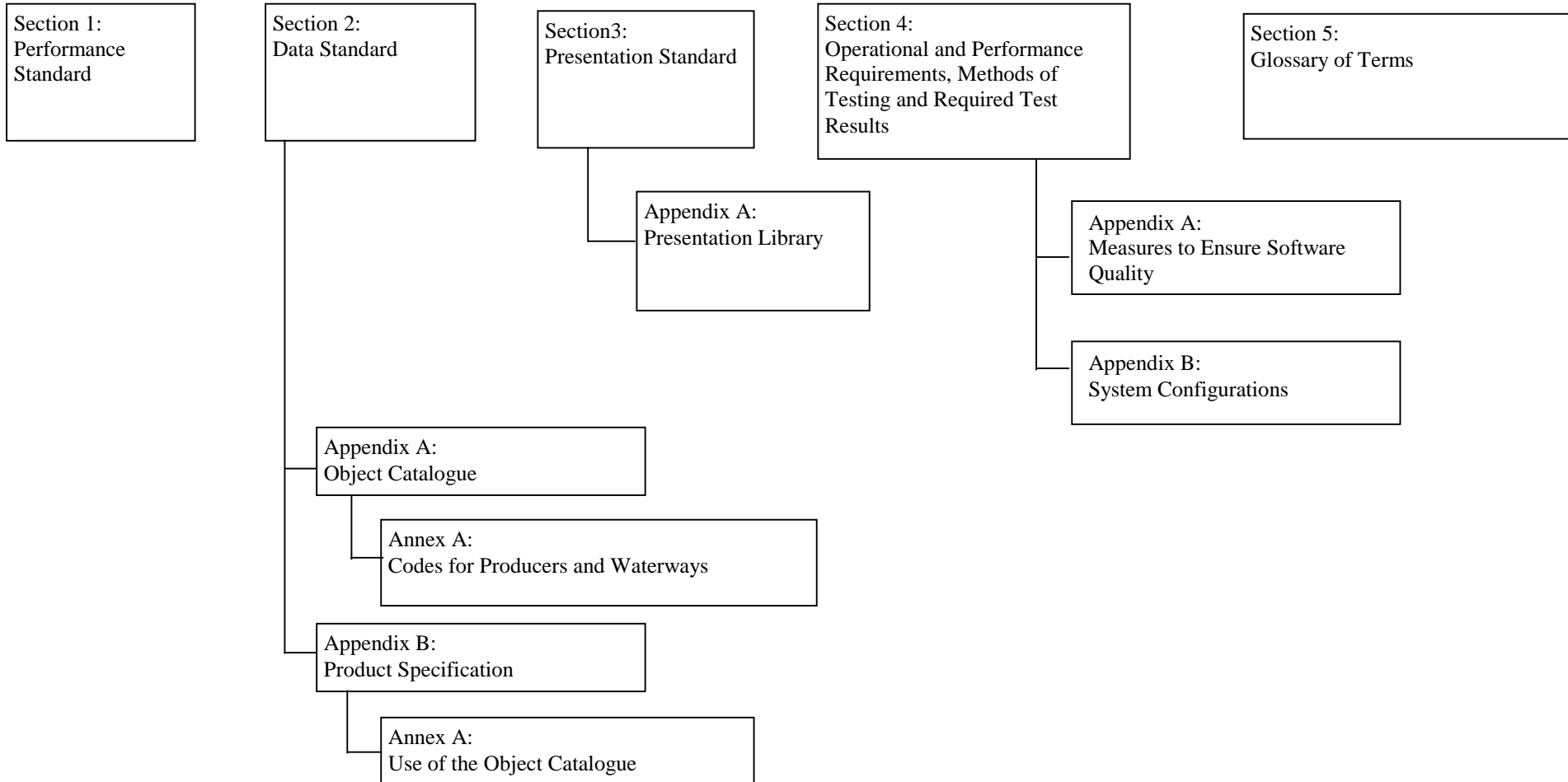
5. In the year 2000, the Central Commission for the Navigation of the Rhine (CCNR) set up an Ad hoc Working Group for Inland ECDIS with a mandate to draft the Inland ECDIS Standard of the CCNR.

6. The Ad hoc Working Group started with the consideration of results of work of the Expert Group as a basis for their further work.

¹ IMO means International Maritime Organization; IHO means International Hydrographic Organization and IEC means International Electrotechnical Commission.

7. Since the Fourth Framework Programme of the European Union ended in the year 2000, the Expert Group reported to the Ad hoc Working Group of the CCNR afterwards.

Structure of the Inland ECDIS Standard



SECTION 1

Performance Standard for Inland ECDIS

1. Introduction (Primary Functions and Performance)

- (a) Inland ECDIS shall contribute to safety and efficiency of inland shipping and thereby to the environment protection.
- (b) Inland ECDIS shall reduce the navigational workload as compared to traditional navigation and information methods.
- (c) Inland ECDIS (Operating System Software, Application Software and Hardware) shall have a high level of reliability and availability at least of the same level as other means of navigation, for the navigation mode as specified in Section 4 of this standard.
- (d) Inland ECDIS can be designed for information mode only or for both, information mode and navigation mode.
- (e) Inland ECDIS shall use chart information as specified by Sections 2 and 3 of this Standard.
- (f) Inland ECDIS shall facilitate simple and reliable updating of the Inland ENC.
- (g) Inland ECDIS shall provide appropriate alarms or indications with respect to the information displayed or malfunction of the equipment.
- (h) Inland ECDIS shall meet the requirements of this performance standard.

2 Definitions

2.1 Terms (see also section 5 of this Standard: Glossary of Terms)

For the Inland ECDIS performance standard the following definitions will apply:

- (a) **Inland ECDIS** means an electronic chart display and information system for inland navigation, displaying selected information from an Inland System Electronic Navigational Chart (Inland SENC) and, optionally, information from other navigation sensors.
- (b) **Inland Electronic Navigational Chart (Inland ENC)** means the database, standardized as to content, structure and format, issued for use with Inland ECDIS. The Inland ENC complies to the IHO standards S-57 and S-52, enhanced by the additions and clarifications of this standard for Inland ECDIS. The Inland ENC contains all essential chart information and may also contain supplementary information that may be considered as helpful for navigation.
- (c) **Inland System Electronic Navigational Chart (Inland SENC)** means a database, resulting from the transformation of the Inland ENC by Inland ECDIS, for appropriate use, updates to the Inland ENC by appropriate means and other data added by the boatmaster. It is

this database that is actually accessed by the Inland ECDIS for the display generation and other navigational functions. The Inland SENC may also contain information from other sources.

(d) Minimum Information Density (display base) means the minimum amount of SENC information that is presented and which cannot be reduced by the operator, consisting of information that is required at all times in all geographic areas and under all circumstances.

(e) Standard Information Density (standard display) means the default amount of SENC information that shall be visible when the chart is displayed on Inland ECDIS first.

(f) All Information Density (all display) means the maximum amount of SENC information. Here, in addition to the standard display, also all other objects are displayed, individually on demand.

(g) User-defined settings means the possibility to use and store a profile of display- and operation controls-settings.

(h) Integrated Display means a head-up, relative-motion picture consisting of the SENC overlaid with the radar-image with matching scale, offset and orientation.

(i) Navigation Mode means the use of the Inland ECDIS for conning the vessel with overlaid radar image.

(j) Information Mode means the use of the Inland ECDIS for information purposes only without overlaid radar image.

2.2 References

(a) Publication No. S-57 "IHO Transfer Standard for Digital Hydrographic Data", third edition, November 1996.

(b) IHO Special Publication No. S-52 "Specifications for Chart Content and Display Aspects of ECDIS", 5th edition, December 1996, including:

- S-52 Appendix 1 "Guidance on Updating the Electronic Chart", third edition, July 1997,
- S-52 Appendix 2 "Provisional Colour and Symbol Specifications for ECDIS", first edition, February 1991 and
- S-52 Appendix 3 "Glossary of ECDIS-related Terms", second edition, September 1993

(c) IMO Resolution A.817(19) "Performance Standards for Electronic Chart Display and Information Systems (ECDIS)", November 1995.

(d) IEC-Guideline 1174 "ECDIS - Operational and performance requirements, methods of testing and required test results", December 1996.

(e) CCNR resolutions 1989-II-33, 34 and 35 (Minimum requirements, test conditions, installation and performance testing of radar equipment and rate-of-turn indicators for Rhine navigation).

3 Contents, Provision and Updating of Chart Information

3.1 Contents and Provision of Inland ENC's

(a) The chart information to be used in Inland ECDIS shall be the latest edition of information.

(b) Provisions shall be made to prevent the user from altering the contents of original Inland ENC editions.

(c) If the chart is intended to be used for navigation mode (ch. 5.2), at least the following objects have to be included in the ENC:

- bank of waterway (at mean water level)
- shoreline construction (groyne, longitudinal control dam)
- contours of locks and dams
- boundaries of the fairway (if defined)
- isolated dangers in the fairway under water
- isolated dangers in the fairway above water level, such as bridges, overhead wires, etc.
- buoys, beacons, lights, notice marks
- waterway axis with kilometres and hectometres

(d) If the chart is intended to be used for navigation mode (ch 5.2), the government-authorized authority decides for each waterway which of the above named objects have to be verified by the authority.

3.2 Updates

(a) Inland ECDIS shall be capable of accepting updates to the Inland ENC data provided in conformity with the agreed standards. These updates shall be applied to the SENC automatically. The implementation procedure shall not interfere with the display in use.

(b) Inland ECDIS shall allow to display updates, so that the boatmaster may review their contents and ascertain that they have been included in the SENC.

(c) Inland ECDIS shall be capable of revoking automatically applied updates of the Inland ENC data.

- (d) Original Inland ENC editions and later updates shall never be merged.
- (e) The Inland ENC and all updates to it shall be displayed without any degradation of their information content.
- (f) The Inland ENC data and updates to it shall be clearly distinguishable from other information.
- (g) Inland ECDIS shall ensure that the Inland ENC and all updates to it have been correctly loaded into the SENC.
- (h) Inland ECDIS shall keep a record of updates, including the time of application to the SENC.
- (i) The contents of the SENC to be used shall be adequate and up to date for the intended voyage.

4 Presentation of Information

4.1 Display Requirements

- (a) The display method shall ensure that the displayed information is clearly visible to more than one observer in the typical conditions of light experienced in the wheelhouse of a vessel by day and night.
- (b) The display size of the chart presentation shall be at least 270 mm by 270 mm for equipment designed and admitted for the Navigation Mode. In Information Mode ergonomic aspects shall determine the size.
- (c) The display requirements shall be met whether in landscape or in portrait format.

4.2 Display Ranges (Scales)

- (a) In Information Mode (ref. to Ch. 5.1), it is recommended to use the same ranges as specified in the Navigation Mode.
- (b) In Navigation Mode (ref. to Ch. 5.2), only the successive switchable ranges (scales) specified in Section 4, ch.4.7 of this Standard are allowed.

4.3 Image Positioning and Orientation

- (a) In Information Mode all kinds of chart orientation are allowed (see Ch. 5.1).
- (b) In Navigation Mode the chart shall be automatically positioned and oriented in the relative motion, head-up orientation with the own ship's position in the screen centre or off-centred (see Ch. 5.2).

4.4 Display of SENC Information

(a) The display of SENC information shall be divided into the following three display categories:

- Display Base
- Standard Display
- All Information Display

The membership of the object classes in the display categories is given in detail in the Look-up Tables of IHO S-52, Appendix 2, Annex A (Presentation Library) and in Section 3, Appendix A (Presentation Library) of this Standard.

(b) The Display Base category has to contain at least the following objects:

- river bank (at mean water level)
- shoreline construction (groyne, longitudinal control dam)
- contours of locks and dams
- boundaries of the fairway (if defined)
- isolated dangers in the fairway under water
- isolated dangers in the fairway above water level, such as bridges, overhead wires, etc.
- buoys, lights and beacons

(c) The Standard Display category has to contain at least the following objects:

- the objects of Display Base category
- prohibited and restricted areas
- piers for commercial vessels (cargo and passenger)
- kilometre and hectometre marks on the banks

(d) The All Information Display category has to display all objects that are contained in the Inland SENC, individually on demand.

(e) When invoking the Inland ECDIS, it shall come up with the Standard Information Density at an appropriate range available in the SENC for the displayed area

(f) Inland ECDIS shall be switchable to the Standard Information Density at any time by a single operator action.

(g) Inland ECDIS shall clearly indicate the information density presently in use at all times.

(h) Time variable depth information in the ENC has to be displayed independent of the above named three display categories.

4.5 Display of Radar Information

- (a) In Navigation Mode the radar image shall have the highest display priority and it is only allowed to be presented in the relative motion, head-up mode.
- (b) The overlaid SENC shall match in position, range and orientation. The radar image and the position from the position sensor shall both be adjustable for the antenna offset to the conning position.
- (c) The overlaid radar image has to conform with the minimum requirements as specified in Section 4, ch. 4.14 of this Standard.
- (d) The overlaid radar-image may contain additional navigational information.

4.6 Display of Other Navigational Information

- (a) Inland ECDIS and additional navigational information shall use a common reference system.
- (b) It shall be possible to display the own ship's position on the screen.
- (c) It shall be possible for the boatmaster to select safety limits.
- (d) Inland ECDIS shall emphasize the falling short of the safety limits.

4.7 Colours and Symbols

- (a) The display of colours and symbols to represent SENC information shall comply with the regulations of Section 3 of this Standard.
- (b) To present navigational elements and parameters as listed in the IMO-Resolution A.817(19), Appendix 3 other colours and symbols than those mentioned in 4.7.a must be used.

4.8 Data and Display Accuracy

- (a) The accuracy of the calculated data that are presented shall be independent of the display characteristics and shall be consistent with the SENC accuracy.
- (b) The Inland ECDIS shall provide an indication whether the display uses a smaller display range than the accuracy of the Inland ENC data offers (over-scale indication).
- (c) The accuracy of all calculations performed by Inland ECDIS shall be independent of the characteristics of the output device and shall be consistent with the SENC accuracy.

(d) Bearings and distances drawn on the display or those measured between features already drawn on the display shall have an accuracy no less than that afforded by the resolution of the display.

5 Operation

5.1 Information Mode

(a) Information Mode is intended to use for information only and not for navigation.

(b) In Information Mode all kinds of chart orientation, rotation, zooming and panning are allowed. However, it is recommended to use the same fixed ranges as in the Navigation Mode and the chart orientation whether

- to north, or
- to the fairway axis at the actual position, or
- to the actual ship's heading.

(c) It should be possible to scroll the chart manually on the screen with the fairway axis in line with the vertical screen axis.

(d) Inland ECDIS may be connected to a positioning sensor to scroll the chart picture automatically and to display the section of chart matching the actual surrounding, namely in the operator selected range and with the own ship's position to the centre of the screen. The centre line of a river, channel or buoyed route will be assumed as to be decisive for the orientation of the chart.

(e) The own ship's position should be marked with an appropriate generic symbol.

5.2 Navigation Mode

(a) In Navigation Mode, the Inland ECDIS display shall be integrated with the own ship's radar information. The radar information shall be clearly distinguishable from the SENC information.

(b) The integrated display must be in accordance with the requirements for radar on inland waterways as specified in Section 4, ch. 4.14 of this Standard.

(c) The chart and the radar image must match in size, position and orientation within the limits as specified in Section 4, ch. 3.4 and 8.3.2 of this Standard.

(d) The Integrated Display shall only be presented in the head-up orientation. Other orientations are not permitted.

(e) It shall be possible for the operator to adjust the displayed position of the vessel so that the radar image matches the SENC display.

- (f) It shall be possible to remove either the ECDIS or the radar information by a single operator action temporarily.
- (g) The vessel's position shall be derived from a continuous positioning system of which the accuracy is consistent with the requirements of safe navigation.
- (h) Navigation Mode must provide an indication when the input from the position-fixing system is lost. Navigation Mode shall also repeat, but only as an indication, any alarm or indication passed to it from a position fixing system.
- (i) The positioning system and the SENC shall be based on the same geodetic datum.

5.3 Operation and Control Elements

- (a) Inland ECDIS shall be designed following ergonomic principles for user-friendly operation.
- (b) The Inland ECDIS equipment shall have a minimum of operation and control elements (see Section 4).
- (c) Operation and control elements, and indicators for connected sensors may be integrated in Inland ECDIS.
- (d) Standard settings and user-defined settings shall be retrievable easily.

6 Connections with other Equipment

- (a) Inland ECDIS shall not affect the performance of any connected equipment adversely. Nor the connection of optional equipment shall degrade the performance of Inland ECDIS.
- (b) Inland ECDIS shall be capable to generate information to other systems, e.g. for the purpose of electronic reporting.
- (c) The relevant requirements of controls and indicators to connected equipment shall be fulfilled.

7 Indications and Alarms

7.1 Built in Test Equipment (BITE)

Inland ECDIS shall be provided with means for carrying out on board tests of major functions either automatically or manually. In case of a failure, the module at fault shall be shown.

7.2 Malfunctions

Inland ECDIS shall provide a suitable alarm or indication of system malfunctions (ref. to Section 4, ch.9).

8 Fall Back Arrangements

8.1 Insufficient accuracy of the SENC-positioning

In Navigation Mode the SENC shall be automatically switched off, if the SENC positioning does not match the radar picture within the limits of Section 4, ch. 5.1 and 5.2.

8.2 Defects

(a) If the Inland ECDIS system has an evident defect, it shall provide a suitable alarm (ref. to Section 4, ch. 4.16 and 9 of this Standard).

(b) Facilities enabling a safe take-over of the Inland ECDIS functions shall be provided in order to ensure that an Inland ECDIS failure does not result in a critical situation.

9 Power Supply in Navigation Mode

(a) The Inland ECDIS shall have its own separate fused power supply.

(b) Interruptions of the power supply for a period up to 5 minutes shall not have any influence on the correct operation and shall not require restarting the equipment manually.

SECTION 2

Data Standard for Inland ECDIS

Contents

Data Standard

Appendix A Object Catalogue for Inland ECDIS
Annex A Codes for Producers and Waterways

Appendix B Product Specification for Inland ECDIS
Annex A Use of the Object Catalogue for Inland ENC

Data Standard

1 Scope

This "Data Standard for Inland ECDIS" describes the standard to be used

- for the exchange of digital hydrographic data between national inland waterway authorities and
- for its distribution to manufacturers, boatmasters and other users.

This Data Standard shall be used for the production of Inland ECDIS data. The transfer and distribution has to take place in such a way that none of the information is lost.

This Data Standard with its Appendices and Annexes is based on the "IHO Transfer Standard for Digital Hydrographic Data", Special Publication No. 57, edition 3.0 of November 1996 with all Appendices and Annexes (see table in section 0 of this Inland ECDIS Standard), short "S-57".

This Data Standard describes the necessary additions and clarifications to S-57 and the application of S-57 for the purpose of use in Inland ECDIS applications.

2 Structure

Data Standard gives general regulations and describes the connection to the IHO-document S-57.

Appendix A is the "Object Catalogue for Inland ECDIS" which provides the officially approved data scheme to be used to describe entities in the real world. Its Annex A contains the codes producing agencies and waterways.

Appendix B contains the "Product Specification for Inland ECDIS". These are additional sets of rules applicable to Inland ECDIS data. Its Annex A contains the description "Use of the Object Catalogue for Inland ENC". Here rules for the encoding of the geometry and semantic descriptions are given.

3 Definitions

Definitions of terms may be found in

- S-57, part 1, clause 5
- the "Glossary of ECDIS Related Terms" in Appendix 3 to S-52
- the "Glossary of Terms" in Section 5 of this standard.

4 Conformance of data with the standard

No additions to S-57, part 1, clause 6.

5 Maintenance

Users of the standard, for example equipment manufacturers, must address their comments to the national inland waterways authority.

This standard will be updated by means of the following three documents:

Clarifications Document

This contains improvements to the wording of the standard. These are editorial amendments, which do not result in any substantive change to the standard.

Corrections Document

This contains changes to the standard to correct factual errors and to make necessary amendments to the standard.

Extensions Document

This contains extensions, or other significant changes to the standard, which will be included in the next edition of the standard. This is a working document which is produced and made available only on demand.

6 Theoretical Data Model

The description of the theoretical data model as contained in S-57 Part 2, applies to the theoretical data model of Inland ECDIS without any changes or amendments.

7 Data Structure

The description of the data structure as contained in S-57 Part 3, applies to the data structure of Inland ECDIS without any changes or amendments.

SECTION 3

Presentation Standard for Inland ECDIS

Contents

Presentation Standard

Appendix A Presentation Library for Inland ECDIS

Presentation Standard

1. This "Presentation Standard for Inland ECDIS" describes the standard to be used for the presentation of Inland ECDIS data. The presentation has to take place in such a way that none of the information is lost.
2. This Presentation Standard is based on the document "S-52, Specification for Chart Content and Display Aspects of ECDIS" of the IHO, Edition 5.0 of December 1996, with all Appendices and Annexes (see table "Comparison of the structures of the standards for (Maritime) ECDIS and Inland ECDIS" in Section 0 of this Standard for Inland ECDIS).
3. This Presentation Standard describes the necessary additions and clarifications to S-52 and the application of S-52 for the purpose of use in Inland ECDIS applications.
4. This Presentation Standard is organized as follows:
 - this section 2 of the Inland ECDIS Standard,
 - Appendix A "Presentation Library for Inland ECDIS" with additions and clarifications to be applied to S-52, Appendix 2, Annex A.
5. Definitions of terms may be found in
 - IHO-S-57, Part 1, clause 5,
 - the "Glossary of ECDIS-Related Terms" in Appendix 3 to S-52,
 - the "Glossary for Inland ECDIS" in Section 5 of this Inland ECDIS Standard.
6. Section 2 (Data Standard), ch. 5 of this Inland ECDIS Standard shall be applied also for the maintenance of this Presentation Standard.

SECTION 4

Operational and Performance Requirements, Methods of Testing and Required Test Results

Appendices:

- A Software Quality Assurance
- B System Configurations (Figures)

1. Introduction

1.1 Scope of this document

This section 4 of the Inland ECDIS Standard specifies the minimum requirements contained in section 1 and describes the test procedures and the required results concerning the hardware, the software, the functions, the operation, the display and the interfaces to other equipment on board of ships.

1.2 Normative references

References to the following normative documents are made in this document in addition to the references in section 2, ch. 2.2 of this standard:

EN 60945 (1997)	Marine navigational equipment; General requirements – Methods of testing and required test results
IEC 1174:	ECDIS - Operational and performance requirements, methods of testing and required test results
ISO 9000 (1987)	Quality management and quality assurance standard
CCNR Decision 1989-II-33:	Standard on the minimum requirements and on the required test results for navigational radar equipment in the Rhine navigation
CCNR Decision 1989-II-34:	Standard on the minimum requirements and on the required test results for rate-of-turn indicators in the Rhine navigation
CCNR Decision 1989-II-35:	Standard on the installation and on functional tests of navigational radar equipment and of rate-of-turn indicators in the Rhine navigation
EU-Directive 1999/5/EC	Radio Equipment and Telecommunications Terminal Equipment and the Mutual Recognition of their Conformity

2 Operating modes and system configuration

2.1 Operating modes

- (a) The Inland ECDIS Standard distinguishes two operating modes: **navigation mode** and **information mode**.
- (b) Inland ECDIS equipment designed for operating in **navigation mode** has to fulfil the requirements of this standard and the standards on navigational radar equipment and rate-of-turn indicators to be proven by conformity tests.
- (c) For Inland ECDIS equipment designed for **information mode** only, the requirements of this section 4 are to be understood as recommendation.

2.2 System configurations

2.2.1 Inland ECDIS equipment, stand-alone-system without connection to radar

In this configuration only operation in **information mode** is possible (see Appendix B, Fig. 1).

2.2.2 Inland ECDIS equipment, parallel installation and connection to radar

This configuration allows the operation in **information mode** as well as in **navigation mode** (see Appendix B, Fig. 2).

2.2.3 Inland ECDIS equipment, monitor shared with connected radar equipment

In special cases, it is possible to share one display for the Inland ECDIS equipment and for the radar equipment. Prerequisite for this is a monitor with matching graphic parameters for both video signals, and a video switch, which allows a fast switchover of the video sources, and – if needed - a mechanical rotation of the display to the required orientation (see Appendix B, Fig. 3).

2.2.4 Radar equipment with integrated Inland ECDIS functionality

This is a radar installation with integrated Inland ECDIS functionality that can be operated in **information mode** as well as in **navigation mode** (see Appendix B, Fig. 4).

3 Performance requirements

3.1 Hardware performance

- (a) Inland ECDIS equipment shall be designed and manufactured to withstand typical environmental conditions prevailing on board of a vessel without any degradation in quality and reliability. Furthermore, it shall not disturb other communication and navigation equipment.

(b) In the configuration as described in paragraph 2.2.4 all components of inland ECDIS equipment, installed inside the wheelhouse, shall fulfil the requirements of the class b) “protected from weather” equipment as specified in the standard EN 60945 with the exception, that the test temperature range is limited to 0°C to +40°C (whereas the test temperature range in EN 60945 is specified from – 15°C to + 55°C) unless specified differently in this document. For the configurations described in paragraph 2.2.2 and 2.2.3 CE conformity is sufficient.

3.2 Software performance

Operation, visualization, and functionality of Inland ECDIS equipment are usually realized by software. Taking this into account, the software shall be designed, developed, implemented and tested according to the general accepted state of the art. Therefore, the manufacturer shall fulfil the software requirements described in Appendix A to this document.

3.3 Performance of operation controls

(a) The operation of the system shall be simple, appropriate and conform to common human interface standards.

(b) The number of operational controls shall be as low as possible and restricted to the required number.

(c) Wireless remote controls are not admitted.

(d) The ON/OFF-switch is to perform and to be arranged in such a way that inadvertently operation is not possible.

(e) The symbols of the operating controls need a minimum character height of 4 mm and have to be readable under all conditions that may exist in a wheelhouse.

(f) The brilliance and the illumination of the operating controls should be adjustable to the required value.

3.4 Display performance

3.4.1 Display dimensions

In **navigation mode** the minimum chart and radar display area is 270 mm x 270 mm.

3.4.2 Display orientation

(a) A rectangular display may be mounted in landscape or in portrait orientation under the prerequisite that the above mentioned minimum dimensions are fulfilled.

(b) Because of the limited space available in the typical wheelhouse of an inland vessel and the fact, that a vessel usually follows the fairway-axis, the display shall be installed preferably in the portrait orientation.

3.4.3 Display resolution

A display resolution of 5 m in the 1,200-m-range is required. This leads to a maximum pixel dimension of 2.5 m x 2.5 m, i.e. about 1,000 pixels at the short edge of the display.

3.4.4 Display colours

The system shall be able to display proven ergonomically colours combinations for day and night.

3.4.5 Display brilliance

The brilliance of the display shall be adjustable to every operational required value. This is especially valid for the lowest value during operation at night.

3.4.6 Picture renewal

- (a) The picture renewal rate shall not be shorter than that of the radar-picture (≥ 24 pictures per minute).
- (b) Between two consecutive renewals no fluctuations of brilliance may occur.
- (c) On raster scan displays, the frame repetition rate may not be lower than 60 Hz.

3.4.7 Display technology

Preferable such display systems shall be used that are insensitive to the magnetic fields that may occur in the wheelhouse of an inland vessel.

4. Operational functions

4.1 Operating mode

- (a) If the equipment is suitable to work in both operation modes it shall provide the possibility to switch between **navigation mode** and **information mode**.
- (b) The operation mode in use shall be displayed.
- (c) Suitable measures are required to prevent inadvertently switching off of the **navigation mode**.

4.2 Equipment pre-sets (store/recall)

- (a) After invoking, the Inland ECDIS equipment shall come up with a moderate brilliance pre-set which neither blinds in a dark environment nor makes the picture invisible in a bright environment.

- (b) Other parameters may come up with their values at the time before switching off or from stored settings.

4.3 Presentation of SENC information

SENC = System Electronic Navigational Chart

- (a) The radar picture shall be clearly distinguishable from the chart independent of the chosen colour table.
- (b) Only a monochrome presentation of the actual radar picture is permitted.
- (c) The presentation of chart information shall not mask or degrade important parts of the radar picture. This has to be ensured by appropriate entries into the look-up tables (ref. to section 3 of this standard, appendix A, ch. 2.1, field "radar code")
- (d) In **navigation mode**, chart and radar picture presentation shall have the same scale.
- (e) The heading line must be always visible.
- (f) Additionally, the own ship's contour and the safety contours may be inserted.

4.4 Chart orientation, positioning and shifting

- (a) In **navigation mode**, only the chart orientation "relative motion, head up" and the "centred" or "off centred" presentations, as required for the radar picture, are permitted.
- (b) In **information mode**, at least the chart orientations north and parallel to the waterway axis as well as positioning are recommended. By connection of a positioning sensor, the displayed part of the chart can automatically follow the own ship's position.

4.5 Position and bearing of the own ship

- (a) In **navigation mode**, the own ship's position shall always be visible in the display area, whether centred or off centred as specified in the CCNR radar requirements.
- (b) The heading line, which runs from the display centre to the top and which always shall be visible, shall represent the heading of the own ship.

4.6 Information density

The information density shall be at least adjustable to the three switch steps: "Minimum", "Standard" and "All Information". The latter displays all other objects in addition to the "Standard" display, individually on demand. All corresponding visible objects are defined in the "Performance Standard" and the "Presentation Standard (Presentation Library)" (Sections 1 and 3 of the Inland ECDIS Standard).

4.7 Ranges / Range rings

(a) In **navigation mode** the following fixed ranges and range rings are prescribed according to the radar regulations:

Range	Range rings
500 m	100 m
800 m	200 m
1.200 m	200 m
1.600 m	400 m
2.000 m	400 m

(b) Both, smaller as well as larger ranges with a minimum of four and a maximum of six range rings are permitted.

(c) Inland ECDIS equipment in **navigation mode**, shall have fixed range rings with the above-mentioned intervals and at least one variable range marker (VRM).

(d) Switching on/ off and dimming of fixed and variable range markers shall be independent of each other.

(e) The position of the VRM and the corresponding displayed distance shall use the same incrementation and resolution.

(f) The functions of the VRM and the electronic bearing line (EBL) may additionally be realised by a cursor and by a corresponding numerical display, showing range and bearing of the cursor position.

(g) For **information mode** the same ranges are recommended.

4.8 Picture Brilliance

(a) The brightness of the display shall be adjustable to the operationally necessary value. This applies in particular to operation in darkness.

(b) Chart and radar picture require separate brightness controls.

(c) Because of the strongly different environment brightness of bright day and dark night, another control for the basic brightness of the display shall be available additionally to the colour tables in the menu.

4.9 Picture colours

At least the colour combinations included in the IHO-S-52 Presentation Library, ch. 4 and 13 (*colour tables*) for bright day, white-back day, black-back day, dusk and night shall be supported.

4.10 Pick report

- (a) In **navigation mode**, it shall be possible to get all information concerning the objects that are displayed in the chart. By moving the cursor to the desired point in the chart and clicking it with the mouse, the addressed point shall be marked by a symbol. At the same time, a window (pick report) shall be opened with textual and/or graphical information about all objects existing at that point.
- (b) The pick report window may only be shown in the designated areas outside of the screen section that is preserved for the navigational chart.

4.11 Measuring features

- (a) Measuring features for distances and bearings are required.
- (b) Resolution and accuracy shall at least be the same as those of the display, but may not suggest better values than those of the chart data.

4.12 Input and editing of own chart entries

- (a) Inland ECDIS equipment shall allow input, storing, modifying, and deletion of additionally chart information by the boatmaster (*boatmaster's own objects*).
- (b) These own chart entries shall be distinguishable from the SENC data, and may not overlay or degrade the radar picture.

4.13 Loading and updating of SENC's

- (a) All **manual** activities concerning loading or updating of charts shall be possible only outside the **navigation mode**.
- (b) **Automatic** updating shall not downgrade the performance of the navigation display.
- (c) A **roll-back** function has to be implemented to allow restoring to the last working combination.

4.14 Radar picture presentation and overlay

- (a) The radar image representation is mandatory for the operation in the **navigation mode**.
- (b) The dimensions, resolution and attributes of the radar presentation shall fulfil the relevant radar requirements.
- (c) The radar picture must not be degraded by other contents of the picture (see .4.3.c)
- (d) Provided the functional requirements are fulfilled, overlaying of different picture layers is permitted.

- (e) It shall be possible to switch off the chart and to display only the radar picture.
- (f) If the quality and plausibility monitors of the Inland ECDIS equipment detect that the chart cannot be oriented and/or positioned with the accuracy required by this document, an alarm shall be presented on the display and the chart shall be switched off automatically.

4.15 Functions with immediate access

- (a) The following operational functions require direct access:

RANGE
BRILLIANCE
COLOURS
INFORMATION DENSITY

- (b) These functions need either own control elements or own menu areas, which are arranged in the highest menu level and are permanently visible

4.16 Permanent visible function parameters

The following function parameter shall be always visible:

- actual RANGE
- sensor STATUS
- selected WATERLEVEL (if available)
- selected SAFETY DEPTH (if available)
- selected INFORMATION DENSITY

5 Service functions

Service functions have to be protected by password or other suitable measures against unauthorized access and shall not be selectable in **navigation mode**.

5.1 Static correction of the chart position

- (a) The position of the own ship shall be presented centred or off centred on the display in accordance to the radar requirements.
- (b) The chart position shall match the radar image. Assuming an absolute position's input the permissible static difference between actual radar position and displayed radar centre shall not exceed 1 m.
- (c) It shall be possible to correct an offset error (distance between the positions of the position sensor and the radar sensor).

5.2 Static correction of the chart orientation

- (a) The difference between the heading line orientation and the ships axis shall not be greater than ± 1.0 deg.

- (b) Chart and radar image shall have the same orientation. The static directional error between heading line and chart orientation shall be less than ± 0.5 deg.

5.3 Configuration of interfaces

- (a) It shall be possible to configure interfaces for connected sensors, actors and signals (*An actor transforms an electrical quantity into another physical quantity (e.g. optical). An actor is the opposite of a sensor*).
- (b) Interfaces shall comply with existing interface specifications like the NMEA 01/83 standard and the interface specifications for rate of turn indicators (20 mV/deg/min).

6 Hardware test and required certificates

- (a) The test consists of a comparison between the equipment under test (EUT) and the requirements of this document.
- (b) Proved equivalent tests, and proved and documented test results will be accepted without renewed tests.

6.1 Compatibility with the environmental requirements

- (a) Inland ECDIS equipment, as described in paragraph 2.2.4, shall fulfil the requirements of the Standard EN 60 945 concerning the environmental conditions (humidity, vibration and temperature (the latter reduced according to chapter 3.1 of this document)) and concerning the electromagnetic compatibility.
- (b) The provider or his representative is obliged to submit a relevant conformity declaration of an accredited laboratory.

6.2 Equipment documentation

The technical documentation will be checked to be complete, appropriate, and understandable, and to be sufficient for an unproblematic installation, configuration and operation of the equipment.

6.3 Interfaces

- (a) All interfaces shall be documented correctly and completely.
- (b) Electronic Circuits need to be designed failsafe, mechanically as well as electronically, and may not have degrading repercussions to connected equipment.

6.4 Characteristic of operation controls

All operation controls will be checked regarding the ergonomic and functional mode of operation and shall fulfil the requirements of this document.

6.5 Characteristics of the display

The display shall fulfil all requirements of this document concerning dimension, displayable colours, resolution, and variation of brilliance.

7 Test of the chart presentation, operation and functionality

7.1 Preparation of the Equipment Under Test (EUT)

The EUT will be installed, assembled and connected according to the installation manual. After switching on the test SENC will be loaded.

7.2 Test of the operation modes

All operating modes as described in the operating manual will be successively invoked and tested. The requirements of chapter 4 shall be fulfilled.

7.3 Test of the displayed objects

It will be tested whether all objects included in the test-SENC are visible and correctly displayed. For this test, the information density will be switched to “all objects”.

7.4 Test of the scale dependent information density (SCAMIN)

(a) It will be tested if the SCAMIN-functionality (*the minimum scale at which the object may be used for ECDIS presentation*) is installed correctly.

(b) For this test, the range will be used at which the object shall be visible according to its SCAMIN attribute value (ref. to the IHO-S-57 Attribute Catalogue and the IHO-S-52 Users Manual to the Presentation Library, ch. 8.4).

7.5 Test of the brilliance variation

The Inland ECDIS equipment will be operated in a dark room and the brilliance will be brought to its lowest level. The brilliance of the objects shall not exceed a value of 15 cd/m^2 , and the background a value of 0.5 cd/m^2 .

7.6 Test of the colours

All user selectable S-52 colours tables will be sequentially tested to be conform to this document.

7.7 Test of the measurement functions

- (a) All numeric displayed values of the electronic bearing line (EBL) and the variable range marker (VRM) shall exactly match with the analogue positions of the EBL and the VRM (or correspond with the cursor co-ordinates).
- (b) The resolution and incrementation of the numerical display shall be identical with the analogue values of EBL and VRM.

7.8 Test of the chart update function

Before and after every test step the version numbers of the loaded SENC's and updates will be recalled as described in the operation manual and showed on the display.

- Step 1: Loading of the test SENC,
- Step 2: Update of the test SENC,
- Step 3: Test of the roll-back function,
- Step 4: Loading of a new SENC.

After an update it should be possible to recall and display all concerning objects.

8 Test of the radar-picture presentation and-operation

8.1 Preparations

- (a) For the test purposes, the manufacturer or provider has to provide a serial interface at the system to be approved (*Equipment under test* - EUT) which delivers the same actual values (as NMEA 01/83-strings) of position and heading that are used to position and orient the chart.
- (b) During the test, a reference system will be used of which position and heading values are compared with those of the EUT.
- (c) The EUT will be connected to any type approved radar equipment (to the choice of the provider).
- (d) The radar picture will be adjusted in range and bearing with reference to the heading line.

8.2 Test of the radar picture without underlaid chart

- (a) If the Inland ECDIS equipment displays the radar picture but the radar operation control remains at the radar equipment (App. B, figures 2 and 3), the radar picture of the inland ECDIS equipment will be considered as "daughter display" of a radar equipment. In that case, the radar picture has to fulfil the display and picture relevant requirements of the requirements for radar and rate-of-turn indicators.
- (b) If the EUT is a radar installation with integrated Inland ECDIS functionality (Appendix, figure 4), all requirements of the standards for radar equipment and rate-of-turn indicators have to be fulfilled.

8.3 Test of the radar picture and the underlaid chart

The Inland ECDIS equipment will be installed in a reference environment. This can be real (on a ship) or simulated.

8.3.1 Test of the picture overlay

The radar image shall not be degraded by the chart picture (ref. to ch, 4.3.c). The chart picture shall be renewed not later than the radar picture.

8.3.2 Test of the chart positioning and orientation

- (a) The static offset of the chart position shall be less than ± 5 m in all ranges up to 2,000 m.
- (b) The static azimuth orientation offset error between radar and chart image shall be less than ± 0.5 deg.
- (c) The correction of these parameters shall be demonstrated in the service mode.
- (d) The dynamic deviation of the chart orientation at rates of turn less than ± 60 deg./min shall be less than ± 3 deg.
- (e) These tests will be performed visually or by evaluation of measured data.

8.3.3 Test of the scale conformity

The chart's information will be compared with well-known reference points contained in the radar picture in order to test whether the chart scale sufficiently conforms to the radar scale.

9 Test of alarms and indications

- (a) The alarms generated from Inland ECDIS equipment itself as well as the passed alarms delivered by the connected sensors to the ECDIS will be tested.
- (b) The test procedure comprises the following situations:
 - any error in the Inland ECDIS equipment (built-in test equipment - BITE),
 - missing positioning signal,
 - missing radar signal,
 - missing rate of turn signal,
 - missing heading signal,
 - radar map matching not possible,

10 Test of fall back arrangements

- (a) This test shall demonstrate the reaction of the Inland ECDIS equipment to a failure of any internal or external component and the possible and required actions by the operator.
- (b) In addition, the operating manual will be checked if the measures required by the operator are described adequate and appropriate.

SECTION 5

Glossary of Terms

Sources

- 1 IMO A.817(19)
- 2 IHO S-52
IHO S-52, Appendix 3, Glossary
- 3 IHO S-57
- 4 Inland ECDIS Standard, Draft, Revision 3.0
 - 4.1 Section 1: Performance
 - 4.2 Section 2: Data
 - 4.2.1 Object Catalogue
 - 4.3 Section 3: Presentation
 - 4.4 Section 4: Operational Requirements and Tests
- 5 CCNR Radar Regulations

Remark:

Definitions to the object classes and attributes are given on the tables of IHO S-57, Appendix A, Object Catalogue and on the Object Catalogue for Inland ECDIS (Section 2, Appendix A of this Standard)

Term or Abbreviation	Definition	Source
	English	
Acronym	6-character-code of the object class/of the attribute	4.2.1
All other information	A term used in the Performance Standard for ECDIS to describe information not belonging to the standard display. Also sometimes called "on-demand" information	2.1
Attribute	A defined characteristic of an entity (e.g. the category of a light, the sector limits, the light characteristics etc.)	2.1
Attribute copied	S-57 attributes (with their complete list of attribute values) which were extended according to the requirements of Inland ECDIS. All new attributes have the same name like their source, but written in small case letters.	4.2
Attribute value	A specific quality or quantity assigned to an attribute (e.g. "leading light", the limiting angles, the code specifying the light's colour - see attribute).	2.1
Cartographic object	Graphical object needed to satisfy certain presentation requirements mostly associated with a real world object. The attributes of a cartographic object (if any) provide additional drawing instructions. Examples: anchorage symbol associated with an anchorage area; textual annotations.	2.1
CIE colour calibration	Procedure to confirm that the colour specified in IHO S-52 appendix 2 is correctly reproduced on the ECDIS display.	IEE 1174
Cell (chart cell)	Predefined, scale dependant geographic area.	2.1

Term or Abbreviation	Definition	Source
Collection object	Type of feature object containing information about the relationships between other objects	4.2.1
Compilation scale	The scale with which the chart information meets the IHO requirements for chart accuracy. It is established by the producing Hydrographic office and encoded in the ENC.	IEE 1174
Datum	A set of parameters specifying the reference surface or the reference coordinate system used for geodetic control in the calculation of coordinates of points on the earth. Commonly datums are defined as horizontal and vertical datums separately. For the practical use of the datum it is necessary to have one or more well monumented points with coordinates given in that datum.	2.1
Datum, horizontal	A set of parameters specifying the reference for horizontal geodetic control, commonly the dimensions and the location of a reference ellipsoid.	2.1
Datum, vertical	A surface to which elevations and/or depths (soundings and tide heights) are referred. For elevations commonly a level (equipotential) surface, approximately the mean sea level is used, for depths in many cases low water.	2.1
Differential GPS (DGPS)	A form of GPS in which the reliability and accuracy are enhanced by broadcasting a time-varying correction message from a GPS monitoring receiver (differential mode) at a known position on shore. The corrections are fed automatically into the GPS receiver onboard and used to compute an improved position.	2.1
Display base	Minimum information density; means the minimum amount of SENC information that is presented and which cannot be reduced by the operator, consisting of information that is required at all times in all geographic areas and under all circumstances.	1
Display scale	The ratio between a distance on the display and a distance on the ground, normalized and expressed as a ratio, e.g. 1:10 000.	IE 1174

Term or Abbreviation	Definition	Source
EBL	Electronic Bearing Line	5
ECDIS	Electronic Chart Display and Information System; A navigation information system which 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 if required display additional navigation-related information. The performance requirements for ECDIS are defined in the Draft Performance Standard for ECDIS developed by IMO/IHO HGE.	1
Edge	A one-dimensional spatial object, located by two or more coordinate pairs (or two connected nodes) and optional interpolation parameters.	1
ENC	Electronic Navigational Chart; The database, standardized as to content, structure and format, issued for use with ECDIS on the authority of government authorized hydrographic offices. 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 (eg sailing directions) which may be considered necessary for safe navigation.	1
ENC cell	The geographic division of ENC data for distributing purposes.	IE 1174
Electronic chart	Very broad term to describe the data, the software, and the electronic system, capable of displaying chart information. An electronic chart may or may not be equivalent to the paper chart required by SOLAS.	2.1
Exchange Format	A specification for the structure and organization of data to facilitate exchange between computer systems.	2.1
Exchange set	Set of files representing a complete, single purpose (i.e. product specific) data transfer. For example, the ENC product specification defines an exchange set which contains one catalogue file and at least one data set file.	1

Term or Abbreviation	Definition	Source
Face	A two dimensional spatial object. A face is a continuous area defined by a loop of one or more edges which bound it.	1
Feature Object	An object which contains the non-locational information about real world entities. Feature Objects are defined in Appendix A, IHO Object Catalogue.	3
File	An identified set of S-57 records collected together for a specific purpose. The file content and structure must be defined by a product specification.	1
Geometric primitive	One of three basic geometric units of representation: point, line and area.	1
Geo Object	Type of feature objects containing the descriptive characteristics of a real world entity.	4.2.1
Heading	The direction in which the longitudinal axis of a craft is pointed, usually expressed in degrees from north (true, magnetic or compass).	2.1
Head-up display	The information shown on the display (radar or ECDIS) is directed so that the vessel's heading is always pointing upward. This orientation corresponds to the visual view from the bridge in direction of the ship's heading. This orientation may require frequent rotations of the display contents. Changing the ship's course, or yawing of the vessel may render this unstabilized orientation mode unreadable.	2.1
HO-Information	Information content of the SENC originated by hydrographic offices. It consists of the ENC content and updates to it.	2.1
IEC	International Electrotechnical Commission: An international organization which produces world standards for electrical and electronical engineering with the objective of facilitating international trade.	2.1

Term or Abbreviation	Definition	Source
IHO	International Hydrographic Organization: Coordinates the activities of national hydrographic offices; promotes standards and provides advice to developing countries in the fields of hydrographic surveying and production of nautical charts and publications.	2.1
(IHO-) S-52	Specifications for chart content and display aspects of ECDIS	2
(IHO-) S-52 App. 1	Guidance on updating the Electronic Navigational Chart of the IHO	2
(IHO-) S-52 App. 2	Colours & symbols specifications for ECDIS	2
(IHO-) S-57	IHO Transfer standard for digital hydrographic data	3
(IHO-) S-57 App. A	IHO Object Catalogue	3
(IHO-) S-57 App. B	Product Specifications	3
IMO	International Maritime Organization: Formerly called IMCO, the IMO is the specialized agency of the United Nations responsible for maritime safety and efficiency of navigation.	2.1
Information Mode	means the use of the Inland ECDIS for information purposes only.	4.1
Inland ECDIS	An Electronic Chart Display and Information System for inland navigation, displaying selected information from a Inland System Electronic Navigational Chart (Inland SENC) and optionally, information from other navigation sensors .	4.1

Term or Abbreviation	Definition	Source
Inland ENC	Inland E lectronic Navigational Chart; The database, standardized as to content, structure and format, issued for use with Inland ECDIS. The Inland ENC complies to the IHO standards S-57 and S-52, enhanced by the additions and clarifications of this standard for Inland ECDIS. The Inland ENC contains all essential chart information and may also contain supplementary information that may be considered as helpful for navigation.	4.1
Inland SENC	Inland S ystem E lectronic Navigational Chart; A database resulting from the transformation of the Inland ENC by Inland ECDIS for appropriate use, updates to the Inland ENC by appropriate means and other data added by the mariner. It is this database that is actually accessed by the Inland ECDIS for the display generation and other navigational functions. The Inland SENC may also contain information from other sources.	4.1
INT 1	Description entry for object classes and attributes; reference to the legend of paper charts	4.2.1
Integrated display	means a head-up, relative-motion picture consisting of the Inland SENC overlaid with the radar-image with matching scale, offset and orientation.	4.1
M-4	Description entry for object classes and attributes; reference to the IHO-Publication M-4 (Chart Specifications of the IHO)	2
Look-up table	Übersichtstafel, Nachschlagetafel	
Meta object	Type of feature objects; additional area related information, e.g. survey source	4
Navigation Mode	means the use of the Inland ECDIS for conning the vessel.	7
Object	A digital representation of all or a part of an entity by its characteristics (attributes), its geometry, and (optionally) its relationships to other features (e.g., the digital description of a light sector specifying, amongst others, sector limits, the colour of the light, the visibility range, etc., and a link to a light tower, if any).	2

Term or Abbreviation	Definition	Source
Object catalogue	The comprehensive list of currently identified object classes (including cartographic objects and composite objects), their appropriate attributes and the full range of allowable attribute values. It can be compared to the Chart 1 (INT 1) as the legend of the paper chart, a collection of allowed hydrographic object classes.	2 + 4
Object class	A defined group of entities to be considered equivalent to each other, e.g. the light-vessels.	2
Object class copied	S-57 object classes (with their complete set of attributes) which were extended according to the requirements of Inland ECDIS. All new object classes have the same name like their source, but are written in small case letters.	4
Other navigational information	Navigational Information not contained in the SENC, that may be displayed by an ECDIS, such a radar information.	2
Overscale	Displaying data at a larger scale than it was compiled for.	2
Own-ship	The term which identifies the vessel upon which an ECDIS is operating.	2
Own ship`s safety contour	The contour related to the own ship selected by the ship's master out of the contours provided for in the SENC, to be used by ECDIS to distinguish on the display between the safe and the unsafe water, and for generating anti-grounding alarms.	2
Performance standard	Standard developed under the authority of IMO to describe the minimum performance requirements for navigational devices and other fittings required by the SOLAS Convention.	2
Pick report (Object report)	Short information; A window in which additional information regarding the clicked-on objects of the ENC is shown.	2

Term or Abbreviation	Definition	Source
Presentation library	A set of mostly digital specifications, composed of symbol libraries, colour schemes, look-up tables and rules, linking every object class and attribute of the SENC to the appropriate presentation of the ECDIS display. Published by IHO as Appendix 2 of its Special Publication 52 (S-52).	2
Product specification	A defined subset of the entire specification combined with rules, tailored to the intended usage of the transfer data.	1
Range	sequential switchable distance of a radar.	5
Reference INT 1	The reference to the legend of the paper chart at the classification of the object class/of the attribute	3
Reference M-4	The reference to the legend of the IHO-Publication M-4(Chart Specifications of the IHO) at the classification of the object class/of the attribute	3
Relative motion display	A relative motion display shows the chart information, and radar targets, moving relative to the vessel position fixed on the screen.	2
Route monitoring	The operational navigational ECDIS function in which the chart information is displayed, under control of the positioning sensor input, according to the vessel's present position (either in true motion or relative motion mode).	1
Route planning	An ECDIS function in which the area is displayed which is needed to study the intended route, to select the intended track, and to mark the track, its way points and navigational notes.	1
SCAMIN	The minimum scale at which the object may be used e.g. for ECDIS presentation.	

Term or Abbreviation	Definition	Source
SENC	System Electronic Navigational Chart; A database resulting from the transformation of the ENC by ECDIS for appropriate use, updates to the ENC by appropriate means and other data added by the mariner. It is this database that is actually accessed by the ECDIS for the display generation and other navigational functions. The SENC may also contain information from other sources.	4.1
Spatial object	An object which contains locational information about real world entities.	1
Set_Attribute A:	A subset; the individual characteristics of the object	4.2.1
Set_Attribute B:	A subset; the information of the use of an object	4.2.1
Set_Attribute C:	A subset; the information about the administration on the origin of data	4.2.1
Standard display	Standard Information Density means the default amount of SENC information that shall be visible when a chart is first displayed on ECDIS first.	1
SOLAS	International Convention for the Safety of Life at Sea developed by IMO. The contracting governments undertake to promulgate all laws, decrees, orders and regulations and to take all other steps which may be necessary to give the present convention full and complete effect, so as to ensure that, from the point of view of safety of life, a ship is fit for the service for which it is intended (Article Ib of SOLAS).	2.1
User-defined settings	means the possibility to use and store a profile of display and operation controls-settings.	4.1
Vector	Spatial information whose data model is based on graph theory.	1

Term or Abbreviation	Definition	Source
VRM	Variable R ange M arker	5
WGS 84	WORLD GEODETIC SYSTEM :A global geodetic reference system developed by the USA for satellite position fixing and recommended by IHO for hydrographic and cartographic use.	2.1